Reducing, rather than eliminating minimum requirements, however, may prove to be a more politically saleable method for lowering parking supply. It may also be a wise move on the part of planning agencies to rethink their parking management strategies in terms of reducing minimums, applying maximums or taking other actions rather than simply abdicate responsibility to the developer community.

In addition to lowering existing zoning requirements, planning and development agencies may create transit zoning overlays or lower requirements on a case-by-case basis for uses or combinations of uses that generate lower parking demand.

Transit Zoning Overlays are special zones that supersede the use, density, design and parking requirements of a neighborhood's previously existing regulations. Planners use this tool in areas served by regular, reliable transit, such as bus rapid transit or light rail, subway, or other service under the notion that neighborhoods well served by transit demand an urban form different from those more reliant on private automobile (i.e., they require less parking supply). For instance, Montgomery County, Maryland, which lies outside Washington, D.C., reduces parking minimums for sites near Washington Metro stations by 20 percent, while Milwaukee, Wisconsin, allows up to a 15 percent reduction in minimum parking requirements in its transit overlay zones, which pertain to half of the city's area.[48]

Some cities grant minimum parking reductions to affordable and senior housing developments, whose residents tend to have lower rates of car ownership. Los Angeles, for example, reduces its space per unit requirement by 0.5 spaces for deed-restricted affordable housing. Seattle, Washington, permits fewer required parking spaces for affordable and senior housing as well as for multifamily developments that reserve spaces for car sharing.[49]

Shared parking

The most efficient way to use off-street parking is to share it. The driving rationale behind shared parking facilities is that different uses attract visitors at different times throughout the day; thus, spaces that are built to meet a maximum demand at the peak for one use would sit empty at other times of the day. Naturally commercial for-profit parking is shared and parking for a multi-use mall is frequently shared but accessory parking—that which is required to be provided as an accessory to the primary use—is usually single use. Under typical zoning rules a hardware store and the restaurant next door must each provide the amount of parking prescribed for their use even though one business is used almost exclusively in the daytime and the other in the evening. Shared parking allows the same spaces to be used by both businesses.

Shared parking encourages the centralization, consolidation and reduction of a neighborhood's parking facilities, thus improving urban design and allowing more productive land uses. Developers, tenants and building owners benefit

from reduced construction expenses and from creating "captive markets," such as residents of a condominium that shares a parking facility with a gym.

Several cities such as Portland, Oregon, Cambridge, Massachusetts, Boulder, Colorado, and counties like Arlington County, Virginia and Montgomery County, Maryland, have successfully implemented shared parking in their codes. Security, liability and operational obstacles, and the need to overcome perceived customer preferences may pose challenges for potential facility operators.[50] One method is to calculate the demand for each use sharing the parking facility by time period, such as weekday vs. weekends, and mornings vs. evenings, then add the demands for each use to determine the total demand by time period. The highest number of parking spaces demanded among the different time periods would serve as the shared parking minimum requirement. Montgomery County conducts this analysis for shared parking proposals, provided all uses sharing the facility are within 500 feet of it. Alternatively, some cities allow the building owners / developers to propose the number of spaces for a shared parking facility, based on their own analysis.[51]

Commercial and municipal parking can be priced in a way that accessory parking cannot. When parking is required developers and property owners have an incentive to bundle the cost of accessory parking into their leases and sales. Thus, downtown businesses with accessory parking typically provide free parking for customers. Private operators seek to maximize profit, whereas government-owned parking seeks high, but paying, occupancy.

In-lieu parking fees

Several U.S. cities allow developers to reduce minimum parking requirements in exchange for a fee paid to the city to fund construction of shared public parking facilities.

These "in-lieu parking fees" offers key benefits. First, they allow developers the flexibility to choose whether or not to build what can be an expensive amenity, particularly in urban infill locations. The subsequent reduction in construction costs makes affordable housing or historic preservation, for example, more financially viable. Second, by reducing and consolidating scattered off-street parking spaces, a city has the opportunity to significantly improve a district's urban design.

Most cities set uniform fees rather than decide on a case-by-case basis, which can be time-consuming and expensive, as well as creating uncertainty for a developer or owner. To avoid subjecting building developers to a lengthy and unpredictable variance process, cities should clearly delineate the terms of reductions in the zoning code.[52]

Cities have collected the fees either up front or as a surcharge added to property tax bills. A 2002 survey of 15 cities' in-lieu payment programs found that fees averaged $16,146 per space, from as little as $2,500 in Concord, California to $50,994 in Palo Alto, California, which was that city's cost of constructing a parking space in a public structure.[53]

Lower demand for parking

Thus far, this study has reviewed techniques cities used successfully to lower the number of parking spaces in their communities. Numerous states and cities have also pursued policies that reduce the demand for parking, thereby removing the private sector's incentive to construct more parking. The following pages highlight some of the more common strategies for lowering parking demand.

Cash-Out programs

Work trips account for 33 percent of all vehicle miles traveled in the U.S.[54] Employers often provide free parking as a benefit to employees, regardless of their choice of transportation. Cash-out Programs give employees a choice to either accept the free parking or a tax-free transit subsidy (see Transit Incentives, below), or cash, which commuters who bicycle or walk to work may prefer. If employees accept cash payments smaller than cost to the employer of providing the parking space, the employer saves (see Cash Out box p. 19).

California's 1992 cash-out legislation requires firms that have more than 50 employees and lease parking to offer a cash-out option. A study of eight California firms found that the cash-out program reduced solo drivers by an average 11 percent.[55]

Transit incentives

Employers, cities, residential property managers and other institutions may contribute to reduced demand for parking spaces by offering transit incentives to employees and residents. These often take the form of a subsidized bus or rail pass. Some municipalities, such as Montgomery County, Maryland, grant reductions in minimum parking requirements to entities offering employer-paid transit incentives.[56]

Since 1993, Boulder, Colorado, has offered free bus passes to its 7,500 downtown city employees, and partially subsidized passes for downtown employers to provide for their employees. The employer provided bus passes, or Eco Passes, are partially subsidized by meter revenue. The city has found that the Central Area General Improvement District (CAGID) program reduces employee parking demand by 850 spaces, thereby freeing inventory for short-term downtown shoppers.[57]

A typical Eco Pass funded by parking revenues through CAGID in Boulder, CO
CITY OF BOULDER

Unbundling

Cities such as San Francisco (see case study p. 50) have created mandates in some neighborhoods for developers to "unbundle" accessory parking spaces from the sale of a residential unit. The logic is that by including a parking space as part of a residential unit, a seller prevents the buyer from making the choice of whether s/he needs a parking space or not. While unbundling applies more often to residential developments, some commercial building owners bundle parking spaces with office leases as well. A city may require developers and

building owners to unbundle parking spaces through site plan conditions or through zoning.[58]

Urban design best practices

Cities have used zoning codes and neighborhood plans not only to limit the number of parking spaces, but also to set design guidelines that regulate the location, appearance, and type of parking. Effectively enforced design controls can accommodate parking while preserving neighborhood character.

Whether these guidelines are mandated through zoning or neighborhood plans or just strongly encouraged often depends on the district's market conditions. For instance, the high demand for office and residential space of downtown San Francisco and Chicago allow these cities to require specific parking designs, such as underground parking, which is far more expensive than above grade parking.

However they are enforced, parking design guidelines generally regulate the type, location, or appearance of a parking facility. Possible strategies within each of these categories include:

Type

- Prohibit surface or above-grade parking. Examples include San Francisco's Rincon Hill neighborhood and downtown Portland, Oregon.
- Encourage tandem / stacked parking and valet parking.

Location

- To preserve urban fabric and promote a pedestrian oriented streetscape, prohibit parking in between buildings and the property line facing the street—so-called "strip mall" style parking. Rather, locate parking facilities behind buildings.
- Limit the location of curb cut entrances to parking facilities, which disrupt the pedestrian experience.
- Restrict the percentage of a street-facing façade dedicated to a parking use. The Portland, OR ordinance limited garage doors to 50 percent of the street-facing façade, or 12 feet for houses less than 24 feet wide.

Appearance

- Screen for parking lots and architectural treatments for parking structures
- Chicago's 1999 Landscape Ordinance represents an element of the city's strategy to mask the appearance of parking structure by both requiring and encouraging landscaping. Consistent with the city's aim to "green" its urban environment, the ordinance goals include reducing heat, air and noise pollution, and increasing property values. It requires parking facility developers to submit a landscaping plan that specifies elements such

A parking facility wrapped with street level retail at 15th and Pearl Street in Boulder, CO
CITY OF BOULDER

as hanging plants or flower boxes for half of all garage street openings. Similarly, the zoning code requires that downtown garages use design elements like glass and louvers to hide their sloping floors, and mandates masonry materials for their facades. In some cases density bonuses are awarded for additional landscaping.

An innovative approach to improving the design of parking structures is to wrap the ground floor of parking structures with more conventional uses. Also known as laminating or lining, this technique ensures that a parking garage does not deactivate pedestrian street life. San Diego, for example, requires that at least half of the street wall of the parking structure be wrapped with retail or commercial uses. Petaluma and San Francisco, California, prohibit parking within 20 feet of a building's outer envelope (exceptions are made for small properties). Wrapped parking is particularly useful for large, mixed use developments that attract a variety of different users, such as shoppers, residents, and employees. Small sites, however, present challenges to this type of strategy.

Part 4: Case Studies

San Francisco, California

Off-street

San Francisco has evolved over the last half century from a municipality that once required one parking space for every new dwelling to one of the most innovative examples of parking management in the country. This has occurred through investment in transit, gradual replacement of off-street parking minimum requirements with maximums, parking unbundling, and proactive on-street parking management. A relatively small proportion of the city's residents—about 70 percent—own a car.[59] High density development and a preponderance of buildings that pre-date off-street parking mandates has helped keep the number of autos per person low.

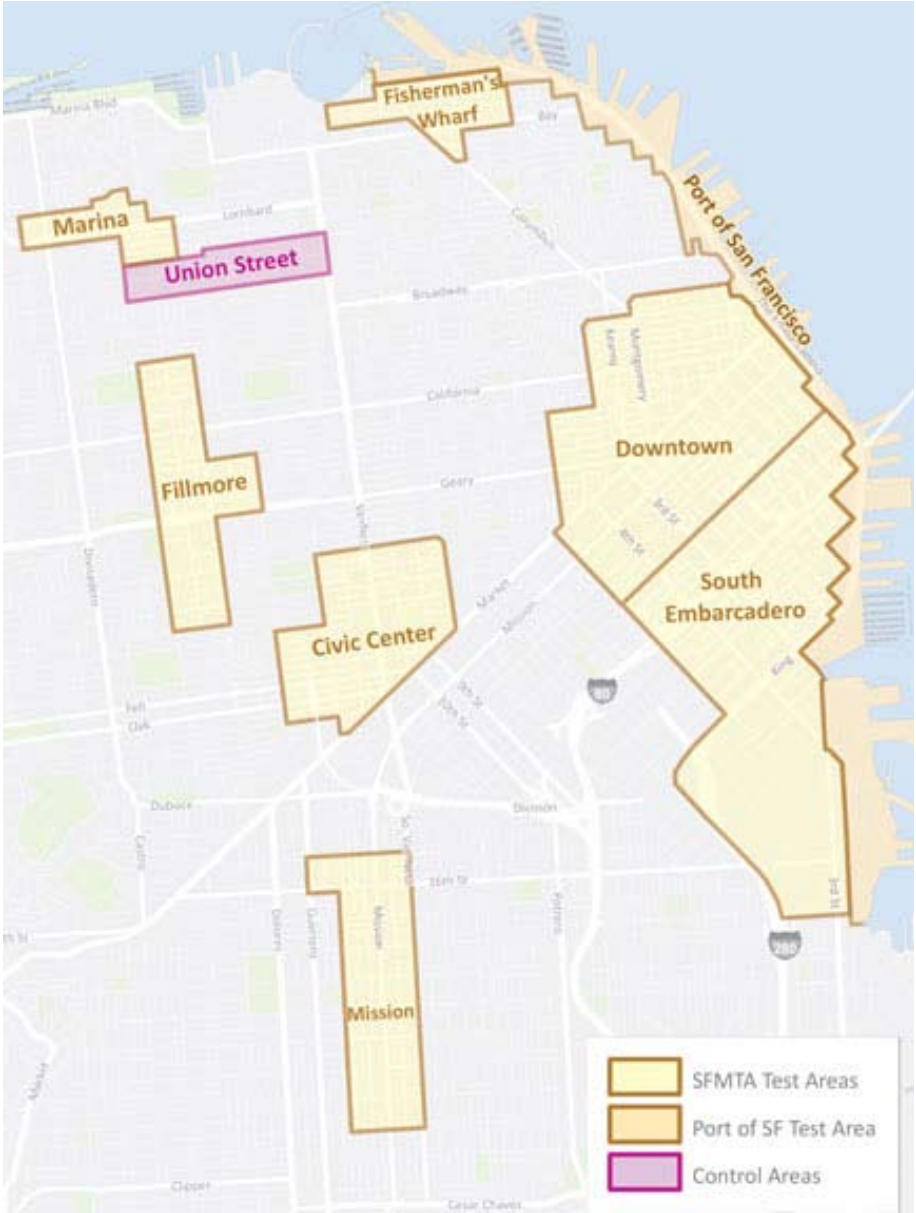
SAN FRANCISCO

Population:
808,976

Metered Spots:
25,000

SF*park* Spots:
6,000

Meter Revenue:
$30 million



COURTESY OF SFMTA, SF*PARK* PROGRAM

Due to its low residential population and high number of commuters, the city introduced many of its parking reforms downtown. Following the opening of the Bay Area Rapid Transit Authority (BART) rail line in 1973, the city authorized a cap of all downtown commuter parking spaces. Minimums do not apply to any use downtown, and a maximum of one space is permitted for every four downtown residential units. Similarly, parking may occupy no more than 7 percent of an office building's gross floor area—about one space for every 20 office workers.[60]

San Francisco has proceeded to eliminate residential minimum parking requirements through the adoption of neighborhood plans for districts close to the downtown, and first through the Mission Bay Redevelopment Plan in 1997. More recently, the 2005 Rincon Hill Plan was the first to eliminate minimum parking requirements for *all* uses in a residential neighborhood.

Recent developments subject to residential parking maximums demonstrate that the maximums are having a binding effect. Most developers build up to the maximum allowed number of spaces.[61] The city's residential parking maximums range from 0.5 to one space per unit, depending on neighborhood factors such as access to transit and density; these were often converted from the existing minimum requirements.

"To some extent (parking maximums) have been achievable because they have been part of a larger package of policy and infrastructure and other changes for neighborhoods as prerequisite for development," reports Joshua Switzky of the San Francisco Planning Department. The drawback to comprehensive neighborhood planning, however, has been its slow pace. Several of the neighborhood plans recently implemented have taken nearly 10 years to complete, due to occasional funding gaps and the state's lengthy environmental review process.

The 2005 Rincon Hill Plan also mandated that developers unbundle parking spaces from residential units and dedicate parking spaces to car share and covered bicycle parking in larger residential developments. In April 2008 the city extended these reforms to the Hayes Valley, Duboce Triangle, and North Mission neighborhoods, and made unbundled residential parking a requirement throughout San Francisco.[62]

Enforcement of parking unbundling is difficult and some developers have sought to circumvent the requirement. They legally unbundle the sale of a parking space from the residential unit but price the space well below market rate (such as for $100) to the buyer of a residential unit. The token sum leaves parking nearly free thus essentially bundled, but in compliance with the letter of the law. When parking spaces are unbundled, assessing the land they occupy has proven difficult. The city assessed unbundled parking spaces separate from the residential unit, but the spaces rather function more as easements. This is particularly the case when unbundled parking spaces are not independently accessible—that is, when parking spaces are "stacked" for greater efficiency.[63]

Although the city board of supervisors is not planning additional extensive neighborhood plans, it is considering parking reforms at the neighborhood scale, such as eliminating minimum parking requirements. The San Francisco Municipal Transportation Agency (SFMTA) is currently studying unbundling commercial parking from leases and adjusting the city's development congestion impact fees to reflect a development's proposed number of parking spaces rather than units.[64]

SFpark multi-space, solar-powered parking meter in San Francisco, CA
BRYAN GOEBEL

Curbside Parking

San Francisco's SF*park*: Circle Less Live More

A revolution in technology and practice

San Francisco's SF*park* is the largest, and by far the most sophisticated, curbside parking reform project underway in the United States. By the summer of 2010, the San Francisco Municipal Transit Agency's (SFMTA) $24.75 million federally funded project will encompass 6,000 of San Francisco's 25,000 metered curbside parking spots in seven pilot neighborhoods. The heart of SF*park* is a Data Management System which sorts a tremendous amount of data collected from the networked array of remote sensors in all 6,000 parking spots. San Francisco installed new electronic, multi-space meters in 2009 and will activate parking spot sensors attached to the pavement sometime in 2010. These wireless sensors can detect whether a spot is occupied by a vehicle and report parking occupancy information in real time to a central computer. City officials and technology vendors say the parking sensors are so sensitive they can recognize the magnetic signature of individual vehicles. The project will produce valuable data about the effect of meter pricing on occupancy.

Overall Goals

Paraphrasing the SFMTA, the city's transit provider and street manager:

> [SF*park*] "...will use pricing to help redistribute the demand for parking. The goal is to encourage drivers to park in garages and lots, and to almost always have one space available on every metered block. . . . With more availability, drivers will circle and double park less. Muni (buses) will be faster and more reliable, and greenhouse gas emissions reduced."

The SFMTA's unstated hope is that SF*park* will change public attitudes towards metering through positive examples, and by providing better information and better customer service. It is expected that SF*park* will foster public support for a curbside parking system based on broader transportation goals rather than local politics.

SF*park* Has three operational goals:

1. To provide real-time parking information.

2. "Just right" meter prices that mitigate parking demand.

3. Easy-to-pay meters and extended time limits for added convenience.

Additional goals include better ways to measure parking usage and better enforcement of parking rules. SFMTA internal surveys have shown that enforcement is erratic and poorly targeted, and as many as one third of vehicles are illegally parked at any given time. Data collected will provide real time information on turnover, length of stay, failure to pay and other illegal parking allowing the city to precisely and more effectively deploy enforcement personnel.

Changes in parking operations

- Rates are set based on occupancy targets. They may range from $0.25 to $6.00 per hour. Based on their effectiveness, rates will be reset in increments of up to $0.50 / hour every four.
- Rates will be set differently at different times of day and during special events to achieve the desired occupancy / availability objectives.
- Some meters are in effect longer than they had been. Again to ensure that occupancy and availability goals are met.
- Extended parking time limits: Probably from two to three or four hours.
- Real-time information is available via web for curbside parking; information on off-street parking is available by web, variable message signs and SMS.
- More convenient payment methods are available: credit cards, pre-paid SFMTA smartcards and cash.

San Francisco probably has the most politically favorable environment for large scale parking reform of any major U.S. city. Though car use is high, the political boundaries of the dense city encompass very few car dependent areas.

Project History and Politics

San Francisco probably has the most politically favorable environment for large scale parking reform of any major U.S. city. Though car use is high, the political boundaries of the dense city encompass very few car dependent areas. Prior to 2009, the city council / Board of Supervisors had already approved the highest curbside parking rates in the U.S. Curbside meter rates on neighborhood commercial strips were two to three times higher than New York or Chicago. Despite this, meter rates were still politically sensitive, and apparently set too low because San Francisco continues to suffer from chronic curbside parking shortages. The resulting cruising and double parking led to heightened air pollution and significant bus service delays as documented in the SFMTA's Transit Effectiveness Project.

The SFMTA, overseen by the mayor, is the only major transit agency in the U.S. to control curbside parking and to receive all parking meter and fine revenue.[65] Thus, the agency has a double financial incentive to properly manage curbside parking: it makes money from meters and fines, plus it saves money from bus operations when it reduces bus service delays caused by circling and double parked vehicles.

Before San Francisco shifted to digital meters over the last decade, it was losing $1.5 to $2.0 million a year to theft. As recently as 2007, the city was only collecting 22 percent of the maximum potential meter revenue it could, compared to 38 percent in San Diego and over 50 percent in Boston.[66]

San Francisco Hourly Parking Rates

Area	Pre-SF*park*	SF*park* (Max-Minimum)
Downtown/Commercial	3.50	0.25 to 6.00
Near Downtown	3	0.25 to 6.00
Neighborhood retail	2	0.25 to 6.00

PORTLAND

Population:

582,130

Density:

4,288 people / sq mile

Portland, Oregon

By combining a variety of innovative off-street parking policies and regulations, Portland has for decades served as a model for effective parking management. The city's investment in extensive, reliable public transit infrastructure has enabled it to wean residents and commuters off private automobiles. Since 1992, the state has mandated that all localities guide their development with transit accessibility goals. The Portland region set the goal of reducing VMT and parking spaces per capita by 10 percent over a 20–year period.[67] The outcomes include improved air quality, increased transit ridership, and improved urban form.

Portland's proactive approach began in the early 1970s, when they city's downtown air quality violated federal carbon monoxide standards one out of every three days. This led to a freeze at 45,000 parking spaces in 1972. Thanks in part to this measure and to the improved technology of automobile exhaust systems, downtown Portland has not exceeded the carbon monoxide standard since 1984. In 1997, the city lifted the freeze replacing it with a more flexible system of parking maximums and minimums to manage, rather than prevent, parking space construction.[68]

Parking minimums are not applied to developments in the city's densest commercial neighborhoods, including downtown, and neighborhood commercial districts, and central residential districts. Similarly, minimums do not apply to any sites within 500 feet of a transit line that provides service at least every 20 minutes during peak hours.[69]

A developer or owner also benefits from reduced minimums if willing to manage parking by arranging space sharing or bike parking in a facility. When the parking demands from two or more uses located near one another occur at different times, the city's zoning code allows a shared parking facility with fewer spaces than the combined, separate requirements for each use. Similarly, bicycle parking may substitute up to 25 percent of required car parking spaces. For every five bike parking spaces a developer builds, one fewer car parking space may be constructed.[70]

"Limiting the number of spaces allowed promotes efficient use of land, enhances urban form, encourages use of alternative modes of transportation,

Approximately two car parking spaces removed in Portland, Oregon can be replaced with a bike corral that holds 24 parked bicycles
COURTESY OF TRIMET

provides for better pedestrian movement, and protects air and water quality," states the city's zoning code. Thus, parking maximums complement minimums in many neighborhoods. The city conducted a study to determine parking demand under different policy scenarios. Taking account of transit capacity, they calibrated parking requirements to meet their travel demand forecasts within the context of the entire transportation system and their land use objectives. Consistent with the city and state's commitment to public transit, the maximums vary according to a site's distance from bus or light rail—closer to transit less parking is permitted. Several neighborhoods are therefore subject to low maximums.

Downtown office and retail developments, for example, are limited to one space per 1,000 square feet of floor space, and hotels may provide only one space per hotel room.[71] Given this low limit, developers almost always build up to the maximum; no waivers to build above the maximum have been granted since 1974.[72]

Because the city treats parking as a transferable entitlement, however, a developer choosing to build below the maximum—or the owner of a historic building that lacks parking—may transfer its parking development rights to another property. In this model a developer may transfer (but not sell) parking rights up to the maximum allowed to another developer as long as the transfer agreement has been completed prior to the laying of the new development's foundation. For pre-existing buildings or for new development where a transfer agreement had not been made prior to the foundation laying the existing building may transfer up to 70 percent of the original entitlement to another developer. In return, the transferring property has the right to use its parking entitlement in the facility where the rights have been transferred but they must pay the prevailing rate for

the privilege. This policy maintains city control over a district's parking supply yet allows developers the flexibility necessary to finance, build and operate new and existing developments.[73] It also helps to consolidate facilities, reducing the number of curb cuts and intrusions into the pedestrian realm.

The impact of this group of programs and policies has been significant. The city reports that transit use increased from 20 to 25 percent in the early 1970s and to 48 percent in the mid-1990s.[74]

BOULDER

Population:

91,685

Daytime Population:

140,000

1,671 people / sq mile

Metered Spots:

1,445

Revenue to:

BID / TDM

Residential Permits:

Yes

Multi-space meters:

Yes

Boulder, Colorado

Parking as the cornerstone of sustainable downtown.

Boulder, a small city 30 miles from Denver, has a compact street grid, pre-war neighborhoods, a defined, walkable downtown and an extensive bus system. Boulder also has the oldest, most sophisticated, Parking Benefit District in the U.S. The Central Area General Improvement District (CAGID). It was created as a city controlled, self-taxing district in 1970.

Downtown Boulder: better than a big box mall, not like one.

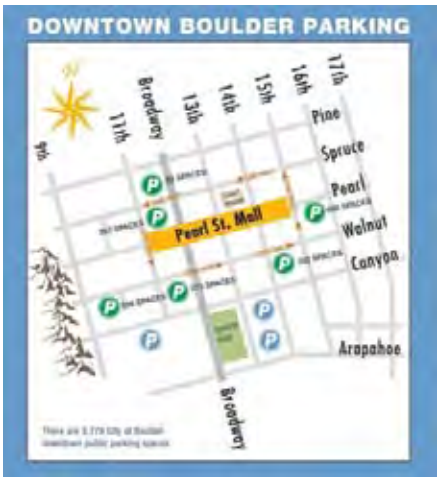
In the mid-1960s Downtown Boulder was stuck in a parking dilemma of its own creation—a problem which continues to this day in much of the country. The downtown merchants, who advocated for meters in 1946, insisted on keeping meter rates too low to affect turnover because they were afraid of losing customers to suburban shopping malls. Curbside parking was monopolized by longer-term parking commuters, many of them store employees. Potential customers, who might have paid for parking, instead had nowhere to park, and avoided downtown. Business suffered. Some merchants even proposed tearing down sections of downtown to build free parking structures. Instead a large scale collaborative planning effort called Boulder Tomorrow was launched in 1966. Boulder Tomorrow persuaded merchants that Boulder's strength was its large inventory of attractive, historic architecture, its human scale and walkable streets. The way to compete with suburban shopping malls was not to try to be like them, but to be better and different than them.

CAGID (pronounced "k-jid,") is operated by a city agency, the *Downtown and University Hill Management Division and Parking Services*. The agency, called Parking Services, has a threefold mission: improve access to downtown, manage and promote downtown public space, and promote downtown business. It does this while working to reduce single occupancy vehicle use and encouraging transit, walking and bicycling.

Parking Services is faced with a balancing act in CAGID. Compact, walkable Boulder is dwarfed by the fast growing sea of suburban sprawl that surrounds it. To promote business downtown, Parking Services / CAGID must welcome visitors from its car dependent environs, and grow downtown employment while still reducing car use. Parking Services does this well, only 36 percent of downtown commuters drive alone. The key to CAGID's success is a set of land-use

and parking strategies which result in the majority of motorists paying for parking and reduction in incentives for private businesses to build and provide free parking.

Boulder's CAGID / DMC Parking Benefit / Transportation Improvement District features these characteristics:



1. Most motorists pay for parking whether they park at the curb or off-street.
2. There are five centrally located public garages which are wrapped with active storefronts thus complementing street life.
3. Curbside and off-street parking is both priced and time limited to encourage short term use.
4. Parking revenues fund bus passes and public space refurbishment.
5. There is an extensive and effective bus system[75] in which bus passes for downtown employees are subsidized.

The net result of these policies is to make transit inexpensive, and driving just expensive enough to discourage car commuting, while still keeping curbside parking available and affordable for day-tripping shoppers and tourists. Key to this is that CAGID sets prices in public garages and at the curbside. They can charge to maximize turnover and use. To accomplish their goal they set garage prices equal to curbside prices for the first three hours; the fourth hour is not permitted at curbside incentivizing longer term parkers to use off-street parking; after four hours prices increase which encourages people who are staying long term—such as commuters—to use alternative modes. Private, for-profit garages, operate in such a manner as to maximize profit rather than use. They tend to set high prices for the first hour or two and marginally low rates after that. Their strategy takes advantage of the fact that short duration trips are less elastic than long duration trips and that labor costs of turning over parking are likely higher than managing a smaller number of long duration parkers. The profit maximizing objective is not well aligned with the public objective.

CAGID Parking Inventory, Prices and Use

Curbside	871 spots	23% spots	38 % parking	$1.25/hr	3 hour limit
Off-Street	2,209 spots	59%spots	30% users	$1.25/hr	$2.50/hr after 4 hours

CAGID's efforts were immensely successful, and have become the template for generations of other U.S. Parking Benefit Districts. Over a 25–year period CAGID has:

1. Created a bondable revenue stream from real estate taxes and parking meters.

2. Raised meter rates to create turn-over and raise revenue for bonds and operations.
3. Issued debt and received a federal grant to build a retail pedestrian mall as a town center.
4. Issued debt to build centrally located public garages, which include ground floor retail.
5. Helped promote seasonal events to attract visitors and promote business.
6. Subsidized Eco Pass bus passes for employees of all businesses downtown.

Pop jets funded by parking revenues enjoyed by kids on a sunny day in downtown Boulder
DOWNTOWN BOULDER INC.

Public garages are important to central district Travel Demand Management

In a place like Boulder, with no minimum parking requirement in its downtown and public garages providing the vast majority of off-street parking, these garages can help reduce motor vehicle use. This is counter-intuitive, since increasing the supply of parking would be expected to induce car use. But that is not the case in Boulder. In the absence of parking requirements, public garages, which charge a modest parking fee, can help deter both free accessory parking, and paid, private garages and thus effectively act to cap the parking supply. Parking structures are very expensive. If an affordable public alternative is available for

Tulip plantings and other public space improvements funded by parking revenues at the Pearl Street Mall in downtown Boulder
DOWNTOWN BOULDER INC.

commuters and shoppers, then commercial developers can save by not building parking. Since government can borrow at a cheaper rate, and government does not have to turn a profit, public garages can charge less than private garages and deter private garages from being built. Additionally, short-term parking can be priced at a low rate to encourage motorists to park off-street and thus relieve demand for curb space.

CHICAGO

Population:
2.53 million

Metered Spots:
34,500

Privatized Spots:
34,500

Meter Revenue:
$1.157 billion one time
$23 million pre-09

Fine Revenue:
$200 million (est.)

Revenue to:
General fund

Residential Permits:
Yes

Multi-space meters:
Yes

Chicago, Illinois

In 2009, Chicago undertook the biggest and boldest curbside parking initiative in the United States, perhaps anywhere. Chicago leased its 34,500 curbside parking meters to Wall Street giant Morgan Stanley for the next 75 years, trading meter revenues for an upfront payment of nearly $1.16 billion. The unprecedented "Public Private Partnership" includes a fixed schedule of meter rate increases which, raise rates two to four fold by 2013 and will result in Chicago having the highest curbside meter rates in the United States. The agreement was closely watched by at least seven U.S. cities, including Los Angeles and Pittsburgh, which are both considering privatizing portions of their curbside meters. Chicago Mayor Richard Daley Jr. championed the secretive deal to plug massive budget deficits exacerbated by the global economic crisis. It was hurriedly passed 40–5 by the City Council.

Mayor Daley's fundamental argument was that privatization was the only way for the city to unlock the value of the Department of Revenue's underpriced curbside meters. Daley pointed out that due to a lack of political will, rates on 25,000 of the 34,500 meters had been frozen for 20 years. Meters were netting $20 million annually. Had rates simply kept pace with inflation, revenue would be double that. Chicago has previous experience with large scale transportation privatization; in 2004, the City granted a 99 year lease to a private concessionaire to operate the Chicago Skyway. The value to the City was $1.8 billion.

Terms of Chicago Parking Meter Privatization Deal include the following:

- $1.157 billion one-time payment to Chicago from Morgan Stanley.
- For 75 years all meter revenue will accrue to Morgan Stanley.
- Meter rates will be set based on a four-year, fixed schedule, then indexed to inflation.
- Overall hours of metering were increased 27 percent, to include Sundays and late nights.
- Morgan Stanley will modernize meters by 2011 to take cash and credit cards. The cost of this improvement is estimated at $50 million.
- Chicago must pay Morgan Stanley for all metered spaces taken out of operation. Payment set equal to the potential maximum meter revenue during period of service.
- Chicago will enforce meter violations and receive all fines.
- Chicago is metering an additional 4,400 previously free curbside spots along Lake Michigan. The City will retain control of these new metered spots.

Chicago Meter Pricing Schedule (Dollar / Hour)

Location	Pre-deal	2009	2010	2011	2012	2013
Loop/CBD	3.00	3.50	4.25	5.00	5.75	6.50
Outer CBD	1.0	2.00	2.50	3.00	3.50	4.00
Neighborhoods	0.25	1.00	1.25	1.50	1.75	2.00

Source: Chicago Metered Parking System Concession Agreement—Exhibit A Metered Parking System

Backlash

The terms of the parking privatization deal have been harshly criticized throughout the city. It has been condemned by groups representing sustainable transportation and good government advocates, neighborhood groups, motorists and editorial boards. In spite of this, there has been no serious movement to reverse it as of July 2009. Much of the criticism has been on the hurried and secretive process, and restrictive terms. But the backlash was intensified by a bungled roll-out that required motorists to carry far more quarters for the coin-only meters than they had in the past. This was particularly true outside the Loop and in the city's neighborhoods where rates increased substantially. In May, the Chicago Inspector General's office issued a comprehensive report which disputed the mayor's financial model and claimed that the system would be worth approximately $2.13 billion (in present dollars), or $974 million more than the city received. The Inspector General also noted that the length of the lease was excessive and that the city had put itself at a disadvantage by not including opportunities to renegotiate aspects of the deal in the future.

Impact on Chicago Transportation Policy

The fundamental argument for privatizing transportation facilities is that they are not part of the "core functions" of city governments, and that private companies can operate them more efficiently and profitably. However, in Chicago, the city has done more than privatize meter operation and revenue collection. It has essentially made the meter franchise agreement the highest street management priority for the next 75 years. Under the meter agreement Chicago cannot shorten hours of meter operation, reduce rates or remove meters without compensating Morgan Stanley. Thus, planners must take into account the expense of losing meter hours when considering any change in street use, including: bus rapid transit, pedestrian bulb-outs, or protected bicycle lanes. Since most of the city's arterial streets are metered, these restrictions could seriously impinge reprogramming street space for pedestrians, bicyclists and transit. Additionally, the rigid, and blanket price zones adopted in the parking deal may have created local parking dysfunction as nearby blocks with vastly different parking demand are priced the same.

Revenue Maximization versus Optimal Curb Use

Whatever its procedural flaws and fiscal wisdom, Chicago's privatization deal has inverted the curbside parking paradigm. In other big U.S. cities, curbside parking is underpriced and there are parking shortages. In Chicago, curb prices have been set to maximize revenue, likely resulting in parking surpluses. A few months after meter prices were raised, an alderman claimed half of his district's metered spots were unused. However, according to local transportation experts, it appears that parking demand has evened out, and complaints about large swaths of empty curb space have diminished. Though as yet, no before or after occupancy studies have been released.

NEW YORK CITY

Population:
8.3 million

Metered Spots:
75,900

Commercial Spots + ParkSmart Spots:
9,500

Meter Revenue:
$127 million

Fine Revenue:
$596 million

Revenue to:
General fund

Residential Permits:
No

Multi-space meters:
Yes

New York, New York

Islands of innovation in a politically hostile sea

New York City is the largest, densest and most transit- and pedestrian-oriented city in the United States. It is the only U.S. city in which a majority of households do not have a car. Despite this, New York City is very much an American city in the way it under prices and under uses curbside parking meters. Meter rates are far lower than in other leading world cities, and New York suffers from high levels of cruising and double parking. Only a small percentage of New York streets are metered (the city has 32 percent fewer meters per capita than Chicago, for example): all are on retail strips and in the Manhattan Central Business District.

Like other U.S. cities, curbside parking rates in New York City are largely determined by politics, not by policy goals. In 2005, the city council overrode a mayoral veto and objections from the Department of Transportation and eliminated metered parking on Sundays. Rates on most meters were frozen from 1992 until 2009. In February 2009, the rate on 53,000 of the city's 75,900 meters was raised from $0.50 per hour to $0.75 per hour. Because of political resistance, curbside parking reform lags far behind the city DOT's aggressive efforts to promote bicycling and new pedestrian spaces. The business community has been divided in its support of parking reform. Some Business Improvement Districts have lobbied the city for changes, others to maintain the status quo.

Yet, despite the difficult political environment, the city DOT has undertaken three curbside parking initiatives from which other cities can learn.

NYC Commercial Congestion Parking Program

In 2000, the NYC DOT began metering commercial parking in the CBD using escalating hourly rates and modern, multi-space, "Muni-meters." By 2009, the NYC Commercial Congestion Parking Program had steadily expanded to include about 8,000 curbside parking spaces available only to commercial vehicles. The meters cover a two- by one-half- mile swath of Manhattan from 60th Street to 14th Street. Rates for commercial vehicles are $2 for the first hour, $3 for the second, and $4 for the third hour. Muni-meters accept coins, credit cards and pre-paid

parking cards. According to DOT internal studies, commercial parking availability has increased and double-parking and overall traffic delays have decreased.

Prior to the commercial curb pricing program, the areas suffered from severe parking-related congestion, chronic shortages of commercial parking, double parking and circling traffic.

Parking problems were especially severe because Manhattan's dense Central Business District has no alleys and relatively few off-street loading docks. Prior to the commercial curb pricing program, commercial parking was regulated by a complex series of time-of-day rules centered on a much ignored three-hour parking time limit. The political impetus for the project came from building managers and large vehicle fleets frustrated with the time and expense of the dysfunctional parking. Since regulations already restricted the free parking to commercial vehicles, local community planning boards, which often vociferously oppose meter rate increases, supported commercial metering as a way to reduce circling traffic, congestion and parking spill-over. The program is considered a big success by stakeholder groups and the DOT and has received a number of industry awards for innovation.

ParkSmart meters limit parking to 1 hour for more efficient turnover at the curb in Park Slope, Brooklyn
NYC DEPARTMENT OF TRANSPORTATION

ParkSmart NYC

Creating consensus for curbside parking changes

In October 2008, the NYC DOT introduced ParkSmart at 281 metered spots in Manhattan's transit- and pedestrian-oriented Greenwich Village. ParkSmart is an opt-in program in which DOT approaches community planning boards and asks for their participation. The articulated goal of the program is to increase curbside availability and reduce circling and double parking. By 2014, ParkSmart will

include six neighborhood pilot programs encompassing 1,500 to 2,000 existing meters, and no new meters. In May 2009, a second pilot began in Park Slope Brooklyn. During the six-month trial period in Greenwich Village, DOT raised meters rates from $1 to $2 an hour during the peak 12 p.m. to 4 p.m. period. The project was well received by the public and the rates have been adjusted to $3 since then, reducing curbside occupancy during peak times. All the meters are programmed to allow a maximum of one paid hour, which limits the convenience of meter feeding for an extended period.

ParkSmart is noteworthy because it is a thoughtful, sustained effort by a major city to change public attitudes towards higher meter rates. The DOT is well aware of the problems caused by underpriced curbside parking. Well publicized studies by the advocacy group Transportation Alternatives found that circling for parking accounted for 28 percent of vehicular traffic in Lower Manhattan's SoHo neighborhood, and 45 percent of traffic in Park Slope, Brooklyn. But neighborhood political resistance to raising meter rates remains very high. DOT hopes that positive results in ParkSmart neighborhoods will help create a new public consensus throughout the city that higher meter rates are a benefit.

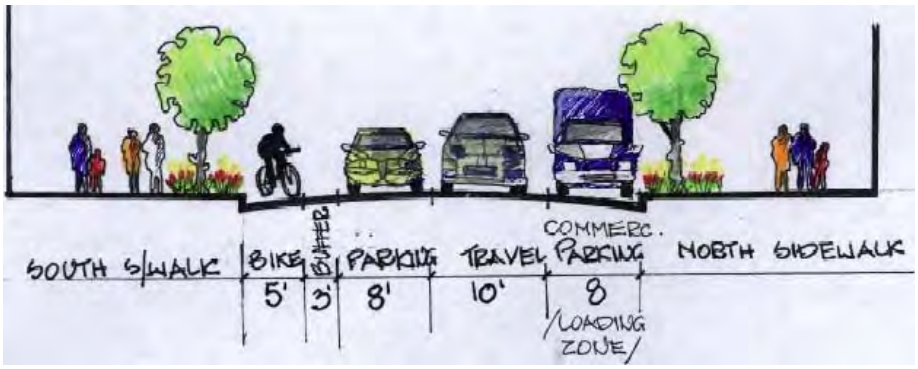
Grand Street Protected Bicycle Lane

Using curbside parking to protect bicyclists

On Lower Manhattan's Grand Street, the NYC DOT used on-street parking to create a low-cost, protected bicycle lane. The DOT moved curbside parking to the first traffic lane and a painted a curbside lane. The project is a model for how to quickly reprogram road space freed up when on-street parking is properly priced. Eliminating circling and double parking creates substantial excess street capacity which can be reprogrammed for bicyclists and pedestrians, or which will otherwise draw more through traffic.

A bicyclist using the parking protected bike lane on Grand Street in NYC
NYC DEPARTMENT OF TRANSPORTATION

A bicyclist using the parking protected bike lane on Grand Street in NYC
STREETSBLOG, THE OPENING PLANNING PROJECT



CAMBRIDGE

Population:

105,594

Density:

15,767 people / sq mile

Cambridge, Massachusetts

Cambridge's zoning code specifies both minimum and maximum parking requirements—the latter since the early 1980s—for office, retail, government and university buildings. Offices, for example, are required to provide between 1 and 2.5 spaces per 1,000 square feet. Minimums are reduced for sites that are close to transit, share parking, provide affordable housing, or are near public or commercial parking. The planning board allows developments to exceed the maximum in the case of demonstrated unusually high parking demand. Whereas parking maximums in San Francisco and Portland are often binding and few variances are allowed, those of Cambridge create a range of viable parking allowances, and developers do not always build up to the maximum allowed. Even with maximums allowed, the planning agency encourages developments applying for permits to target the minimum required amount of off-street parking.

In 1998 Cambridge instituted its Travel Demand Management (TDM) Ordinance, a policy that seeks to lower travel by private automobile by mandating that new developments seeking to add parking to their sites provide alternative transportation resources, such as transit pass subsidies, bicycle parking, priority carpool parking, and other measures. The policy's objective is to reduce generation of single occupancy vehicle trips by 10 percent, relative to 1990 levels. The city employs a TDM officer to perform annual surveys and counts of parking facilities subject to the TDM ordinance.

Conclusion

Parking policy exerts great influence on mode choice and urban design. In turn these affect air and water quality; development density; the ratio of active, tax ratable land uses to accessory land uses; and the quality of street-life or pedestrian environment. Many cities take a passive approach to managing parking. They borrow strategies from neighboring jurisdictions and promote the objectives to avoid spillover effects and assist private automobile use. They fail to recognize parking policy's wider potential to affect environmental objectives and to promote positive economic outcomes.

The unintended consequences include reinforced dependence on the automobile by concomitantly, though inadvertently, subsidizing auto use and undermining availability and effectiveness of other modes. Ironically, making auto use less costly has resulted in increased traffic and parking congestion, ultimately making auto use more costly. By undermining other modes, people are left without alternatives to the automobile. Classic parking policy also results in increasing the cost of development and discouraging development in some cases.

A few cities, including those highlighted here, are taking steps to align parking policy with the broader city goals of accessibility, economic development and better quality of life—such as clean air and water and increasing access and travel alternatives.

There are few examples and many of the experiments in alternative parking approaches are relatively new, so it is difficult to recommend a one-size-fits-all account of best practices. In spite of that concern, sufficient consistency has emerged in these practices to make the following observations:

Price Sensitivity

Even small price adjustments will induce changes in behavior. Coordinating off-street and curbside pricing is effective in eliminating excess demand at the curb while off-street parking space remains available.

Increasing prices of both off-street and curbside parking will induce mode shifts when alternatives are available.

Introduction of travel alternatives along with parking pricing can reduce demand without placing an onerous burden on travelers or diverting them to alternate destinations.

When employers offer a choice of free off-street parking or its cash equivalent, some of their workers choose the cash thus reducing demand for parking spots. Similarly, when the cost of parking is unbundled from housing and other developments, demand for off-street parking is reduced.

Time limits have been notoriously difficult to enforce, though some new technologies may make it easier. Alternatively, escalating prices with increasing duration of stay have proven effective at increasing turnover and yielding greater productivity from the same number of spaces.

Performance Standards

To the extent there are standards for curbside performance, full occupancy with high turnover is one that has been articulated. Full occupancy can only be achieved when there is a queue of vehicles waiting for curb space.

Vehicles waiting for curb space are typically cruising for parking or double parked. In both cases they are using street space that could be used for bicycle lanes, wider sidewalks, smoother transit operations and / or smoother vehicular traffic flow. Vehicles unable to find space at the curb are also frequently parked illegally blocking bus stops, loading zones or access to fire hydrants, thus, impeding transit and commerce and / or creating a dangerous hazard in the event of a fire.

Better performance standards include the elimination of illegal parking—including double parking—and elimination of wasteful cruising for free curb space. Some people have advocated vacancy targets as another way to achieve these objectives.

Without well-defined, measurable standards policy objectives are impossible to achieve.

Supply

Minimum accessory parking requirements tend to flood the market. Minimums are based on the assumption that drive trips should be accommodated with easy parking at the destination. Excess parking developed based on minimum requirements drives the price of parking to zero. Minimums are generally set without respect to the development context or reference to the total transportation system. Excessive parking induces auto trips and contributes to greater congestion.

While some jurisdictions allow shared parking among uses that have different time-of-day use profiles, the most efficient sharing is found in commercial and / or municipal lots, i.e. non-accessory lots. These lots can be centralized; they can serve multiple users minimizing excess spaces; and they concentrate and reduce pedestrian vehicle conflict points, improving opportunities for good urban design.

Without accessory parking, commercially or publicly shared parking can be priced at market clearing rates since its cost is not easily shifted to another land use. When municipally owned, parking can be priced to accomplish transportation goals including reducing parking demand by reducing automobile trips and increasing parking turnover (potentially increasing automobile trips).

In lieu fees and transfer of parking rights both facilitate central, shared parking.

Parking maximums should be set according to constraints on the entire transportation system. Transit capacity is a factor in setting maximums in at least one city. Additional transit capacity can also counter perceived need for additional off-street parking space.

Epilogue

Dysfunction will continue as long as parking policy is viewed independent of transportation policy and as long curbside and off-street parking are treated independently. Frequently, this manifests in excess auto trips, spot shortages at curb-side, an excess of empty off-street parking spots and degradation of transit service and the pedestrian environment. Failure to develop coherent policy is a missed opportunity for achieving transportation and revenue objectives.

Cities like Chicago, New York City and San Francisco are experimenting with new policies in select locations. Boulder and Portland have much more comprehensive citywide transportation policies with parking policy a prime component. While there are lessons to be gained from all of these cities, it is Portland and Boulder who have truly had the most success in achieving their objectives.

Appendix A: Commercial Off-Street and Curbside Hourly Parking Rates for Select U.S. Cities

(COMPLIED 7/1/2009)

	Curbside Rates					Commercial Off-street Rates
New York City	**1st Hour**	**2nd Hour**	**3rd Hour**			
CBD (commercial 6,500 meters)	$2.00	$3.00	$4.00			Not applicable
CBD	$2.00					$20
CBD/ParkSmart (12pm–4pm)	$3.00					$15
Near CBD Neighborhood	$2.00					$15
Los Angeles						
CBD	$4.00					$6.50
Near CBD	$1.50					Not available
Chicago*	**2009**	**2010**	**2011**	**2012**	**2013**	
Loop/Inner CBD	$3.50	$4.25	$5.00	$5.75	$6.50	$17
CBD	$2.00	$2.50	$3.00	$3.50	$4.00	
Near CBD Neighborhood	$1.00	$1.25	$1.50	$1.75	$2.00	
*Chicago PPP deal mandates these rates						
Houston	**1st Hour**					
CBD/Red Zone–Commercial only	$5.00					Not applicable
CBD	$1.50					$13*
San Francisco						
Core CBD	$3.50					$12
Overall CBD	$3.00					
Phoenix						
CBD only	$1.50					Not available
Denver						
CBD	$1.00					Not available

*average maximum NOT hourly

Appendix B: Curbside Parking Highlights in Select U.S. Cities

Houston

As part of the creation of 20 miles of new light rail, Houston is more than doubling the number of parking spots it meters. By 2016, Houston plans to add 7,500 new metered spots to the 6,300 spots it already meters. Many of the new metered spots will be near light rail stations and areas expected to land use changes because of the new transit.

Miami

Miami has 5,500 pay by phone, metered curbside spots. This is far more than any other U.S. city. The program is politically popular and will be expanded to 8,000 spots within the next few years.

Los Angeles

L.A. policy makers are intensely interested in the transportation and land use implications of parking policy. The city's 2006 parking report recognizes key structural issues to changing parking policy and using parking policy as a transportation management and sustainability tool.
http://www.ladot.lacity.org/pdf/ParkingReport2006.pdf

Denver

In 2009, Denver undertook an extensive, Strategic Parking Plan, much of which is available online. This plan, and LA's and San Francisco's SF*park*/ SFTA parking recommendations are the three most advanced parking studies undertaken by major U.S. cities.
http://www.denvergov.org/Default.aspx?alias=www.denvergov.org/parking

Seattle

Seattle is attempting to reduce pressure on curbside parking by directing more motorists to off-street parking garages through the introduction of a real-time electronic guidance system, which uses variable message signs and the web to promote available parking spaces in nearby facilities. The system is based on those installed in German and other European cities. Seattle hopes the project will reduce circling for parking, especially in residential neighborhoods.
http://www.seattle.gov/transportation/innovativepark.htm

Redwood City/ Silicon Valley, Northern California

Maybe the only city in the United States which has abolished time limits for most metered parking. Additionally, as part of an overall parking plan, Redwood City has established an average 85 percent occupancy target for metered parking downtown and set meter rates accordingly. Though meters are inexpensive by big city standards and free parking remains plentiful.
http://www.redwoodcity.org/cds/redevelopment/downtown/Parking/parkingbigpicture.htm

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Parking Management

Strategies, Evaluation and Planning

5 November 2013

by
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Abstract

Parking management refers to various policies and programs that result in more efficient use of parking resources. This report summarizes the book, *Parking Management Best Practices* (Planners Press, 2006), which describes and evaluates more than two-dozen such strategies. It investigates problems with current parking planning, discusses the costs of parking facilities and potential savings from improved management, describes specific parking management strategies and how they can be implemented, discusses planning and evaluation issues, and describes how to develop optimal parking management in a particular situation. Cost-effective parking management programs can usually reduce parking requirements by 20-40% compared with conventional planning requirements, providing many economic, social and environmental benefits.

An shorter version of this paper was presented at the
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Paper 07-1581

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Introduction

Parking is an essential component of the transportation system. Vehicles must park at every destination. A typical automobile is parked 23 hours each day, and uses several parking spaces each week. Parking convenience affects the ease of reaching destinations and therefore affects overall accessibility.

Parking facilities are a major cost to society, and parking conflicts are among the most common problems facing designers, operators, planners and other officials. Such problems can be often defined either in terms of *supply* (too few spaces are available, somebody must build more) or in terms of *management* (available facilities are used inefficiently and should be better managed). Management solutions tend to be better than expanding supply because they support more strategic planning objectives:

- Reduced development costs and increased affordability.
- More compact, multi-modal community planning (smart growth).
- Encourage use of alternative modes and reduce motor vehicle use (thereby reducing traffic congestion, accidents and pollution).
- Improved user options and quality of service, particularly for non-drivers.
- Improved design flexibility, creating more functional and attractive communities.
- Ability to accommodate new uses and respond to new demands.
- Reduced impervious surface and related environmental and aesthetic benefits.

Parking management refers to policies and programs that result in more efficient use of parking resources. Parking management includes several specific strategies; nearly two dozen are described in this report. When appropriately applied parking management can significantly reduce the number of parking spaces required in a particular situation, providing a variety of economic, social and environmental benefits. When all impacts are considered, improved management is often the best solution to parking problems.

Parking Management Principles
These ten general principles can help guide planning decision to support parking management.

1. *Consumer choice.* People should have viable parking and travel options.
2. *User information.* Motorists should have information on their parking and travel options.
3. *Sharing.* Parking facilities should serve multiple users and destinations.
4. *Efficient utilization.* Parking facilities should be sized and managed so spaces are frequently occupied.
5. *Flexibility.* Parking plans should accommodate uncertainty and change.
6. *Prioritization.* The most desirable spaces should be managed to favor higher-priority uses.
7. *Pricing.* As much as possible, users should pay directly for the parking facilities they use.
8. *Peak management.* Special efforts should be made to deal with peak-demand.
9. *Quality vs. quantity.* Parking facility quality should be considered as important as quantity, including aesthetics, security, accessibility and user information.
10. *Comprehensive analysis.* All significant costs and benefits should be considered in parking planning.

Parking Management Benefits

- *Facility cost savings.* Reduces costs to governments, businesses, developers and consumers.
- *Improved quality of service.* Many strategies improve user quality of service by providing better information, increasing consumer options, reducing congestion and creating more attractive facilities.
- *More flexible facility location and design.* Parking management gives architects, designers and planners more ways to address parking requirements.
- *Revenue generation.* Some management strategies generate revenues that can fund parking facilities, transportation improvements, or other important projects.
- *Reduces land consumption.* Parking management can reduce land requirements and so helps to preserve greenspace and other valuable ecological, historic and cultural resources.
- *Supports mobility management.* Parking management is an important component of efforts to encourage more efficient transportation patterns, which helps reduce problems such as traffic congestion, roadway costs, pollution emissions, energy consumption and traffic accidents.
- *Supports Smart Growth.* Parking management helps create more accessible and efficient land use patterns, and support other land use planning objectives.
- *Improved walkability.* By allowing more clustered development and buildings located closer to sidewalks and streets, parking management helps create more walkable communities.
- *Supports transit.* Parking management supports transit oriented development and transit use.
- *Reduced stormwater management costs, water pollution and heat island effects.* Parking management can reduce total pavement area and incorporate design features such as landscaping and shading that reduce stormwater flow, water pollution and solar heat gain.
- *Supports equity objectives.* Management strategies can reduce the need for parking subsidies, improve travel options for non-drivers, provide financial savings to lower-income households, and increase housing affordability.
- *More livable communities.* Parking management can help create more attractive and efficient urban environments by reducing total paved areas, allowing more flexible building design, increasing walkability and improving parking facility design.

This report describes various parking management strategies, how to evaluate these strategies and develop an integrated parking plan, plus examples and resources for more information. Most parking management strategies have been described in previous publications but no existing document describes them all or provides guidance on planning and implementing a comprehensive parking management program. This report summarizes the book *Parking Management Best Practices*, published by Planners Press in 2006. If you find this report useful, please purchase the book for more information.

Examples

Below are three illustrative examples of parking management programs.

Reducing Building Development Costs

A mixed-use building is being constructed in an urban or suburban area that will contain 100 housing units and 10,000 square feet of commercial space. By conventional standards this requires 200 parking spaces (1.6 spaces per housing unit plus 4 spaces per 1,000 square feet of commercial space), costing from $2 million for surface parking (about 9% of the total development costs), up to $6 million for underground parking (about 25% of total development costs). However, because the building is in a relatively accessible location (on a street that has sidewalks, with retail business and public transit services located nearby) and onstreet parking is available nearby to accommodate occasional overflows, the building owners argue that a lower standard should be applied, such as 1.2 parking spaces per housing unit and 3 spaces per 1,000 square feet of commercial space, reducing total requirements to 150 spaces. To further reduce parking requirements the developer proposes the following:

- *Unbundle parking*, so parking spaces are rented separately from building space. For example, rather than paying $1,000 per month for an apartment with two parking spaces renters pay $800 per month for the apartment and $100 per month for each parking space. This typically reduces parking requirements by 20%.
- Encourage businesses to implement *commute trip reduction programs* for their employees, including *cashing out* free parking (employees are offered $50 per month if they don't use a parking space). This typically reduces automobile commuting by 20%.
- *Regulate* the most convenient parking spaces to favor higher-priority uses, including delivery vehicles and short errands, and handicapped users.
- Include four *carshare vehicles* in the building. Each typically substitutes for 5 personal vehicles, reducing 4 parking spaces.
- Incorporate excellent *walking facilities*, including sidewalk upgrades if needed to allow convenient access to nearby destinations, overflow parking facilities and transit stops.
- Incorporate *bicycle parking* and changing facilities into the building.
- Provide *information* to resident, employees and visitors about transit, rideshare and taxi services, bicycling facilities, and overflow parking options.
- Develop a contingency-based *overflow parking plan* that indicates where is available nearby if on-site facilities are full, and how and *spillover impacts* will be addressed. For example, identify where additional parking spaces can be rented if needed.

This management program allows total parking requirements to be reduced to 100 spaces, providing $100,000 to $500,000 in annualized parking facility capital and operating cost savings (compared with $20,000-$50,000 in additional expenses for implementing these strategies), as well as providing improved options to users and reduced vehicle traffic.

Increasing Office Building Profits and Benefits

An office building has 100 employees and 120 surface parking spaces, providing one space per employee plus 20 visitor spaces. The building earns $1,000,000 annually in rent, of which $900,000 is spent on debt servicing and operating expenses, leaving $100,000 annual net profit.

Parking management begins when a nearby restaurant arranges to use 20 spaces for staff parking during evenings and weekends for $50 per month per space, providing $12,000 in additional annual revenue. After subtracting $2,000 for walkway improvements between the sites, and additional operating costs, this increases profits 10%. Later a nearby church arranges to use 50 parking spaces Sunday mornings for $500 per month, providing $6,000 in annual revenue. After subtracting $1,000 for additional operating costs, this increases profits by another 5%. Next, a commercial parking operator arranges to rent the building's unused parking to general public during evenings and weekends. This provides $10,000 in net annual revenue, an additional 10% profit.

Inspired, the building manager develops a comprehensive management plan to take full advantage of the parking facility's value. Rather than giving each employee a reserved space, spaces are shared, so 80 spaces can easily serve the 100 employees. A commute trip reduction program is implemented with a $40 per month cash-out option, which reduces parking requirements by another 20 spaces. As a result, employees only need 60 parking spaces. The extra 40 parking spaces are leased to nearby businesses for $80 per month, providing $32,000 in annual revenue, $9,600 of which is used to fund cash-out payments and $2,400 to cover additional costs, leaving $20,000 net profits.

Because business is growing, the tenant wants additional building space for 30 more employees. Purchasing land for another building would cost approximately $1 million, and result in two separate work locations, an undesirable arrangement. Instead, the building manager stops leasing daytime parking and raises the cash-out rate to $50 per month, which causes an additional 10 percentage point reduction in automobile commuting. With these management strategies, 87 parking spaces are adequate to serve 130 employees plus visitors, leaving the land currently used by 33 parking spaces available for a building site. To address concerns that this parking supply may be insufficient sometime in the future, a contingency plan is developed which identifies what will be done if more parking is needed, which might involve an overflow parking plan, providing additional commuter incentives during peak periods, leasing nearly parking, or building structured parking if necessary.

This parking management plan saves $1 million in land costs, a $50,000 annualized value. Parking spaces can still be rented on weekends and evenings, bringing in an additional $25,000. These parking management strategies increased total building profits about 75%, allow a business to locate entirely at one location, and provide parking to additional users during off-peak periods. Other benefits include increased income and travel options for employees, reduced traffic congestion and air pollution, and reduced stormwater runoff.

Downtown – Addressing Parking Problems

A growing downtown is experiencing parking problems. Most downtown parking is unpriced, with 2-hour limits for on-street parking. During peak periods 90% of core-area parking spaces are occupied, although there is virtually always parking available a few blocks away, and many of the core spaces are used by commuters or long-term visitors, who moved their vehicles every two hours to avoid citations.

Local businesses asked the city to build a $5 million parking structure, which would either require about $500,000 in annual subsidies or would require user charges. Experience in similar downtowns indicates that if most public parking is unpriced, few motorists will pay for parking so the structure would be underutilized and do little to alleviate parking problems. Local officials decide to first implement a management program, to defer or avoid the need for a parking structure. Parking surveys are performed regularly to track utilization and turnover rates, in order to identify problems. The program's objectives are to encourage efficient use of parking facilities, insure that parking is convenient for priority uses (deliveries, customers and short errands), and maintain parking utilization at about 85%. It includes the following strategies:

- Increase enforcement of regulations, particularly during busy periods, but insure that enforcement is friendly and fair.
- Reduce on-street time limits (e.g., 2-hours to 90 minutes) where needed to increase turnover.
- Expand core area boundaries to increase the number of spaces managed for short-term use.
- Encourage businesses to share parking, so for example, a restaurant allows its parking spaces to be used by an office building during the weekdays in exchange for using the office parking during evenings and weekends.
- Encourage use of alternative modes. The city may partner with the downtown business organization to support commute trip reduction programs and downtown shuttle service.
- Develop special regulations as needed, such as for disabled access, delivery and loading areas, or to accommodate other particular land uses.
- Implement a residential parking permit program if needed to address spillover problems in nearby residential areas, but accommodate non-residential users as much as possible.
- Provide signs and maps showing motorists where they may park.
- Have an overflow parking plan for occasionally special events that attract large crowds.
- Establish high standards for parking facility design, including aesthetic and safety features, to enhance the downtown environment.
- Price parking, using convenient pricing methods. Apply the following principles:
    - Adjust rates as needed to maintain optional utilization (i.e., 85% peak occupancy).
    - Structure rates to favor short-term uses in core areas and encourage longer-term parkers to shift to other locations.
    - Provide special rates to serve appropriate uses, such as for evening and weekend events.
    - Use revenues to improve enforcement, security, facility maintenance, marketing, and mobility management programs that encourage use of alternative modes.

Paradigm Shift

Parking planning is undergoing a *paradigm shift*, a fundamental change in how a problem is perceived and solutions evaluated. The old paradigm assumes that parking should be abundant and free at most destinations. It strives to maximize supply and minimize price. The old paradigm assumes that parking lots should almost never fill, that parking facility costs should be incorporated into the costs of buildings or subsidized by governments, and that every destination should satisfy its own parking needs.

The new paradigm strives to provide *optimal* parking supply and price. It considers too much supply as harmful as too little, and prices that are too low as harmful as those that are too high. The new paradigm strives to use parking facilities efficiently. It considers full lots to be acceptable, provided that additional parking is available nearby, and that any spillover problems are addressed. It emphasizes sharing of parking facilities between different destinations. It favors charging parking facility costs directly to users, and providing financial rewards to people who reduce their parking demand.

The old paradigm tends to resist change. It places a heavy burden of proof on innovation. The new paradigm recognizes that transport and land use conditions evolve so parking planning practices need frequent adjustment. It shifts the burden of proof, allowing new approached to be tried until their effectiveness (or lack thereof) is proven. Table 1 compares the old and new parking paradigms.

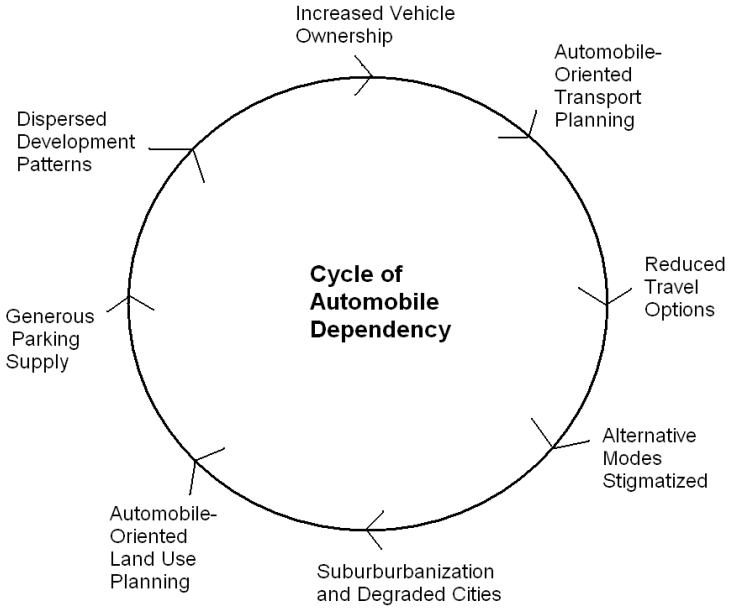
Table 1 **Old and New Parking Paradigms Compared**

Old Parking Paradigm	New Parking Paradigm
"Parking problem" means inadequate parking supply.	There can be many types of parking problems, including inadequate or excessive supply, too low or high prices, inadequate user information, and inefficient management.
Abundant parking supply is always desirable.	Too much supply is as harmful as too little.
Parking should generally be provided free, funded indirectly, through rents and taxes.	As much as possible, users should pay directly for parking facilities.
Parking should be available on a first-come basis.	Parking should be regulated to favor higher priority uses and encourage efficiency.
Parking requirements should be applied rigidly, without exception or variation.	Parking requirements should reflect each particular situation, and should be applied flexibly.
Innovation faces a high burden of proof and should only be applied if proven and widely accepted.	Innovations should be encouraged, since even unsuccessful experiments often provide useful information.
Parking management is a last resort, to be applied only if increasing supply is infeasible.	Parking management programs should be widely applied to prevent parking problems.
"Transportation" means driving. Land use dispersion (sprawl) is acceptable or even desirable.	Driving is just one type of transport. Dispersed, automobile-dependent land use patterns can be undesirable.

Parking management changes the way parking problems are defined and solutions evaluated.

The old paradigm results in *predict and provide* planning, in which past trends are extrapolated to predict future demand, which planners then try to satisfy. This often creates a self-fulfilling prophecy, since abundant parking supply increases vehicle use and urban sprawl, causing parking demand and parking supply to ratchet further upward, as illustrated in Figure 1.

Figure 1 **Cycle of Automobile Dependency**



Generous parking supply is part of a cycle that leads to increased automobile dependency. Parking management can help break this cycle.

It is important to define parking problems carefully. For example, if people complain about a parking problem, it is important to determine exactly what type of problem, and where, when and to whom it occurs. Increasing supply helps reduce parking congestion and spillover problems but increases most other problems. Management solutions tend to reduce most problems, providing a greater range of benefits and so are supported by more comprehensive planning.

How Much Is Optimal?

Optimal parking supply is the amount that motorists would purchase if they paid all costs directly and had good parking and transport options. But conventional planning practices reflect an assumption that it is desirable to maximize parking supply and minimize user charges. They consider parking management a measure of last resort, to be applied only where it is infeasible to expand supply.

Conventional planning determines how much parking to provide at a particular site planners based on recommended minimum parking standards published by various professional organizations. This provides an *index* or *parking ratio* used to calculate the number of spaces to supply at a particular location. These are *unconstrained* and *unadjusted* values, which generally reflect the maximum supply that could be needed.

These standards are often excessive and can usually be adjusted significantly downward (Topp 2009). To appreciate why it is helpful to know a little about how parking standards are developed. Conventional parking standards are based on parking demand surveys, the results of which are collected and published in technical reports such as ITE's *Parking Generation*. This process implies a higher degree of accuracy than is actually justified. Fewer than a dozen demand surveys are used to set standards for many land use categories. The analysis does not usually take into account geographic, demographic and economic factors that can affect parking demand, such as whether a site is urban or suburban, and whether parking is free or priced.

These standards err toward oversupply in many ways. They are derived from parking demand studies that were mostly performed in automobile-dependent locations. They are generally based on 85th percentile demand curves (which means that 85 out of 100 sites will have unoccupied parking spaces even during peak periods), an 85th occupancy rate (a parking facility is considered full if 85% of spaces are occupied) and a 10th design hour (parking facilities are sized to fill only ten hours per year). Applying these standards results in far more parking supply than is usually needed at most destinations, particularly where land use is mixed, there are good travel options, parking is managed for efficiency or priced.

Most people planning apply parking standards have little understanding of the biases and errors they contain, and the problems created by excessive parking supply. The application of generous and inflexible parking standards is often defended as being *conservative*, implying that this approach is cautious and responsible. Use of the word *conservative* in this context is confusing because it results in the opposite of what is implied. Excessive parking requirements waste resources, both directly, by increasing the money and land devoted to parking facilities, in indirectly, by increasing automobile use and sprawl. Better parking management actually tends to be more *conservative* overall.

Alternative Ways To Determine How Much Parking To Supply

There are better ways to determine how much parking to supply at a particular site. *Efficiency-based standards* size facilities for optimal utilization. This means that most parking lots are allowed to fill, provided that management strategies can insure user convenience and address any problems. For example, parking facilities at a store can be sized to fill daily or weekly, provided that overflow parking is available nearby, motorists have information about available parking options, and regulations are adequately enforced to address any spillover problems that develop.

Efficiency-based standards take into account geographic, demographic and economic factors that affect parking demand. They also reflect the relative costs and benefits of different options, so less parking is supplied where parking supply is relatively costly to provide or where management programs easy to implement. Efficiency-based standards should also reflect strategic planning objectives such as a desire for more compact development, or to reduce traffic.

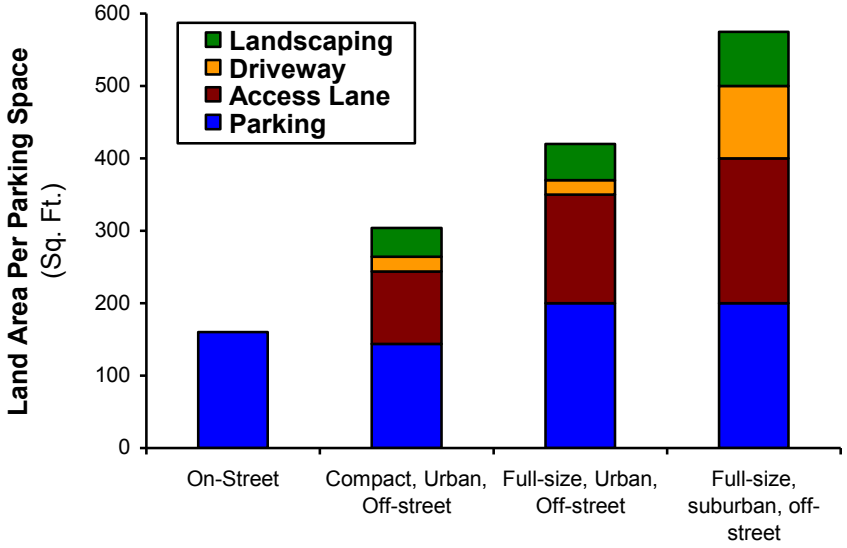
Because it is not possible to predict exact parking demand and management program effectiveness, efficiency-based standards rely on *contingency-based planning*, which means that planners identify solutions that can be deployed if needed in the future. For example, if a new building is predicted to need 60 to 100 parking spaces, the conventional approach is to supply either the middle value (80 spaces), or the maximum value (100 spaces). With contingency-based planning, the lower-bound value (60 spaces) is initially supplied, conditions are monitored, and various strategies are identified for implementation if needed. This may include banking land for additional parking supply and various parking management programs. This allows planners to use lower parking standards with the confidence that any resulting problems can be easily solved.

Parking Facility Costs

A major benefit of parking management is its ability to reduce facility costs (Parking Costs," Litman, 2003). Parking facility costs are usually borne indirectly through rents, taxes and as a component of retail goods, so most people have little idea of parking facility costs and the potential savings from more efficient management.

A typical parking space is 8-10 feet (2.4-3.0 meters) wide and 18-20 feet (5.5-6.0 meter) deep, totaling 144-200 square feet (13-19 sq. meters). Off-street parking requires driveways and access lanes, and so typically requires 300-400 square feet (28-37 square meters) per space, allowing 100-150 spaces per acre (250-370 per hectare).

Figure 2 **Typical Parking Facility Land Use** ("Parking Evaluation," VTPI, 2005)



Land requirements per parking space vary depending on type and size. Off-street spaces require driveways and access lanes. Landscaping typically adds 10-15% to parking lot area.

The direct, annualized costs of providing parking (not including indirect costs such as stormwater management, environmental impacts, aesthetic degradation, etc.). This varies from about $250 per space if otherwise unused land is available, and construction and operating costs are minimal, to more than $2,250 for structured parking with attendants. On-street parking spaces require less land per space than off-street parking, since they do not require access lanes, but their opportunity costs can be high if they use road space needed for traffic lanes or sidewalks. The *Parking Cost, Pricing and Revenue Calculator* (www.vtpi.org/parking.xls) can be used to calculate these costs for a particular situation.

In addition to these direct costs, generous parking supply imposes indirect costs, including increased sprawl, impervious surface and associated stormwater management costs, reduced design flexibility, reduced efficiency of alternative modes (walking, ridesharing and public transit use), and increased traffic problems. Put more positively, parking management can help solve a variety of economic, social and environmental problems, increase economic productivity, and make consumers better off overall.

Parking Management Strategies

This section describes a variety of specific parking management strategies. For more information see Litman (2006a) and related chapters in VTPI (2005).

Shared Parking

Shared Parking means that a parking facility serves multiple users or destinations ("Shared Parking," VTPI, 2005). This is most successful if destinations have different peak periods, or if they share patrons so motorists park at one facility and walk to multiple destinations. Parking facilities can be shared in several ways.

- *Shared Rather Than Reserved Spaces*. Motorists share parking spaces, rather than being assigned a reserved space. For example, 100 employees can usually share 60-80 parking spaces, since at any particular time some are on leave, commuting by an alternative mode, in the field, or working another shift. Hotels, apartments, condominiums and dormitories can share parking spaces among several units, since the number of vehicles per unit varies over time. Sharing can be optional, so for example, motorists could choose between $60 per month for a shared space or $100 for a reserved space.
- *Share Parking Among Destinations.* Parking can be shared among multiple destinations. For example, an office building can share parking with a restaurant or theater, since peak demand for offices occurs during weekdays, and on weekend evenings for restaurants and theaters, as indicated in Table 2. Sharing can involve mixing land uses on single site, such as a mall or campus, or by creating a sharing arrangement between sites located suitably close together.

Table 2 **Typical Peak Parking Periods For Various Land Uses**

Weekday	Evening	Weekend
Banks and public services	Auditoriums	Religious institutions
Offices and other employment centers	Bars and dance halls	Parks
Park & Ride facilities	Meeting halls	Shops and malls
Schools, daycare centers and colleges	Restaurants	
Factories and distribution centers	Theaters	
Medical clinics	Hotels	
Professional services		

This table indicates peak parking demand for different land use types. Parking can be shared efficiently by land uses with different peaks.

- *Public Parking Facilities.* Public parking, including on-street, municipal off-street, and commercial (for profit) facilities generally serve multiple destinations. Converting from free, single-use to paid, public parking allows more efficient, shared use.
- *In Lieu Fees.* "In lieu fees" mean that developers help fund public parking facilities instead of providing private facilities serving a single destination. This tends to be more cost effective and efficient. It can be mandated or optional.

- *Special Parking Assessment*. Businesses in an area can be assessed a special assessment or tax to fund parking facilities in their area, as an alternative to each business supplying its own facilities. This is often implemented through a downtown business improvement district.

Parking Regulation

Parking regulations control who, when and how long vehicles may park at a particular location, in order to prioritize parking facility use. The table below describes common regulations and the type of parking activity they favor.

Table 3 **Common Parking Regulations**

Name	Description	Favored Activity
User or vehicle type	Spaces dedicated to loading, service, taxis, customers, rideshare vehicles, disabled users, buses and trucks.	As specified.
Duration.	Limit parking duration (5-minute loading zones, 30-minutes adjacent to shop entrances, 1- or 2-hour limits).	Short-term users, such as deliveries, customers and errands.
Time period restrictions	Prohibit occupancy at certain times, such as before 10 am, to discourage employee use, or between 10 pm and 5 am to discourage resident use.	Depends on restrictions.
Employee restrictions.	Require or encourage employees to use less convenient parking spaces.	Customers, deliveries and errands.
Special events	Have special parking regulations during special events.	Depends on restrictions.
Accommodate short-term users.	Provide options for vehicles that make numerous short stops, such as special parking passes.	Delivery and service vehicles.
Residential parking permits	Use Residential Parking Permits (RPPs) to give area residents priority use of parking near their homes.	Residents.
Options for special users.	Establish a system that allows specific parking spaces to be reserved for service and construction vehicles.	Vehicles used for special activities.
Restrict overnight parking	Prohibit overnight parking to discourage use by residents and campers.	Shorter-term parkers
Street cleaning restrictions	Regulations that prohibit parking on a particular street one day of the week to allow street sweeping.	Street cleaning. Insures motorists move their vehicles occasionally.
Large vehicle restrictions	Limit on-street parking of large vehicles, such as freight trucks and trailers.	Normal-size vehicles
Arterial lanes	Prohibit on-street parking on arterials during peak periods, to increase traffic lanes.	Vehicle traffic over parking.
abandoned vehicles	Have a system to identify and remove abandoned vehicles from public parking facilities.	Operating vehicles.

More Accurate and Flexible Standards

More accurate and flexible standards means that parking requirements at a particular location are adjusted to account for factors such as those in Table 4 (Cuddy 2007; Engel-Yan and Passmore 2010; Litman 2009).

Table 4 **Parking Requirement Adjustment Factors**

Factor	Description	Typical Adjustments
Geographic Location	Vehicle ownership and use rates in an area.	Adjust parking requirements to reflect variations identified in census and travel survey data.
Residential Density	Number of residents or housing units per acre/hectare.	Reduce requirements 1% for each resident per acre: Reduce requirements 15% where there are 15 residents per acre, and 30% if there are 30 residents per acre.
Employment Density	Number of employees per acre.	Reduce requirements 10-15% in areas with 50 or more employees per gross acre.
Land Use Mix	Range of land uses located within convenient walking distance.	Reduce requirements 5-10% in mixed-use developments. Additional reductions with shared parking.
Transit Accessibility	Nearby transit service frequency and quality.	Reduce requirements 10% for housing and employment within ¼ mile of frequent bus service, and 20% for housing and employment within ¼ mile of a rail transit station.
Carsharing	Whether a carsharing service is located nearby.	Reduce residential requirements 5-10% if a carsharing service is located nearby, or reduce 4-8 parking spaces for each carshare vehicle in a residential building.
Walkability	Walking environment quality.	Reduce requirements 5-15% in walkable communities, and more if walkability allow more shared and off-site parking.
Demographics	Age and physical ability of residents or commuters.	Reduce requirements 20-40% for housing for young (under 30) elderly (over 65) or disabled people.
Income	Average income of residents or commuters.	Reduce requirements 10-20% for the 20% lowest income households, and 20-30% for the lowest 10%.
Housing Tenure	Whether housing are owned or rented.	Reduce requirements 20-40% for rental versus owner occupied housing.
Pricing	Parking that is priced, unbundled or cashed out.	Reduce requirements 10-30% for cost-recovery pricing (i.e. parking priced to pay the full cost of parking facilities).
Unbundling Parking	Parking sold or rented separately from building space.	Unbundling parking typically reduces vehicle ownership and parking demand 10-20%.
Parking & Mobility Management	Parking and mobility management programs are implemented at a site.	Reduce requirements 10-40% at worksites with effective parking and mobility management programs.
Design Hour	Number of allowable annual hours a parking facility may fill.	Reduce requirements 10-20% if a 10th annual design hour is replaced by a 30th annual peak hour. Requires overflow plan.
Contingency-Based Planning	Use lower-bound requirements, and implement additional strategies if needed.	Reduce requirements 10-30%, and more if a comprehensive parking management program is implemented.

This table summarizes various factors that affect parking demand and optimal parking supply.

Reduce Residential Street Width Requirements

Most jurisdictions require wide residential streets in order to provide on-street parking. This practice is not justified for safety or by consumer demands, since many households would not choose to pay for parking if it were unbundled, and so represents a hidden subsidy of automobile ownership and use (Guo, et al. 2012). Reducing minimum residential street widths in municipal zoning codes and development policies allows developers to build *new urbanist* communities with narrower streets and less parking, and rely more on efficient parking management.

Parking Maximums

Parking Maximums means that an upper limit is placed on parking supply, either at individual sites or in an area. Area-wide limits are called *Parking Caps*. These can be in addition to or instead of minimum parking requirements. Excessive parking supply can also be discouraged by reducing public parking supplies, imposing a special parking tax, and by enforcing regulations that limit temporary parking facilities. Maximums often apply only to certain types of parking, such as long-term, single-use, free, or surface parking, depending on planning objectives.

Remote Parking and Shuttle Service

Remote Parking (also called *Satellite Parking*) refers to the use of off-site parking facilities. This often involves shared facilities, such as office workers parking at a restaurant parking lot during the day, in exchange for restaurant employees using the office parking lot evenings and weekends. It can involve use of public facilities, such as commercial parking lots. Remote parking can also involve use of parking facilities located at the periphery of a business district or other activity center, and use of overflow parking during a special event that attracts large crowds. Special shuttle buses or free transit service may be provided to connect destinations with remote parking facilities, allowing them to be farther apart than would otherwise be acceptable. Another type of remote parking is use of *Park & Ride* facilities, often located at the urban fringe where parking is free or significantly less expensive than in urban centers.

Figure 3 **Overflow Parking Sign**

Remote parking requires providing adequate use information and incentives to encourage motorists to use more distant facilities. For example, signs and maps should indicate the location of peripheral parking facilities, and they should be significantly cheaper to use than in the core. Without such incentives, peripheral parking facilities are often underused while core parking is congested.

Smart Growth

Smart growth (also called *New Urbanism*, *Location Efficient Development* and *Transit Oriented Development*) is a general term for development policies that result in more efficient transportation and land use patterns, by creating more compact, development with multi-modal transportation systems ("Smart Growth," VTPI 2005).

Smart growth supports and is supported by parking management. Parking management reduces the amount of land required for parking facilities, reduces automobile use and increases infill affordability. These land use patterns, in turn, tend to reduce vehicle ownership and use, and so reduce parking requirements. They allow more sharing of parking facilities, shifts to alternative modes, and various types of parking pricing. Smart growth usually incorporates specific parking management strategies, as indicated in Table 5. Effective parking management is a key component of smart growth.

Table 5 **Conventional and Smart Growth Parking Policies**

Conventional Parking Policies	Smart Growth Parking Policies
Managed only for motorist convenience	Managed for transport system efficiency
Maximum parking supply	Optimal parking supply (not too little, not too much)
Prefers free parking	Prefers priced parking (user pays directly)
Dedicated parking facilities	Shared parking facilities
Favors lower-density, dispersed development	Favors compact development.

Walking and Cycling Improvements

Walking and Cycling (together called *Non-motorized*, *Active* or *Human Powered* transport) improvements support parking management strategies in several ways ("Walking and Cycling Improvements," VTPI 2005):

- Improving walkability (the quality of walking conditions) expands the range of parking facilities that serve a destination. It increases the feasibility of sharing parking facilities and use of remote parking facilities.
- Improving walkability increases "park once" trips, that is, parking in one location and walking rather than driving to other destinations, which reduces vehicle trips and the amount of parking required at each destination.
- Walking and cycling improvements allow these modes to substitute for some automobile trips.
- Walking and cycling improvements encourage transit use, since most transit trips involve walking or cycling links.

Increase Capacity of Existing Parking Facilities

Increase capacity of existing parking facilities means that parking supply increases without using more land or major construction. There are various ways to do this:

- Use currently wasted areas (corners, edges, undeveloped land, etc.). This can be particularly appropriate for small car spaces, motorcycle and bicycle parking.
- Where there is adequate street width, change from parallel to angled on-street parking.
- Maximize the number of on-street parking spaces, for example, by using a curb lane for parking rather than traffic during off-peak periods, and designating undersized spaces for small cars or motorcycles.
- Provide special, small parking spaces for motorcycles. Allow and encourage motorcycles to share parking spaces when possible.
- Reduce parking space size. Shorter-term parking requires larger spaces, but employee and residential parking spaces can be somewhat smaller. A portion of spaces can be sized for compact vehicles, which require about 20% less space than full-size stalls.
- Use car stackers and mechanical garages. These can significantly increase the number of vehicles parked in an area. However, they are only suitable for certain applications. They generally require an attendant to move lower-level vehicles when needed to access upper-level vehicles, and stackers may be unable to accommodate larger vehicles such as SUV, vans and trucks.
- Use valet parking, particularly during busy periods. This can increase parking capacity by 20-40% compared with users parking their vehicles. Commercial lots often have attendants park vehicles during busy periods, but not off-peak.
- Remove or consolidate non-operating vehicles, equipment, material and junk stored in parking facilities, particularly in prime locations.

Mobility Management

Mobility Management (also called *Transportation Demand Management* or *TDM*) is a general term for strategies that increase transportation system efficiency by changing travel behavior (VTPI 2005). It may affect travel frequency, mode, destination or timing (for example, shifting from peak to off-peak). There are many different mobility management strategies, as summarized in the table below.

Table 6 **Mobility Management Strategies** (VTPI 2003)

Improved Transport Options	Incentives to Shift Mode	Land Use Management	Policies and Programs
Alternative Work Schedules	Bicycle and Pedestrian Encouragement	Car-Free Districts	Access Management
Bicycle Improvements	Congestion Pricing	Compact Land Use	Campus Transport Management
Bike/Transit Integration	Distance-Based Pricing	Location Efficient Development	Data Collection and Surveys
Carsharing	Commuter Financial Incentives	New Urbanism	Commute Trip Reduction
Guaranteed Ride Home	Fuel Tax Increases	Smart Growth	Freight Transport Management
Security Improvements	High Occupant Vehicle (HOV) Priority	Transit Oriented Development (TOD)	Marketing Programs
Park & Ride	Pay-As-You-Drive Insurance	Street Reclaiming	School Trip Management
Pedestrian Improvements	Parking Pricing		Special Event Management
Ridesharing	Road Pricing		Tourist Transport Management
Shuttle Services	Vehicle Use Restrictions		Transport Market Reforms
Improved Taxi Service			
Telework			
Traffic Calming			
Transit Improvements			

Mobility management includes numerous strategies that affect vehicle travel behavior. Many affect parking demand.

Mobility management both supports and is supported by parking management. Mobility management programs often reduce parking demand, and many parking management strategies help reduce vehicle traffic create more accessible land use patterns or support other mobility management objectives.

Parking Pricing

Parking Pricing means that motorists pay directly for using parking facilities ("Parking Pricing," VTPI 2005; Shoup 2005). This may be implemented as a parking management strategy (to reduce parking problems), as a mobility management strategy (to reduce transport problems), to recover parking facility costs, or to raise revenue for any purpose (such as funding local transport programs or downtown improvements). It is often intended to achieve a combination of objectives.

Currently, most parking is inefficiently priced; it is provided free, significantly subsidized, or bundled (automatically included) with building purchases and rents, forcing consumers to pay for parking facilities regardless of whether or not they want it. When motorists do pay directly for parking, it is often a flat annual or monthly fee, providing little incentive to use an alternative mode occasionally. Rates should be set to optimize parking facility use, called *performance-based pricing*, which means that about 15% of parking spaces are vacant and available at any time (Shoup 2006 and 2008).

Improve Parking Pricing Methods

Much of the resistance to parking pricing results from inconvenient pricing methods:

- Many require payment in specific denominations (coins or bills).
- Many require motorists to predict how long they will be parked, with no refund available if motorists leave earlier than predicted.
- Some payment systems cannot easily handle multiple price structures or discounts.
- Some are confusing or slow to use.
- Some have high equipment or enforcement costs.
- Enforcement often seems arbitrary or excessive.

Better payment methods are available. Newer electronic systems are more convenient, accurate, flexible, and increasingly cost effective. They can accommodate various payment methods (coins, bills, credit and debit cards, and by cellular telephone or the Internet), charge only for the amount of time parked, incorporate multiple rates and discounts, automatically vary rates by day and time, and are convenient to use. Some can be integrated with payment systems for other public services such as transit, roads tolls, and telephone use. Some employ contactless technology which automatically deducts payment. Newer systems also produce printed receipts and record data for auditing, which prevents fraud and increases convenience for customers, operators and local governments. They can also automatically record data on utilization and turnover, which improves planning and administration.

Financial Incentives

Financial Incentives means that travelers (particularly commuters) are offered financial benefits for reducing their automobile trips ("Commuter Financial Incentives," VTPI, 2005). These benefits represent the cost savings that result from reduced parking demand. There are various types of incentives. *Parking cash-out* means that commuters who are offered subsidized parking can choose cash instead. *Transit benefits* means that employees receive a subsidized transit pass. *Universal transit passes* means that a group purchases discounted, bulk transit passes for all members. Another incentive is to provide *discounted* or *preferential parking* for rideshare (carpool and vanpool) vehicles. Consumers value these options because they provide positive rewards for those who reduce vehicle trips and parking demand.

Financial incentives such as transit benefits and parking cash-out typically reduce automobile travel 10-30%, depending on the value of the incentive, and various factors. In urban areas commuters tend to shift to walking and transit. In suburban areas they tend to shift to cycling and ridesharing. These programs have been particularly successful at college and university campuses.

Unbundle Parking

Unbundling means that parking is rented or sold separately, rather than automatically included with building space. For example, rather than renting an apartment with two parking spaces for $1,000 per month, the apartment would rent for $800 per month, plus $100 per month for each parking space. This is more equitable and efficient, since occupants only pay for parking they need.

Parking can be unbundled in several ways:

- Facility managers can unbundle parking when renting building space.
- Developers can make some or all parking optional when selling buildings.
- In some cases it may be easier to offer a discount to renters who use fewer than average parking spaces, rather than charging an additional fee. For example, an office or apartment might rent for $1,000 per month with two "free" parking spaces, but renters who only use one space receive a $75 monthly discount.
- Parking costs can be itemized in lease agreements to help renters understand the parking costs they bear, and to help them negotiate reductions.
- Informal unbundling can be encouraged by helping to create a secondary market for available spaces. For example, office, apartment and condominium managers can maintain a list of residents who have excess parking spaces that are available for rent.

Parking Tax Reform

Parking tax reform includes various tax policies that support parking management, including *commercial parking taxes* (a special tax on parking rental transactions) and *per-space parking levies* (a special property tax applied to parking facilities). These can help reduce parking supply and increase parking prices, as well as providing revenues for public programs.

Bicycle Parking and Changing Facilities

Bicycle parking and changing facilities increase the convenience and security of bicycle transportation ("Bicycle Parking," VTPI 2005). In some situations, bicycle parking facilities can substitute for a portion of automobile parking, particularly if implemented as part of a comprehensive bicycle improvement and encouragement program. Optimal bicycle parking supply depends on the level of cycling that occurs in that community and the type of destination. Some destinations, such as schools, campuses and recreation centers have 10-20% of visitors arrive by bicycle, at least during fair weather.

Improve User Information and Marketing

User information refers to information for travelers about parking availability, regulations and price, and about travel options, such as walking, ridesharing and transit. Many parking problems result in part from inadequate user information. User information can be provided by signs, maps, brochures, websites, and electronic guidance systems. It is particularly useful if there is a perceived parking shortage, although space are actually available in an area.

Improve Enforcement and Control

Improve Enforcement and Control means that parking regulations and pricing requirements are enforced more frequently, more effectively and more considerately. Evading parking regulations is a folk crime. Many otherwise upstanding citizens who otherwise never steal will proudly ignore parking regulations and evade payments, reducing their effectiveness. Improving enforcement and control supports parking management by increasing regulatory and pricing effectiveness. As parking management activities expand, so too should enforcement activities.

Transportation Management Associations and Parking Brokerage

Transportation Management Associations (TMAs) are private, non-profit, member-controlled organizations that provide transportation and parking management services in a particular area, such as a commercial district, mall or medical center ("Transportation Management Associations," VTPI 2005). TMAs can be an effective way to implement parking management programs. TMAs are typically funded through dues paid by member businesses, and local government grants.

Overflow Parking Plans

Overflow parking plans describe the management strategies that will be applied when parking facilities fill, for example, during special events, peak shopping periods, or temporary reductions in parking supply. Because most parking facilities are sized to accommodate peak demands that seldom occur, an overflow parking plan can significantly reduce the amount of parking needed, and provide reassurance that reduced supply will not create problems.

Address Spillover Problems

Spillover parking problems refers to the undesirable use of offsite parking facilities, such as when business customers and employees park on nearby residential streets or use another businesses' parking lot. Concerns about spillover impacts are used to justify excessive parking requirements and opposition to management solutions. Addressing spillover problems can increase parking management program acceptability and effectiveness. There are several ways to address spillover parking problems.

- Provide information indicating where motorists may and may not park.
- Use regulations to control spillover impacts, such as time limits and permit programs on residential streets near activity centers.
- Use pricing to control spillover impacts, such as charging non-residents for parking on residential streets near activity centers, and businesses charging non-customers for using in their parking facilities.
- Create *Parking Benefit Districts* in areas that experience parking spillover problems, so on-street parking is priced (residents can be exempt).
- Compensate people who bear spillover parking impacts. For example, a high school can send complementary sport event tickets to residents of nearby streets who experience spillover parking problems.
- Establish a monitoring program to identify where parking spillover is a problem. This may include surveys to identify who is parking where, and ways for residents and businesses to report spillover problems.

Improve Parking Facility Design and Operation

Parking facility design and operation refers to physical layout, construction and day-to-day management. Improved design and operation can better integrate parking facilities into communities, improve the quality of service experienced by users, support parking management, and help address specific problems.

Summary

The table below summarizes potential parking management strategies and their impacts.

Table 7 **Parking Management Strategies**

Strategy	Description	Typical Reduction	Traffic Reduction
Shared Parking	Parking spaces serve multiple users and destinations.	10-30%	
Parking Regulations	Regulations favor higher-value uses such as service vehicles, deliveries, customers, quick errands, and people with special needs.	10-30%	
More Accurate and Flexible Standards	Adjust parking standards to more accurately reflect demand in a particular situation.	10-30%	
Parking Maximums	Establish maximum parking standards.	10-30%	
Remote Parking	Provide off-site or urban fringe parking facilities.	10-30%	
Smart Growth	Encourage more compact, mixed, multi-modal development to allow more parking sharing and use of alternative modes.	10-30%	✓
Walking and Cycling Improvements	Improve walking and cycling conditions to expand the range of destinations serviced by a parking facility.	5-15%	✓
Increase Capacity of Existing Facilities	Increase parking supply by using otherwise wasted space, smaller stalls, car stackers and valet parking.	5-15%	
Mobility Management	Encourage more efficient travel patterns, including changes in mode, timing, destination and vehicle trip frequency.	10-30%	✓
Parking Pricing	Charge motorists directly and efficiently for using parking facilities.	10-30%	✓
Improve Pricing Methods	Use better charging techniques to make pricing more convenient and cost effective.	Varies	✓
Financial Incentives	Provide financial incentives to shift mode such as parking cash out.	10-30%	✓
Unbundle Parking	Rent or sell parking facilities separately from building space.	10-30%	✓
Parking Tax Reform	Change tax policies to support parking management objectives.	5-15%	✓
Bicycle Facilities	Provide bicycle storage and changing facilities.	5-15%	✓
Improve Information and Marketing	Provide convenient and accurate information on parking availability and price, using maps, signs, brochures and the Internet.	5-15%	✓
Improve Enforcement	Insure that regulation enforcement is efficient, considerate and fair.	Varies	
Transport Management Assoc.	Establish member-controlled organizations that provide transport and parking management services in a particular area.	Varies	✓
Overflow Parking Plans	Establish plans to manage occasional peak parking demands.	Varies	
Address Spillover Problems	Use management, enforcement and pricing to address spillover problems.	Varies	
Parking Facility Design and Operation	Improve parking facility design and operations to help solve problems and support parking management.	Varies	

This table summarizes the parking management strategies described in this report. It indicates the typical reduction in the amount of parking required at a destination, and whether a strategy helps reduce vehicle traffic, and so also provides congestion, accident and pollution reduction benefits.

Not every strategy is appropriate in every situation. Actual impacts vary depending on geographic and demographic factors, how a strategy is implemented and other factors. Below are some general guidelines.

- Impacts are higher where there are more parking and travel options. For example, parking pricing will have greater demand reduction impacts if implemented in conjunction with improvements in rideshare and public transit services.
- Financial incentives tend to have greater impacts on lower-income consumers.
- Some strategies are complementary. For example, shared parking becomes more effective if implemented with suitable regulations, pricing and walkability improvements.
- Impacts generally increase over time as programs mature. A Low value may be appropriate the first year, but increases to Medium after two or three years, and High after five or ten years.

Special care is needed when predicting the impacts of a program that includes multiple parking management strategies. Be careful to take into account strategies with overlapping impacts. For example, Transportation Management Associations (TMAs) provide an institutional framework for implementing strategies that directly affect parking requirements. While it would be true to say that a TMA can reduce parking requirements by 10-30% compared with not having such an organization, it would be incorrect to add the demand reductions of the TMA to the impacts of the individual strategies it helps implement.

Total impacts are multiplicative not additive. Shared parking reduces the parking requirements by 10%, to 90% of the original level. The 10% reduction of Parking Pricing reduces this further to 81% of the original level, and another 10% reduction from Mobility Management results in 73% of the original level, a 27% reduction, somewhat less than the 30% reduction that would be calculated by adding three 10% reductions.

Some combinations of strategies have synergistic effects (total impacts are greater than the sum of their individual impacts), and so become more effective if implemented together. For example, sharing parking and walkability improvements may each reduce parking requirements just 10% if implemented alone, but 25% if implemented together because they are complementary.

Developing An Integrated Parking Plan

Below are recommendations for integrated parking planning. This should be adjusted to reflect the needs of a particular situation.

Define Scope

Define the geographic scope of analysis, such as the site, street, district/neighborhood and regional scale. It is desirable to plan for a walkable area, such as a business district or neighborhood, since this is the functional scale of parking activities.

Define Problems

Carefully define parking problems. For example, if people complain of inadequate parking it is important to determine where, when and to whom this occurs, and for what types of trips (deliveries, commuting, shoppers, tourists, etc.).

Strategic Planning Context

Parking planning should be coordinated with a community's overall strategic vision. This helps insure that individual decisions reflect broader community objectives.

Establish Evaluation Framework

Develop a comprehensive *evaluation framework*. This provides the basic structure for analyzing options, insuring that critical impacts are not overlooked and different situations are evaluated consistently. A framework identifies:

- *Perspective and scope*, the geographic range and time-scale of impacts to consider.
- *Goals* (desired outcomes to be achieved) and *objectives* (ways to achieve goals).
- *Evaluation criteria*, including costs, benefits and equity impacts to be considered.
- *Evaluation method*, how impacts are to be evaluated, such as benefit/cost analysis.
- *Performance indicators*, practical ways to measure progress toward objectives.
- *Base Case* definition, that is, what would happen without the policy or program.
- *How results are presented*, so results of different evaluations can be compared.

Survey Conditions

Survey parking supply (the number of parking spaces available in an area) and demand (the number of parking spaces occupied during peak periods) in the study area.

Identify and Evaluate Options

Develop a list of potential solutions using ideas from this report and stakeholder ideas. Evaluate each option with respect to evaluation criteria.

Develop An Implementation Plan

Once the components of a parking management plan are selected, the next step is to develop an implementation plan. This may include various phases and contingency-based options. For example, some strategies will be implemented the first year, others within three years, and a third set will only be implemented if necessary, based on performance indicators such as excessive parking congestion or spillover problems.

Conclusions

Current parking planning practices are inefficient, resulting in economically excessive parking supply, increased automobile traffic, and more dispersed destinations, contributing to various economic, social and environmental problems. There are many reasons to use management strategies that result in more efficient use of parking resources, in order to address parking problems without expanding supply.

Parking facilities that serve multiple destinations and are efficiently regulated or priced to favor higher value users (for example, delivery vehicles and customers over commuters and residents) tend to be efficiently used. On-street metered parking and commercial parking are particularly suitable for this type of management, and so should be favored over unpriced, off-street parking that serves a single destination.

This report describes more than two-dozen management strategies that result in more efficient use of parking resources. These strategies are technically feasible, cost effective, and can provide many benefits to users and communities. Although all of these strategies have been implemented successfully in some situations, they are not being implemented as much as economically justified, due to various institutional barriers. Parking management implementation requires changing the way we think about parking problems and expanding the range of options and impacts considered during planning.

Most parking management strategies have modest individual impacts, typically reducing parking requirements by 5-15%, but their impacts are cumulative and synergistic. A comprehensive parking management program that includes an appropriate combination of cost-effective strategies can usually reduce the amount of parking required at a destination by 20-40%, while providing additional social and economic benefits.

Management solutions represent a change from current practices and so various obstacles must be overcome for parking management to be implemented as much as optimal. Current planning practices are based on the assumption that parking should be abundant and provided free, with costs borne indirectly, incorporated into building construction costs or subsidized by governments. Current parking standards tend to be applied inflexibly, with little consideration of demographic, geographic and management practices that may affect parking requirements. Parking management requires changing current development, zoning and design practices. This requires that public officials, planners and the public change the way they think about parking problems and solutions, and become familiar with the full menu of parking management strategies available and the benefits they can provide. It requires an institutions and relationships, such as transportation management associations, and activities to improve enforcement and addressing potential spillover impacts.

This report summarizes the book *Parking Management Best Practices*, by Todd Litman, published by Planners Press in 2006. If you find this report useful, please purchase the book, which contains more detailed information.

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The High Cost of Free Parking

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To Pat

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CHAPTER

20

Unbundled Parking

The point of cities is multiplicity of choice.

—JANE JACOBS

If cities required restaurants to offer a free dessert with each dinner, the price of every dinner would soon increase to include the cost of a dessert. To ensure that restaurants didn't skimp on the size of the required desserts, cities would have to set precise "minimum calorie requirements." Some diners would pay for desserts they didn't eat, and others would eat sugary desserts they wouldn't have ordered had they paid for them separately. The consequences would undoubtedly include an epidemic of obesity, diabetes, and heart disease. A few food-conscious cities like New York and San Francisco might prohibit free desserts, but most cities would continue to require them. Many people would get angry at even the thought of paying for the desserts they had eaten free for so long.

Cities don't require free desserts with every dinner, of course, but they do require off-street parking spaces for every building. As a result, the cost of parking is usually bundled into the prices for everything else, and most people drive wherever they go.[1] If cities remove these requirements, developers will be able to provide as few parking spaces as they choose. Some existing spaces will disappear as developers build infill projects on parking lots no longer required by law. Adaptive reuse of older buildings will also become less problematic because cities will no longer require property owners to provide additional parking spaces for new uses.

These responses to the liberation from parking requirements will reduce the supply and increase the price of parking. No one will be happy about

paying for parking, but think of it this way: a dessert not included in the price of a dinner is still available, but not everyone will order it. Eliminating off-street parking requirements is like giving diners more control over what they eat, in that unbundled parking gives travelers more options. Unbundling will also lead to an increase in shared parking because everyone who is willing to pay for the parking can use it. In contrast, required parking is typically *not* shared since each specific site must provide its own spaces.[2] Moreover, businesses that have paid dearly to provide their own parking are not eager to let their competitors' customers use it. The growth of paid, shared parking will therefore allow a smaller parking supply to serve more trips, while the higher price of parking will increase travel by carpools, transit, biking, and walking. Removing off-street parking requirements will slowly but surely lead to shared parking, higher urban density, and a shift away from solo driving.

Unbundling will be simple where parking spaces are expensive and where the transaction costs of charging for them are low. Perhaps the simplest example is the case of apartment buildings that now typically offer two "free" parking spaces with every unit. Parking can be unbundled in this case by offering residents the option to lease the apartments and parking spaces separately. Residents can then choose how many parking spaces they are willing to pay for. I will use the example of separating the rent for parking spaces from the rent for apartments to show how unbundling can reduce the cost of housing.

PARKING COSTS UNBUNDLED FROM HOUSING COSTS

Landlords customarily bundle the prices for housing and parking in a single transaction. The bundled parking is not really free, of course. It just comes at no extra cost, so that residents think it is free and make their choices accordingly. Renting apartments and parking spaces separately will make the housing cheaper for those who think a second parking space (or even a first one) isn't worth the extra cost. If developers provide fewer parking spaces and pass the cost savings on to the residents, the housing itself will be cheaper.

An Example

Because cities require parking spaces as a condition for granting a building permit, developers usually don't separate the cost of parking from the other costs of an apartment building. As explained in Chapter 5, however, an apartment project on the UCLA campus unbundled these two costs because the housing and the parking were financed from separate budgets. Data from this project can thus illustrate the effects of charging

Table 20-1. Unbundling Reduces Apartment Rents and Increases Parking Rents

	Rent ($/month)						
	Bundled parking			*Unbundled parking*			
Number of cars	Apartment	Parking	Total	Apartment	Parking	Total	Saving
(1)	(2)	(3)	(4)=(2)+(3)	(5)	(6)	(7)=(5)+(6)	(8)=(4)-(7)
No car	$1,800	$0	$1,800	$1,400	$0	$1,400	$400
One car	$1,800	$0	$1,800	$1,400	$200	$1,600	$200
Two cars	$1,800	$0	$1,800	$1,400	$400	$1,800	$0

Assumptions:
Construction cost per apartment = $140,000.
Construction cost per parking space = $20,000.
Monthly rent = 1% of construction cost.
Bundled parking: two spaces for every apartment.
Unbundled parking: rent per space is $200 per month.

residents separately for apartments and parking spaces (see Chapter 5 and Table 5-4 for details of the project).

UCLA is exempt from zoning regulations, but if the project had been required to comply with the city's off-street parking requirements it would have needed 2.1 spaces per apartment. To keep the numbers simple, suppose each apartment costs $140,000, each parking space costs $20,000, and the city requires two parking spaces per apartment.[3] Further, suppose the monthly rent necessary to recover the cost of an apartment or a parking space is 1 percent of its construction cost.[4] Table 20-1 shows the results of bundling the parking cost into the apartment cost, as well as what happens when the two costs are unbundled.

If the cost of two parking spaces is included in the cost of each apartment, the apartments will cost $180,000 apiece ($140,000 + 2 x $20,000), and if the monthly rent is 1 percent of the construction cost, each apartment will rent for $1,800 a month regardless of how many cars the resident owns (see column 4). Suppose, however, the apartments and the parking spaces are rented separately. An apartment will then cost $1,400 a month, and each parking space will cost $200 a month. Residents without a car will pay $1,400 a month, those with one car will pay $1,600, and those with two cars will pay $1,800 (see column 7). Those who rent two parking spaces still pay the same total rent they would have paid if two "free" spaces had been bundled with their rent, but everyone else saves money. All unbundling has done is to release residents from the obligation to pay for parking spaces they think are not worth the cost.

The price of $200 a month is based on the construction cost of a parking space. From a marketing perspective, however, it may seem exorbitant,

since everyone is accustomed to "free" parking. To avoid giving the impression of overcharging, a landlord can instead give residents a discount for not taking a parking space, just as restaurants and bars offer early-bird specials and happy hours for those who come early rather than add late fees for everyone else.[5] If the rent for an apartment is $1,800 with two free parking spaces (as in the case of bundled parking), a landlord can give a discount of $200 a month to a resident who has only one car, and $400 a month to a resident with no car.

Most people don't realize they already pay for parking in the rent for their housing. Unbundling does not increase the total cost for housing and parking, but rather splits it into two components and gives residents control over their parking costs. Residents can also be offered the choice of assigned or unassigned spaces, tandem or side-by-side spaces, or even valet parking, with all prices based on cost. Compact spaces can be priced less than full-size spaces since they are cheaper to construct, and this will encourage residents to buy smaller cars. Developers offer choices in the size and layout of apartments at different prices to suit different demands; offering choices in the number and type of parking spaces will also suit different demands, and the new choices will make the apartments themselves more affordable.[6]

Condominiums

Parking can also be unbundled in owner-occupied condominiums. Developers can offer the option to buy parking spaces separately from housing units or to lease parking spaces from the condominium association rather than buy them. Under the first option, the market would reveal how much residents value the parking spaces, and developers could cease building spaces residents do not think are worth the construction and maintenance costs.[7] Under the second option, the association could own the parking spaces as common property and lease them to the residents at a price that equates demand and supply. The rent from commonly owned parking spaces could then replace all or part of the association fees residents pay to maintain their association. Parking wouldn't be free, but those who own fewer cars would pay less. After unbundling, developers would find they could build condominiums with fewer parking spaces because residents would want fewer cars when they pay for parking separately.

Skeptics may doubt condominium owners will prefer to lease rather than to buy parking spaces, but it can easily become a mainstream practice. After all, people used to lease their apartments and buy their cars, but now the reverse is often true.[8] And if people choose to lease their cars, they may decide to lease their parking spaces as well. To begin with, the transaction costs for renting a parking space are much lower than for renting a car. Furthermore, the ability to vary the number of parking spaces you use is an advantage, especially because many bundled parking spaces cost more than the cars parked in them. Few people rent an expensive parking space they don't use. Unbundled parking simply gives people the option to decline a space they think is not worth the cost.

Like Cashing Out Employer-Paid Parking

Offering a discount for not taking a parking space in an apartment building resembles the option to cash out employer-paid parking at work. Employers who offer parking cash out praise its simplicity and fairness, and report that it helps recruit and retain workers. If commuters can cash out their employer-paid parking at work and also pay less for housing if they use less parking at home, they can double the savings from reduced car ownership. Cashing out free parking at both the work end and the home end of the commute trip will especially appeal to those who appreciate proximity rather than mobility as the way to gain access to activities.

What is the Right Number of Unbundled Parking Spaces?

If cities do not require off-street parking, how will developers know the right number of spaces to provide? This brings us back to the restaurant menu. How many desserts should the chef prepare if they aren't included free with the dinners? The truth, universally acknowledged, is that demand depends on price. The right number of desserts depends on how much the different kinds of desserts cost to prepare and how much the diners are willing to pay for them. So too with parking spaces. The right number depends on how much the spaces cost and how much residents think they are worth.

Constructing the second parking space per housing unit can be much more expensive than the first because of natural "break points" in the cost of parking spaces—points where the marginal cost per space jumps. One major break point occurs when surface lots cannot provide all the required spaces, and a parking structure is required. Another occurs when aboveground space is exhausted, and parking must be built underground. And with underground parking, additional break points occur with each successive level that must be excavated. The second parking space per apartment can thus be much more expensive than the first.

Returning to the UCLA example, the average cost of all the parking is $20,000 a space, but the first spaces may cost only $15,000 while the second ones cost $25,000. Yet while the second parking space costs more to construct, it is likely to be less valuable to residents than the first one since many households may get by with only one car. The high demand for the

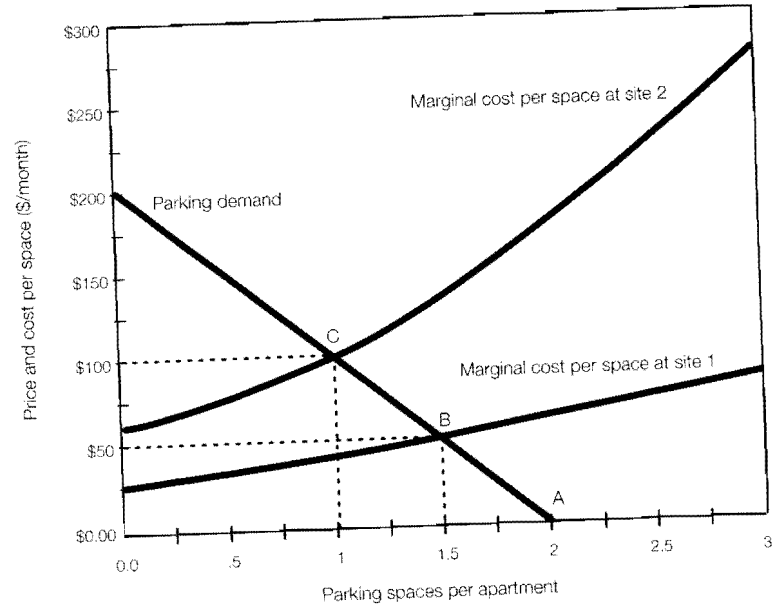
first space should thus not be confused with the lower demand for a second one, and unbundling can significantly reduce the cost of an apartment while only slightly reducing its value to residents. After all, you are much better off if you can save $200 a month by forgoing a second parking space you may think is worth only $50 a month.

A simple graph can illustrate how price affects the demand for parking, and how cost affects the supply. Figure 20-1 shows the demand for parking at two apartment houses as a function of the rent per space. Suppose the demand curve for parking is the same at both sites. Although different families will have different demands, the number of spaces demanded increases as the rent per space falls, with demand in both buildings for two spaces per unit when parking is free (point A). Now consider the marginal cost of parking spaces at the two sites. The lower curve shows how the marginal cost of providing an additional space at site 1 increases as the number of spaces increases. If the rent charged for a parking space covers the marginal cost of constructing it, residents will demand 1.5 spaces per apartment (perhaps half the residents will take one space, and the other half will take two) at a price of $50 a month (point B).[9] In this case, a developer will lose money by providing more than 1.5 spaces per apartment because the additional spaces will cost more than the residents are willing to pay for them. The upper curve shows the marginal cost per space at site 2 where parking costs more to construct, and in this case residents demand one space per apartment at a price of $100 a month (point C). Even if the demand for parking were the same everywhere (which it is not), the different construction costs at different sites imply that the number of parking spaces should not be the same everywhere.

Developers can compare the cost of parking spaces with the rates they believe the residents will be willing to pay for them. For example, at an interest rate of 10 percent a year and an amortization period of 30 years, each $1,000 in cost for a parking space requires $8 a month in debt payments. At this rate, a parking space that costs $20,000 must earn $160 a month in rent to cover its cost. If only a few residents are willing to pay more than $100 a month for a second parking space, developers will not voluntarily provide two spaces for every apartment. For the same amount of money, many residents might prefer bigger apartments with fewer parking spaces, so that is what the market will tend to provide.

If cities charge market-rate prices for curb parking, the price of off-street parking can guide the number of spaces developers provide, so that residents are not forced to pay for parking they don't think is worth the cost. But if curb parking remains free, cities that want to prevent spillover must require developers at both sites to provide two off-street spaces for every

Figure 20-1. Demand for Unbundled Parking



apartment, which is wasteful on several levels. To begin with, the economic waste associated with providing two parking spaces per apartment is measured by how much more the spaces cost than residents think they are worth.[10] In addition, the oversupply of bundled parking induces residents to spend more to buy and drive cars. The resulting traffic congestion and air pollution then compound the economic waste associated with too many parking spaces.

What Is the Right Size for Unbundled Parking Spaces?

Some cities allow developers to provide a share of the required parking as compact spaces so that more cars can fit within the same area. Many cities have abandoned this policy, however, and instead require "universal" spaces big enough to fit all cars. In their study of the parking requirements for Montgomery County, Maryland, for example, Steven Smith and Alexander Hekimian reported that the county adopted the dimensions of 8.5 feet x 18 feet for all parking spaces because the single size (1) simplifies parking regulations, (2) eliminates enforcement problems caused by large cars squeezing into compact spaces, (3) makes parking

plan reviews easier, (4) avoids the need to change the maximum allowable percentage of compact spaces as the proportion of small cars in the fleet changes, (5) improves traffic circulation by eliminating the need to search for an appropriate size space in the facility, and (6) eliminates frustration and user complaints.[11] These reasons for the one-size-fits-all requirement suggest the problems created when planning replaces prices as the way to measure demand. If all parking is free, planners must devise clumsy, heavy-handed regulations that fail to discriminate among the different circumstances of many different people.

Off-street parking requirements eliminate any incentive to charge for parking in proportion to a car's size. When cars grow larger, cities typically respond by increasing the minimum width and length of the required parking spaces so that drivers can safely and comfortably open the doors of their bigger cars without marring the finish of adjacent vehicles in parking lots. Imagine the public health problems if people were always given, free, an entire new wardrobe of larger clothes whenever they gained weight. Because cities require wider and longer parking spaces when cars expand, the price of parking does not restrain the size of cars. In contrast, some garages in Europe include ceiling-mounted sensors at the entrance to measure each car's length. Smaller cars are automatically given a discount and are guided to smaller stalls.[12] If more garages give discounts for smaller cars, more drivers will buy small cars, and parking spaces can be smaller.

If cities stop specifying the minimum number and size of parking spaces, developers and property owners can respond to changes in the demand for different sized cars by re-striping and reconfiguring the parking spaces, and then by charging for the spaces according to their size. Suppose, for example, an apartment building is built with half compact spaces and half full-size spaces. If the demand for the cheaper compact spaces later increases, the building owner can re-stripe and convert some full-size spaces into a larger number of compact spaces. And if large Sports Utility Vehicles (SUVs) cannot fit into a full-size space easily, the owner can re-stripe to provide a few oversize spaces at a higher price, or perhaps an SUV owner can rent two compact spaces. If parking spaces are priced by their size, people will take these prices into account when choosing what size car to buy. A Chevrolet Aveo, for example, occupies only 57 percent of the space occupied by a Chevrolet Silverado.[13] If parking were priced in proportion to a car's size, Aveo owners would pay less than Silverado owners, and motorists would buy more Aveos. The size differences are also great in other countries. In Britain, a Mini Cooper takes only 54 percent of the space occupied by a Rolls Royce Phantom. In Japan, two Suzuki Cappuccinos can fit into the space occupied by one Nissan Armada. And in Germany, three Daimler-Chrysler Smart Cars can fit into the space occupied by one Daimler-Chrysler Maybach 62. Because the size differences among cars are so large, charging for parking in proportion to a car's size is fairer than charging the same price for all cars regardless of their size.[14] After all, no one expects to pay the same rent for a 500-square-foot apartment as for a 1,500-square-foot apartment in the same building.

Two Markets for Unbundled Parking

Unbundled parking gives residents the option to save money on housing if they own fewer cars. Even where two free parking spaces are bundled into the rent for apartments, some families own only one car, and a few own no car. Because bundled parking forces these families to pay for parking spaces they don't use, they are an obvious niche market for apartments with unbundled parking. They can save on the cost of housing without giving up anything.

There is another niche market even among families who now own two cars. Unbundled parking increases the fixed cost of car ownership, and this higher fixed cost may lead some residents to decide not to buy a second car. Just as bundled parking increases spending on cars and driving, unbundled parking reduces it. Because the price of parking affects car ownership, the car ownership rates observed at sites where all parking is free give a distorted view of "the demand for parking." Residents who have to pay a high price for a second parking space may decide that a second car is not worth owning. They may, for example, choose to own one newer and higher-quality car in response to unbundling rather than two older, cheaper, and less reliable ones. Downsizing the number of cars but increasing their quality in response to unbundled parking can also increase the amount of money a household has available for nonautomobile expenditures.[15] The option to save money on both cars *and* parking will especially appeal to residents who enjoy walking or bicycling rather than driving for short trips.

Tiebout Sorting

Some apartment buildings were built before cities required off-street parking and provide few or no on-site parking spaces. Some residents are thus, in a sense, offered unbundled parking because they can select an apartment without a parking space if they choose to live in an old building. People therefore tend to sort themselves among apartments according to their demand for parking: those who want more parking can live in newer buildings, while those who want less parking can opt for older buildings. This residential sorting is similar to the idea that people "vote

with their feet" by moving to the city that provides their preferred combination of public services and taxes, as public finance economist Charles Tiebout hypothesized.[16] Tiebout argued that households with similar tastes for public services and taxes tend to settle in the same jurisdictions. Similarly, households who own more cars will move to newer buildings with more parking spaces, and households who own fewer cars will move to older buildings. But this process is limited because older buildings are concentrated in older areas, and their supply is shrinking. In 2000, only 15 percent of owner-occupied units and 36 percent of renter-occupied units were built before 1960.[17] Because off-street parking requirements had become common by 1960, most housing now comes with ample parking, regardless of whether the residents want it. Tiebout sorting undoubtedly occurs, but it is a clumsy way to provide unbundled parking, and it becomes less effective as time passes.

PARKING CAPS OR PARKING PRICES?

In 1998 the British government established an Urban Task Force, chaired by the architect Lord Richard Rogers, to examine the causes of urban decline in England and to recommend practical solutions. In his introduction to the task force's report, *Towards an Urban Renaissance*, Lord Rogers wrote:

> We need a vision that will drive the urban renaissance. We believe that cities should be well designed, be more compact and connected, and support a range of diverse uses—allowing people to live, work and enjoy themselves at close quarters—within a sustainable urban environment.... An urban renaissance is desirable, necessary, achievable and long overdue.[18]

A controversial feature of the report was its proposal to set a maximum standard of one parking space per dwelling for all new urban residential development.[19] Local government authorities argued this recommendation is too prescriptive, ignores local circumstances, and conflicts with the projected growth of car ownership in Britain. House builders argued that new dwellings with only one parking space are difficult to sell because residents place a high value on residential parking even if they don't own a car. In a survey of London residents, Michael Stubbs of Oxford Brookes University found the paradoxical result that the more central the residence, the greater the desire for residential parking spaces. Respondents also mentioned it was difficult to resell a property with no parking. Typical responses in the survey included comments such as "In Central London parking is a must," and "London is impossible if you have a car and no space."[20] Although some planners recommend car-free housing as

a way to increase density and improve design, developers are unlikely to build housing without parking if residents will not rent or buy it. Even those who do not own a car want flexibility because circumstances can change. If they do buy a car, they want a place to park it, and they want a place for guests to park.

In part, the demand for residential parking arises because it is bundled with housing, seemingly at no extra cost. You either have a parking space or you don't, and price is not mentioned. But with *unbundled* parking, residents can make separate housing and parking decisions. Those who don't own a car will be more willing to rent or buy an apartment without bundled parking if they know they can always rent or buy a convenient parking space whenever their circumstances change and they decide they want one. They won't have to move to a new apartment with bundled parking just because they buy a car. Bundling, in contrast, increases the demand for parking even by those who don't need it and who would rather live in a city less dominated by cars.

If parking is unbundled from housing and priced separately, prices can do the job of reducing the number of parking spaces. With parking priced to cover its cost, there is less need to cap the number of spaces in new development. If parking *is* capped, however, it should definitely be unbundled as well. Residents will be far more open to moving into housing with limited parking if they know they can always obtain a parking space if they are willing to pay the fair-market price for it. Market-price curb parking will complement the "cap and unbundle" approach to off-street parking. If curb parking is priced so that everyone can always find a place to park on their own street, residents will be even more willing to rent or buy an apartment without a bundled off-street space. People will not have to give up cars and change their lives in response to unbundled parking, but small changes made by enough people can make a big difference for cities and society.

EFFECTS OF UNBUNDLING ON VMT AND VEHICLE EMISSIONS

If you own a car, you'll also need a place to park it because the average car is parked 95 percent of the time. The demand for parking may therefore seem almost perfectly inelastic—an unquestioned necessity. But unbundling will shift parking from the cost of housing into the cost of car ownership, and the rent for a parking space will become part of the fixed cost of owning a car. Like insurance premiums and annual registration fees, parking will become another cost to consider in the decision to own and drive a car. Predicting the effects of car ownership costs on vehicle travel is complex, but Dutch transportation economist Gerald de Jong developed a model for this purpose.[21] He calibrated the model using data

from the Netherlands and Norway, and then used it to estimate the long-run elasticity of annual Vehicle Miles Travelled (VMT) with respect to the annual fixed cost of owning a car. The estimates were -0.68 for the Netherlands and -0.48 for Norway; that is, a 10 percent increase in the fixed cost of car ownership reduced VMT by 6.8 percent in the Netherlands and 4.8 percent in Norway. If we assume the lower elasticity of -0.5, we can use the model to predict how the increase in the fixed cost of car ownership associated with unbundling will reduce annual VMT. Table 20-2 shows the results.

The American Automobile Association estimated the average fixed cost for a new car in 2002 was $5,800 a year and the median age of passenger cars in the U.S. was eight years.[22] Because 79 percent of the fixed cost of a new car is depreciation and finance charges, an eight-year-old car has much lower fixed costs (consisting mainly of insurance and registration fees). If we assume the fixed cost of the median-age car is $1,000 a year, we can estimate how unbundled parking will increase the fixed cost of owning both new cars and median-age cars, and how the increase in fixed cost will in turn reduce annual VMT.

Suppose the rent for a parking space is $50 a month, or $600 a year. For median-age cars, unbundling will increase the fixed cost by 60 percent, and if the elasticity of VMT with respect to fixed costs is -0.5, this cost increase will reduce annual VMT by 30 percent (-0.5 x 60%, see column 2). For new cars, unbundling will increase the fixed cost by only 10 percent and thus reduce VMT by only 5 percent, but the VMT reduction will be greater if the price of parking is higher. For example, if the rent for a parking space is $150 a month, or $1,800 a year, and the other fixed costs for a new car are $5,800 a year, unbundling will reduce VMT by 15 percent (column 4).[23]

Table 20-2. Unbundling Reduces Vehicle Travel (% reduction in annual VMT)

	Car's fixed cost ($/year)	Parking price ($/year)		
		$600	$1,200	$1,800
	(1)	(2)	(3)	(4)
New car	$5,800	-5%	-10%	-15%
Median car	$1,000	-30%	-60%	-90%

Columns 2, 3, and 4 show the percentage reduction in annual VMT.
Assumption:
Elasticity of VMT with respect to the fixed cost of automobile ownership = -0.5.
Sources: de Jong (1997) and *Ward's Automotive Facts and Figures 2002*, p. 64.

Unbundled parking will reduce car ownership rates. While no-car families may remain rare, one-car families will become more common. Unbundled parking will also make car-sharing programs more popular because people can save by splitting the cost of parking. Car sharing's greatest benefit is to divide the fixed cost of automobile ownership among a large group of potential users, and adding the cost of parking to the fixed ownership cost will increase this benefit. The car-sharing households face a higher marginal cost of driving because they pay per hour of use or per mile driven. In Los Angeles, for example, one car-sharing plan has a $25 annual fee plus a charge of $10 per hour; each hour includes 10 free miles, and additional miles are charged at 35¢ a mile.[24] If a family drives its second car only 10 hours a month, the cost of car sharing for the same time will be only $100 a month, which may be less than the cost of parking and insurance alone for the second car. Many families may therefore choose a shared car as a convenient substitute for a second car.[25] Because car sharing converts much of the fixed cost of car ownership into the marginal cost of driving, this higher marginal cost will further reduce VMT.

Housing is not the only land use where parking can be unbundled. Commuters who cash out their employer-paid parking subsidies, for example, will be able to save on parking at both the home and work ends of their commute trips. If stores and restaurants unbundle parking from the prices of merchandise and meals, everyone will be able to save on parking by using less of it. Unbundling will thus convert parking from a hidden, fixed cost of living into an explicit, marginal cost of owning and using cars.[26]

Unbundled parking will raise ownership costs proportionally more for the older and less reliable second (or third or fourth) cars in a household, which often consume more fuel and produce more pollution. When people consider the price of parking a rarely used car, it may come to be seen as an expendable luxury. As a result, unbundled parking will tend to cull from the fleet the cars that contribute least to mobility and most to fuel consumption and air pollution (the evaporative emissions from older cars while they are parked can be higher than the running emissions of new cars while they are being driven). Separating the costs of housing and parking will therefore selectively discourage ownership of the cars that impose the highest social costs. Using remote-sensing technology, University of Denver chemistry professor Donald Stedman estimated that the dirtiest 10 percent of all cars produce about 50 percent of all vehicle emissions.[27] Scrapping some of these gross polluters that are not worth the cost of parking can therefore greatly improve air quality. Unbundling will reduce both the number of cars and total VMT, and since the remaining

cars will tend to be the cleaner ones, the reduction in emissions will exceed the reduction in VMT.

OBJECTIONS TO UNBUNDLING

If unbundling is such a good idea, why don't most landlords already do it? Parking often *is* unbundled in the older, denser parts of cities like New York and San Francisco, where parking is scarce. Parking condominiums have even been built for sale to residents who live in buildings that have no parking spaces (see Chapter 19). But most developers and landlords bundle parking with housing because the off-street parking requirements in zoning ordinances are so high. If cities require developers to provide two spaces per apartment, landlords cannot hope to rent the required spaces at a cost-recovery price. Many residents will think a second parking space, or even a first one, is not worth the high cost. Unbundled parking is rare because most cities require enough on-site parking spaces to satiate the demand for free parking.

Off-street parking requirements and bundled parking don't just happen, of course. Cities require off-street parking to solve problems that would occur if parking were not bundled into the prices for everything else. Consider the following potential problems that people might expect with unbundled parking: spillover, uncertainty, liability, transaction costs, and fairness. As we shall see, each can be successfully addressed *without* off-street parking requirements and bundled parking.

Spillover

Off-street parking requirements are intended to prevent parking spillover. If curb parking is free and new development doesn't provide enough off-street spaces, spillover will create a nuisance for everyone. Unbundling parking from housing will—if nothing else is done—create the spillover parking requirements are designed to solve.

To discourage spillover in residential neighborhoods, some cities prohibit overnight curb parking in order to prevent residents from using the streets as their garages. A more promising approach is to establish parking benefit districts that charge market prices for curb parking and spend the revenue to pay for public expenditures in the neighborhood (see chapters 16 and 17). If cities don't require off-street parking, curb parking can produce substantial revenue to pay for public services, which will then become another important benefit of unbundling.

Uncertainty

Another concern about unbundled parking is that without off-street parking requirements, some developers may provide too few spaces, and their

projects will be unrentable. Consider the example of the two apartment houses presented earlier in Figure 20-1. Suppose the developer at the first site underestimates the demand for parking and provides only 1.25 spaces per apartment. One way to deal with this mistake is to raise the price of a parking space (or the discount for not taking one) until residents want only 1.25 spaces per apartment, which in this case is $75 a month per space. Parking prices can adjust to clear the market, just as the prices of apartments themselves adjust to clear the market, and these flexible prices will reveal how much residents really value the parking spaces. Another option is to offer all residents the option of one parking space at $50 a month, with the second space offered at a price that clears the market. Flexible prices can thus resolve any uncertainty in matching future parking demand with the available supply.

Another way to deal with uncertainty regarding future parking demand is to make some garage space convertible between parking and on-site storage, so the space can be used for whichever purpose is more valuable.[28] Demand for the on-site storage alternative in apartment buildings might be strong, as shown by the demand for space in commercial self-storage lockers. Homeowners often convert their garages to storage, and some apartment residents may want to do the same thing. Parking spaces will become more flexible, like other types of real estate.

The price of parking in a new apartment building can also adjust in a way that will benefit both landlords and residents. New office buildings often offer free parking during the initial leasing period when plenty of parking spaces are available, and the free parking is an incentive for early tenants. Parking charges are introduced only after the building is fully leased, and there is a need to limit demand. An apartment building can similarly offer free parking in the early stages of leasing when most spaces are vacant. Free parking will be an incentive for the first tenants, and parking charges can be introduced only after the building is nearly full (the leases must inform residents of this arrangement in advance, of course). In contrast, when parking is bundled into higher rent for the apartments, free parking is no incentive for the first tenants.

Urban planners have no training to estimate the demand for parking, and no financial stake in the success of a development. They do not know more than the developers do about how many parking spaces each project needs. They may, at best, know a little about the peak demand for free parking at a few land uses (see Chapter 2), but they know nothing about the marginal cost of parking spaces at any site or how to estimate the demand for parking as a function of its price. Markets will quickly reveal the demand for parking if cities cease requiring off-street spaces. Developers, landlords, and residents will all be able to make their own

independent decisions about the right number of parking spaces. Market-priced parking will allow cities to evolve naturally in response to developers' costs and citizens' preferences, while parking requirements force evolution toward car dependency and sprawl. In planning for an uncertain future, flexible prices are far better than rigid requirements.

Liability

Legal liabilities help explain some cities' onerous transportation regulations. Excessive street widths, for example, are a defense against potential allegations that narrow streets contribute to automobile accidents. Legal rather than transportation concerns inhibit changing these regulations. But liability problems do not explain parking requirements. In their Central Business Districts (CBDs), Boston, New York, and San Francisco restrict rather than require off-street parking, while Cleveland, Milwaukee, and Philadelphia neither restrict nor require it. These examples show that, from a legal standpoint, cities can either restrict or ignore the number of off-street parking spaces. A failed Burger King, for example, is unlikely to prevail if it sues a city for negligently allowing fast-food restaurants to provide too little parking for their customers. Off-street parking requirements stem from cities' transportation and land-use planning policies, not from liability concerns.

Transaction Costs

Is parking too cheap to unbundle? If the cost of collecting the revenue outweighs the benefits of using prices to manage parking demand, free parking may be efficient; that is, parking may be too cheap to justify the transaction costs of charging for it. In the case of apartments, however, the transaction costs of charging for a parking space are minuscule compared with the cost of constructing it.[29]

The balance between the benefits of unbundling and the costs of transactions can differ greatly among different land uses, sites, and trips. If cities stop requiring off-street parking, the market will begin to sort out where unbundling is efficient. But it is wrong to assume that unbundling always involves higher transaction costs. Validated parking, for example, requires extra paperwork and accounting schemes to shield drivers from the parking charges that already exist. The parkers must also remember to have their parking tickets stamped, and forgetting to do this often leads to arguments at the exit kiosk, holding up everyone else waiting to leave. With validated parking, *bundling* increases transactions costs, and unbundling will reduce them.

Fairness

Will charging separately for parking harm the poor? To answer this question, we must remember that everybody pays for parking, but almost nobody pays for it directly. Everyone pays for bundled parking in the form of higher prices for everything else. If the cost of parking is bundled into the rent for housing, even those who can't afford a car must still pay for parking. Because the required parking spaces are a fixed cost, they represent a larger share of a lower income, and thus a greater burden for lower-income families. For example, if two required parking spaces add $100 a month to the rent for a family with an income of $24,000 a year, "free" parking consumes 5 percent of the family's income.

Unbundled parking will especially help those without cars because they will pay less for housing and nothing for parking. Unbundling will therefore benefit the poorest families more than anyone else. But will charging separately for parking harm poor families who give up a car—or decide not to buy one—to save the rent for an unbundled space? Again, we have to remember that bundled parking is not free; instead, it raises the cost of housing. How can the option to pay less for housing by taking less parking harm anyone, rich *or* poor? Those who rent the unbundled parking are no worse off, and those who don't rent it are better off because they have more money available for other things they value more.[30] The benefits to lower-income families are thus yet another advantage of unbundled parking.

CONCLUSION: THE HIGH COST OF BUNDLED PARKING

If the cost of parking is included in higher prices for everything else, we cannot pay less for parking by using less of it. Bundled parking hides the cost of owning and using cars, and it distorts choices toward cars and sprawl. The bloated parking supply required to satisfy the demand for free parking degrades urban design and drains life from city streets. By contrast, unbundled parking will reveal the cost of parking, reduce the prices of everything else, and give everyone the option to save money by conserving on cars and driving. Less driving will reduce traffic congestion, energy consumption, and air pollution. Fewer parking spaces will increase density and slow sprawl. As citizens cut back on driving in response to the rising price of parking, they will promote the public interest while pursuing their self-interest. Cities that remove off-street parking requirements will receive their just deserts.

CHAPTER 20 NOTES

1. Fang and Norman (2003, 1) say that bundling is "the practice of selling two or more products as a package deal, rather than selling each product separately… . The economics literature makes a distinction between *mixed bundling* and *pure bundling*. Mixed bundling refers to a pricing strategy where commodities included in a bundle can also be purchased separately, whereas pure bundling is used to describe a situation where the commodities in a bundle are not offered for sale separately." Validated parking is an example of mixed bundling; there is a price for parking, but the parking is free for those who buy something else from the firm that offers the validation. Residential parking is an example of pure bundling; a parking space is included in the price of a condominium, for example, but is not available otherwise.

2. Only at shopping malls, where many different uses are combined at one site, is it common for different uses to share free parking lots.

3. The actual construction cost of the project was $139,000 per apartment and $21,000 per parking space (see Chapter 5).

4. The monthly cost of 1 percent of the capital is a rough rule of thumb for rental housing and is used only for illustration. Obviously, the ratio depends on interest rates, taxes, operating costs, and other variables.

5. Similarly, some cities automatically reduce the fine for a parking citation if it is paid within a certain time rather than assess a late fee if the fine is not paid within the same time frame. An initial fine of $50 with a reduction to $35 if paid within a week, for example, is identical to one of $35 rising to $50 if not paid within a week. Although the lower fine with a late fee is the same as the higher one with a reduction for early payment, the issue is public relations: a late fee is a penalty, but a reduction for early payment is a reward.

6. The lower prices for smaller parking spaces should especially appeal to "green" residents who view oversized SUVs as "axles of evil" and "weapons of mass consumption."

7. The regulations could restrict ownership of parking spaces to residents to avoid any perception that "outsiders" are using their parking.

8. Similar reversals also occur. What use to be wired is now wireless (telephones), and what used to be wireless is now wired (cable television). Coffee drinkers are no longer surprised to see liquid sweeteners and powdered creamers. We should never underestimate consumers' adaptability to new circumstances. Owning rather than renting a parking space is a social convention that may easily change, just as other familiar conventions change.

9. I assume the real estate market is competitive and developers do consider the effect of their supply on the prices of apartments and parking spaces.

10. The magnitude of the waste is measured by the triangle above the demand curve, below the marginal cost curve, and to the left of a vertical line at two spaces per unit.

11. Smith and Hekimian (1985, 39). The ITE's recommended one-size-fits-all dimensions for parking spaces are 8.5 feet x 18 feet. In a survey of the parking requirements in the 27 cities in Dade County, Florida, John Bradley (1996) found that their required stall dimensions ranged from 8.5 feet x 18 feet (153 square feet) up to 10 feet x 25 feet (250 square feet). Many cities seem to take the ITE's recommendation as the minimum size and then require even larger spaces.

12. Several garages in Switzerland, and the National Car Park garage in Portman Square in London, have installed this technology.

13. An Aveo is 1.67 meters wide by 4.24 meters long, and occupies 7.07 square meters, while a Silverado is 1.99 meters wide by 6.27 meters long, and occupies 12.49 square meters.

14. Smaller cars reduce not only the demand for parking space, but also for road space. Because most of the road space used by cars in traffic is for the spacing between vehicles rather than for the vehicles themselves, however, reducing the average size of cars will reduce the demand for parking more than it reduces the demand for roads.

15. Downsizing the number of cars will reduce the fixed costs, such as insurance, of car ownership. The total insurance payments for one newer car can be significantly less than for two older cars. The repair costs for one newer car can also be less than for two older cars. The important point is that households will have more options with unbundled than with bundled parking. Some households with more than the usual number of drivers may even choose to rent *more* parking spaces than are commonly bundled free with the typical apartment.

16. Tiebout (1956). See Donahue (1997) and Fischel (2001b) for discussions of Tiebout sorting.

17. Table H-36 in Census 2000. These numbers are the averages for the nation, and most cities will have less variety. For example, Boston may have many more apartments with no or only one parking space, and Phoenix may have very few apartments with fewer than two parking spaces.

18. Urban Task Force (1999, 8).

19. Urban Task Force (1999, 105).

20. Stubbs (2002, 233).

21. De Jong (1997) explains that because of the fixed costs, car ownership is worthwhile only if you drive the car regularly. Households must therefore make a simultaneous decision on the ownership and use of a car.

22. *Ward's Motor Vehicle Facts & Figures 2002*, p. 64.

23. If residents pay for bundled parking in their rent, unbundling does not change the amount that car owners pay for parking. Unbundled parking does, however, increase the fixed cost of car ownership and decrease the rent for housing. For someone who gives up a second or third car after parking is unbundled, the lower rent will have an "income" effect on automobile use, so the elasticity of demand will slightly overstate the VMT reduction.

24. See the Flexcar web site at www.flexcar.com. Other plans with a higher fixed cost and a lower marginal cost are available for more frequent users.

25. In a study of one car-sharing plan in San Francisco, Cervero and Tsai (2003, 24-25) found that nearly nine out of 10 members were from households with no vehicle or only one.

26. We can think of how unbundling will reduce driving in another way. Andreas Schafer (2000) presents evidence showing that households' time and money budgets for travel are surprisingly stable over time. If unbundled parking raises the money cost of automobile

travel, reducing the number of vehicles and VMT are two ways to make compensating reductions in the money cost of travel, to keep the travel budget stable.

27. Stedman (1994) used on-road testing technology to measure the emissions. He also found that found that the dirtiest 3 percent of vehicles emit 23 percent of the on-road CO emissions, and 27 percent of the hydrocarbon emissions (p. viii). The poorly maintained cars are driven fewer miles per year, but they emit far more pollution per mile; their evaporative emissions when parked are also far higher. Unbundling will reduce total VMT and disproportionately reduce the VMT by the dirtier cars, but will increase the VMT per car for the remaining cleaner cars.

28. Owners of office buildings sometimes convert parking spaces into storage space when the tenants are willing to pay more for storage more than for parking. This conversion is illegal if the parking spaces are required by zoning, but code enforcement is difficult if no one complains.

29. When UCLA economist Harold Demsetz (1964) examined the trade-offs between the costs of transactions and the benefits of accurate economic incentives, he used parking to illustrate the case where transactions costs were high enough to justify offering something free. "It is true that the setting and collecting of appropriate shares of construction and exchange costs [of parking] from each parker will reduce the number of parking spaces needed to allow ease of entry and exit. But while we have reduced the resources committed to constructing parking spaces, we have increased resources devoted to market exchange. We may end up by allocating more resources to the provision and control of parking than had we allowed free parking" (Demsetz 1964, 14). Demsetz was referring to parking in shopping centers. De Alessi (1983, 66) also used parking in shopping centers as an example to explain why some resources are not be priced because of the transactions costs, and he ignored the effect of free parking on travel demand. Richard Epstein (2001, 5) uses curb parking to examine the general trade-off between transaction costs and accurate price signals in allocating scarce resources: "It is only when the intensity of use increases that more complex legal regimes can pay their way."

30. Unbundling will also benefit families who turn down an expensive parking space in their apartment building and instead rent a cheaper space nearby so that they can save money on parking without giving up a car. As Thomas Sowell (1980, 128) says, "There is no reason to believe that people will generally make a better set of choices out of a smaller set of options, where the larger set includes all the options of the smaller set."

CHAPTER

21

Time for a Paradigm Shift

How can a conceptual scheme that one generation admiringly describes as subtle, flexible, and complex become for a later generation merely obscure, ambiguous, and cumbersome?

—THOMAS KUHN

Princeton historian of science Thomas Kuhn said a paradigm is a conceptual scheme that has gained acceptance throughout a profession:

> [Scientists] whose research is based on shared paradigms are committed to the same rules and standards for scientific practice. That commitment and the apparent consensus it produces are prerequisites for normal science, *i.e.*, for the genesis and continuation of a particular research tradition.[1]

Kuhn argued that each profession's practices embody the current ruling paradigm and this paradigm frames the problems studied, the research methods used, and the criteria for evaluating the results. Furthermore, he said, the "normal" process of scientific inquiry focuses on the variables considered significant within the ruling paradigm. In other words, scientists fix on a train of thought and measure the relevant variables in extreme detail.

Because research in normal science is cumulative, Kuhn said, data that contradict the ruling paradigm are usually ignored or contested. Over time, however, if the body of contradictory evidence grows sufficiently large, a new paradigm that explains it may be adopted. When this type of paradigm shift occurs, scientists may discover a new set of relevant

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CALIFORNIA LEGISLATURE— 2015–2016 REGULAR SESSION

SENATE BILL No. 734

Introduced by Senator Galgiani

February 27, 2015

An act to amend Sections *21178,* 21181, 21183, 21189.1, and 21189.3 ~~of~~ *of, and to add Section 21184.5 to,* the Public Resources Code, relating to environmental quality, and declaring the urgency thereof, to take effect immediately.

LEGISLATIVE COUNSEL'S DIGEST

SB 734, as amended, Galgiani. Environmental quality: Jobs and Economic Improvement Through Environmental Leadership Act of 2011.

(1) The California Environmental Quality Act (CEQA) requires a lead agency, as defined, to prepare, or cause to be prepared, and certify the completion of an environmental impact report on a project that it proposes to carry out or approve that may have a significant effect on the environment or to adopt a negative declaration if it finds that the project will not have that effect. CEQA also requires a lead agency to prepare a mitigated negative declaration for a project that may have a significant effect on the environment if revisions in the project would avoid or mitigate that effect and there is no substantial evidence that the project, as revised, would have a significant effect on the environment.

The Jobs and Economic Improvement Through Environmental Leadership Act of 2011 authorizes the Governor, until January 1, 2016, to certify projects meeting certain requirements, including the requirement that the project creates high-wage, highly skilled jobs that pay prevailing wages and living wages, for streamlining benefits provided by that act. The act provides that if a lead agency fails to approve a project certified by the Governor before January 1, 2017, then the certification expires and is no longer valid. The act requires a lead agency to prepare the record of proceedings for the certified project concurrent with the preparation of the environmental documents. The act is repealed by its own terms on January 1, 2017.

This bill would extend the authority of the Governor to certify a project to January 1, 2018. The bill would provide that the certification expires and is no longer valid if the lead agency fails to approve a certified project before January 1, 2019. If a project is certified by the Governor, the bill would require contractors and subcontractors to pay to all construction workers employed in the execution of the project at least the general prevailing rate of per diem wages and would provide for the enforcement of this requirement. The bill would repeal the act on January 1, 2019. Because the bill would extend the obligation of the lead agency to prepare concurrently the record of proceedings, this bill would impose a state-mandated local program.

This bill would, notwithstanding any other law, require a multifamily residential project certified pursuant to the act to provide private vehicle parking spaces that are priced and rented or purchased separately from dwelling units, except as provided.

(2) The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

This bill would provide that no reimbursement is required by this act for a specified reason.

(3) This bill would declare that it is to take effect immediately as an urgency statute.

Vote: 2/3 Appropriation: no Fiscal Committee: yes Local Program: yes

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1. *Section 21178 of the Public Resources Code is amended to read:*

21178. The Legislature finds and declares all of the following:

~~(a)The overall unemployment rate in California is 12 percent, and in certain regions of the state that rate exceeds 13 percent.~~

~~(b)~~

(a) The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) requires that the environmental impacts of development projects be identified and mitigated.

~~(c)~~

(b) The act also guarantees the public an opportunity to review and comment on the environmental impacts of a project and to participate meaningfully in the development of mitigation measures for potentially significant environmental impacts.

~~(d)~~

(c) There are large projects under consideration in various regions of the state that would replace old and outmoded facilities with new job-creating facilities to meet those regions' needs while also establishing new, cutting-edge environmental benefits to those regions.

~~(e)~~

(d) These projects are privately financed or financed from revenues generated from the projects themselves and do not require taxpayer financing.

~~(f)~~

(e) These projects further will generate thousands of full-time jobs during construction and thousands of additional permanent jobs once they are constructed and operating.

~~(g)~~

(f) These projects also present an unprecedented opportunity to implement nation-leading innovative measures that will significantly reduce traffic, air quality, and other significant environmental impacts, and fully mitigate the greenhouse gas emissions resulting from passenger vehicle trips attributed to the project.

~~(h)~~

(g) These pollution reductions will be the best in the nation compared to other comparable projects in the United States.

~~(i)~~

(h) The purpose of this ~~act~~ *chapter* is to provide unique and unprecedented streamlining benefits under the California Environmental Quality Act for projects that provide the benefits described above for a limited period of time to put people to work as soon as possible.

~~**SECTION 1.**~~***SEC. 2.*** Section 21181 of the Public Resources Code is amended to read:

21181. This chapter does not apply to a project if the Governor does not certify the project as an environmental leadership development project eligible for streamlining pursuant to this chapter prior to January 1, 2018.

~~**SEC. 2.**~~***SEC. 3.*** Section 21183 of the Public Resources Code is amended to read:

21183. The Governor may certify a leadership project for streamlining pursuant to this chapter if all the following conditions are met:

(a) The project will result in a minimum investment of one hundred million dollars ($100,000,000) in California upon completion of construction.

(b) (1) The project creates high-wage, highly skilled jobs that pay prevailing wages and living wages and provide construction jobs and permanent jobs for Californians, and helps reduce unemployment. For purposes of this subdivision, "jobs that pay prevailing wages" means that all construction workers employed in the execution of the project will receive at least the general prevailing rate of per diem wages for the type of work and geographic area, as determined by the Director of Industrial Relations pursuant to Sections 1773 and 1773.9 of the Labor Code. If the project is certified for streamlining, the project applicant shall include this requirement in all contracts for the performance of the work.

(2) (A) If the project is certified pursuant to this chapter, contractors and subcontractors shall pay to all construction workers employed in the execution of the project at least the general prevailing rate of per diem wages.

(B) Except as provided in subparagraph (C), the obligation of the contractors and subcontractors to pay prevailing wages pursuant to subparagraph (A) may be enforced by the Labor Commissioner through the issuance of a civil wage and penalty assessment pursuant to Section 1741 of the Labor Code, which may be reviewed pursuant to Section 1742 of the Labor Code, within 18 months after the completion of the project, or by an underpaid worker through an administrative complaint or civil action. If a civil wage and penalty assessment is issued, the contractor, subcontractor, and surety on a bond or bonds issued to secure the payment of wages covered by the assessment shall be liable for liquidated damages pursuant to Section 1742.1 of the Labor Code.

(C) Subparagraph (B) does not apply if all contractors and subcontractors performing work on the project are subject to a project labor agreement that requires the payment of prevailing wages to all construction workers employed in the execution of the project and provides for enforcement of that obligation through an arbitration procedure. For purposes of this subparagraph, "project labor agreement" has the same meaning as set forth in paragraph (1) of subdivision (b) of Section 2500 of the Public Contract Code.

(c) The project does not result in any net additional emission of greenhouse gases, including greenhouse gas emissions from employee transportation, as determined by the State Air Resources Board pursuant to Division 25.5 (commencing with Section 38500) of the Health and Safety Code.

(d) The project applicant has entered into a binding and enforceable agreement that all mitigation measures required pursuant to this division to certify the project under this chapter shall be conditions of approval of the project, and those conditions will be fully enforceable by the lead agency or another agency designated by the lead agency. In the case of environmental mitigation measures, the applicant agrees, as an ongoing obligation, that those measures will be monitored and enforced by the lead agency for the life of the obligation.

(e) The project applicant agrees to pay the costs of the Court of Appeal in hearing and deciding any case, including payment of the costs for the appointment of a special master if deemed appropriate by the court, in a

form and manner specified by the Judicial Council, as provided in the Rules of Court adopted by the Judicial Council pursuant to Section 21185.

(f) The project applicant agrees to pay the costs of preparing the administrative record for the project concurrent with review and consideration of the project pursuant to this division, in a form and manner specified by the lead agency for the project.

SEC. 4. *Section 21184.5 is added to the Public Resources Code, to read:*

21184.5. *(a) Notwithstanding any other law, except as provided in subdivision (b), a multifamily residential project certified under this chapter shall provide unbundled parking, such that private vehicle parking spaces are priced and rented or purchased separately from dwelling units.*

(b) Subdivision (a) shall not apply if the dwelling units are subject to affordability restrictions in law that prescribe rent or sale prices, and the cost of parking spaces cannot be unbundled from the cost of dwelling units.

~~**SEC. 3.**~~***SEC. 5.*** Section 21189.1 of the Public Resources Code is amended to read:

21189.1. If, prior to January 1, 2019, a lead agency fails to approve a project certified by the Governor pursuant to this chapter, then the certification expires and is no longer valid.

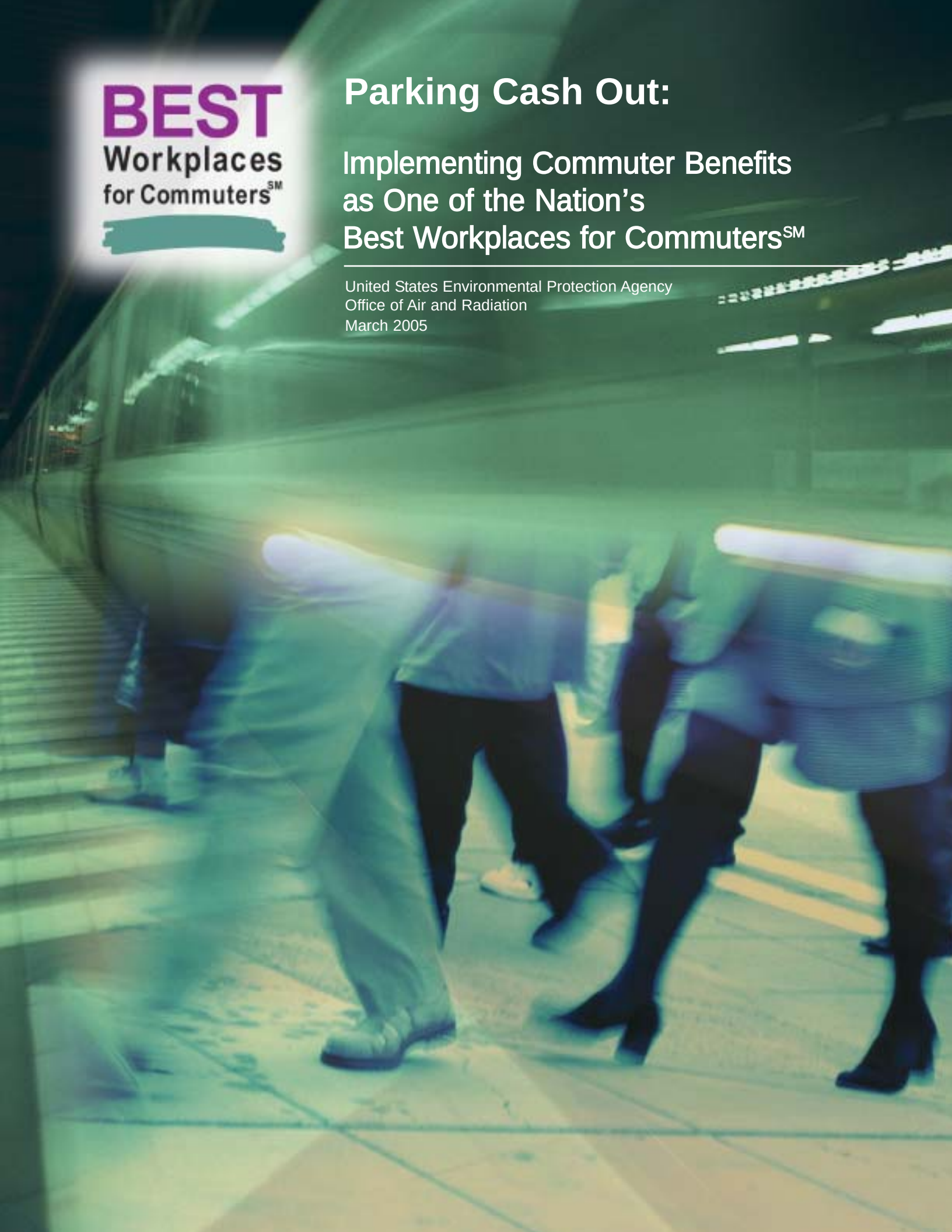
~~**SEC. 4.**~~***SEC. 6.*** Section 21189.3 of the Public Resources Code is amended to read:

21189.3. This chapter shall remain in effect until January 1, 2019, and as of that date is repealed unless a later enacted statute extends or repeals that date.

~~**SEC. 5.**~~***SEC. 7.*** No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because a local agency or school district has the authority to levy service charges, fees, or assessments sufficient to pay for the program or level of service mandated by this act, within the meaning of Section 17556 of the Government Code.

~~**SEC. 6.**~~***SEC. 8.*** This act is an urgency statute necessary for the immediate preservation of the public peace, health, or safety within the meaning of Article IV of the Constitution and shall go into immediate effect. The facts constituting the necessity are:

In order to reauthorize the Governor to certify projects as environmental leadership development projects in 2016 and prevent a one-year gap in this authorization, it is necessary that this act take effect immediately.



BEST Workplaces for Commuters℠

Parking Cash Out:

Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters℠

United States Environmental Protection Agency
Office of Air and Radiation
March 2005

Parking Cash Out: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters℠

- Employers offering free or subsidized parking to employees can implement parking cash out. Under a parking cash out program, an employer gives employees a choice to keep a parking space at work, or to accept a cash payment and give up the parking space.

- Parking cash out programs are one of the most effective means to encourage employees not to drive alone to work. Cash out programs are an effective means of allocating scarce parking or managing a growing demand for more parking.

- Parking cash out programs benefit employees because they allow employees choose whether or not to continue driving alone. Employees perceive these programs as fair since nobody is forced to stop driving or give up free parking, but those who do are rewarded financially.

- Although any employer who pays for parking can implement parking cash out, it works best for employers who lease, rather than own, parking.

- Parking cash out is one of the primary benefits under the Best Workplaces for Commuters℠ program. Employers must offer at least one of three primary benefits to their employees in order to receive the Best Workplaces for Commuters℠ designation (the other two are transit or vanpool benefits and telework). Under the option outlined in this publication, the employer agrees to provide at least $30 per month for parking cash out.

This document is one in a series of briefing papers designed to help employers implement commuter benefits to achieve the Best Workplaces for Commuters℠ designation.

The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Transportation (DOT) have established a voluntary National Standard of Excellence for employer-provided commuter benefits. Commuter benefits help American workers get to and from work in ways that cut air pollution and global warming pollution, improve public health, improve employee recruiting and retention, improve employee job satisfaction, and reduce expenses and taxes for employers and employees. Employers that meet the program's National Standard of Excellence are recognized as Best Workplaces for Commuters℠ and agree to:

- ▶ Centralize commute options information so that it is easy for employees to access and use.
- ▶ Promote the availability of commuter benefits to employees.
- ▶ Provide access to an emergency ride home (ERH) program.
- ▶ Provide one or more of the following primary commuter benefits:
  - ✓ Transit subsidy of at least $30 per month
  - ✓ Vanpool subsidy of at least $30 per month
  - ✓ Cash in lieu of free parking worth at least $30 per month
  - ✓ Telework program that reduces commute trips by at least 6 percent
  - ✓ Other option proposed by employer and agreed to by EPA. These services must reduce the rate at which employees drive to work alone and be perceived by employees as a significant workplace benefit
- ▶ Provide three or more of the following additional commuter benefits:
  - ✓ Active membership in a Transportation Management Association (TMA) or participation in a voluntary regional air quality management program (e.g., Spare the Air, Air Awareness, SEQL, Clean Air Coalition) or another employer-based commuter program
  - ✓ Active membership in a local ozone awareness program, in which you agree to notify employees of expected poor air quality and suggest ways that they might minimize polluting behaviors
  - ✓ Ridesharing or carpool matching, either in-house or through a local or regional agency
  - ✓ Pre-tax transit benefits
  - ✓ Pre-tax vanpool benefits
  - ✓ Parking cash out less than $30 per month or less than 75 percent of the actual parking benefit
  - ✓ Shuttles from transit stations, either employer-provided or through a local TMA or similar service provider
  - ✓ Provision of intelligent (i.e., real-time) commuting information
  - ✓ Preferred parking for carpools and vanpools
  - ✓ Reduced parking costs for carpools and vanpools
  - ✓ Employer-run vanpools or subscription bus programs
  - ✓ Employer-assisted vanpools
  - ✓ Employer-provided membership in a carsharing program (visit <www.carsharing.net> to learn more)
  - ✓ Secure bicycle parking, showers, and lockers
  - ✓ Electric bicycle recharging stations
  - ✓ Employee commuting awards programs
  - ✓ Compressed work schedules
  - ✓ Telework (less than 6 percent of commute trips on a monthly basis)
  - ✓ Lunchtime shuttle
  - ✓ Proximate commute (where employees work at locations closer to their homes)
  - ✓ Incentives to encourage employees to live closer to work
  - ✓ Incentives to encourage employees to use alternative transportation (e.g., additional vacation time)
  - ✓ On-site amenities (e.g., convenience mart, dry cleaning, etc.)
  - ✓ Concierge services
  - ✓ Other options proposed by employers
- ▶ In addition, employers commit to ensuring that within 18 months of applying, at least 14 percent of commute trips are taken using a mode other than driving alone.

Disclaimer

EPA provides this briefing as a service to employers participating in the Best Workplaces for Commuters℠. Information about private service providers is intended for informational purposes and does not imply endorsement by EPA or the federal government.

The information presented here does not constitute official tax guidance or a ruling by the U.S. government. Taxpayers are urged to consult with the Internal Revenue Service of the U.S. Department of Treasury or a tax professional for specific guidance related to the federal tax law.

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Parking Cash Out: A Summary

Parking cash out is a commuter benefit in which an employer offers employees the option to accept taxable cash income instead of a free or subsidized parking space at work.

The idea behind parking cash out is simple: given a choice of cash or a parking space, many people would prefer to receive cash. Most employers in the U.S. provide free or subsidized parking to their employees.[1] This practice encourages employees to drive to work alone, thereby increasing traffic congestion and air pollution. Given the option to take cash instead of the parking space, many employees will take the cash and choose to carpool, take transit, or walk or bike to work. The benefits are substantial: employees receive broader and more equitable commuter benefits, traffic and emissions decrease, and the employer may be able to reduce parking costs.

Also sometimes called a "pay me not to drive" program or a "cash instead of parking" program, parking cash out encourages alternatives to driving alone to work without taking away the existing parking benefit. It has long been recognized that free or subsidized employer-provided parking is a major incentive to drive to work alone, yet many companies are reluctant to eliminate the benefit. Under a parking cash out program, employees may keep their tax-free parking subsidy or accept additional income. Employees who elect to accept the cash income pay taxes on it, but can use the money as they choose. Some people use the cash for transit fares or vanpooling, while others save the money by carpooling or bicycling or walking to work. Employees who wish to continue driving to work still receive the original free or subsidized parking and do not pay any taxes on it.

Brief History

The idea of parking cash out originated with Professor Donald Shoup at the University of California, Los Angeles. In 1992, the state of California enacted legislation requiring many employers who subsidize their employee parking to offer a parking cash out option.[2] The law was not enforced, however, because of conflicts with federal tax law.

Until 1998, federal tax law prohibited an employer from providing an option of cash income or a tax-exempt parking benefit. If an employer chose to give an employee the option of cash in lieu of a parking space, then all parking provided by the employer lost its tax exempt status—both the employer and employee would be required to pay taxes on the value of the parking subsidy.

The Taxpayer Relief Act of 1997 amended the federal tax code to allow employers the option to offer taxable cash instead of a tax-exempt parking space. Since the act went into effect in 1998, the option of parking cash out has been available to employers nationwide.

Employer Benefits

Offering parking cash out can benefit an employer in many ways.

Reduced Parking Costs and Better Parking Management

Parking spaces, particularly in urban areas, are costly. Employers provide an estimated 85 million free parking spaces for commuters—spaces with a net worth of nearly $31.5 billion. Employers can save a substantial amount of money by reducing the number of parking spaces required; one study estimates that annual per space costs vary between $360 and $2,000.[3]

Parking cash out can:

- Reduce the need for employee parking and costs associated with leasing parking space.
- Reduce the maintenance costs of parking areas.
- Allow businesses to convert employee parking spaces to customer parking spots.
- Allow businesses to convert parking spaces into revenue-producing activities.
- Eliminate the need for new parking construction.

Parking cash out allows employers to save on the extensive cost of supplying parking to employees. For certain types of businesses, converting employee parking to customer parking can make businesses more accessible to paying customers.

[1] *It is estimated that nearly three-fourth of all firms in the U.S. provide free parking for their employees, with employers providing 85 million free parking spaces for commuters nationwide. Free parking creates a major incentive to drive to work. About 95 percent of all commuters who drive to work receive free parking, and most auto commuters park free even in the central business districts of large cities. (Shoup and Breinholt, 1997).*

[2] *California Health & Safety Code Section 4385*

[3] *Victoria Transport Policy Institute, Online TDM Encyclopedia, available at www.vtpi.org/tdm. Costs are based on land, construction, and operations costs for suburban and urban locations, and for surface, structured, and underground parking*

Fairness and Employee Satisfaction

Parking cash out benefits go beyond just monetary benefits. Expanding employee options not only increases potential income but also promotes employee choice and equity throughout the workplace. Employees praise parking cash out for its fairness and claim that it better serves everyone's needs. Employers that have implemented cash out programs also have overwhelmingly positive experiences (Shoup, 1997a), as shown by the comments below:

- The employees think it's fair.
- [Cashing out] has been really positive.
- Since we moved to cash out, we've always received a good response.
- I would definitely recommend [cashing out]. We've always found that cash works. Cash is always a good incentive.
- [Cashing out] has been a really good experience. People really like it.
- People like the idea, they like the cash in hand, and it does add to their paycheck.
- [Employees] love it. The ones that qualify love it. And the ones who drive alone don't care because they get free parking.
- Compared to the previous policy, I think [cashing out] is fairer.
- If we decided to scratch the program, we would probably end up with at least fifty or sixty more employee cars, with no place to park.
- Cash works very well for us.

The positive response to cash out may be ascribed to the fact that it is a simple variation on a traditional benefit. According to Shoup (1997a):

> *Parking is a traditional part of most employers' benefit package, and cashing out can logically relate to the parking benefit. …. Cashing out can be a normal operating procedure for any business because it treats all employees equally in terms of an important fringe benefit. Therefore, once established, cashing out is likely to become a permanent feature of the employers' benefit package.*

Parking cash out offers businesses an attractive way to increase employee choice and satisfaction through a simple variation on a benefit the business already offers. As described above, employers consistently remark that the cash out option helps to recruit and retain employees. Further, by equalizing benefits, companies provide a more equitable compensation package for all employees. Together, these features may help to reduce recruitment and retention costs for the company.

Tax Considerations

Although the idea of parking cash out is very simple, and in most cases implementation is straightforward, employers should review with their tax advisor possible tax implications for all parties.

This section reviews some tax considerations associated with employer-paid parking and parking cash out, and highlights changes in tax law with respect to parking cash out.

Cash is Taxable, Parking Remains Tax-Free

Under a parking cash out program, cash offered instead of parking is taxable as regular compensation. It is treated the same way as the rest of an employee's pay: the employer incurs payroll taxes on it, and the employee incurs all regular income taxes on it. For employees who choose to keep the free parking (those who do not take the cash), there is no tax impact. Qualified parking remains a tax-free transportation fringe benefit.

Until recently, this was not the case. Prior to 1998, the Internal Revenue Code (IRC) prohibited tax-free parking from being offered in lieu of taxable cash. The IRC stated that employer-paid parking would be tax-free only if "provided in addition to (and not in lieu of) any compensation otherwise payable to the employee." If an employer offered cash instead of parking to their employees, then parking would lose its tax-free status for all employees. Employees who saw no change in their benefits (i.e., they continued to park for free) would see an increase in taxes. The tax code thus created a major barrier to offering employees a choice of parking or cash.

Changes in the tax code associated with the Taxpayer Relief Act of 1997 removed this barrier to parking cash out.[4] Starting in 1998, employers have been able to offer their employees the choice of taxable compensation or a tax-exempt parking benefit.

[4] *Pub. L. No. 105-34 (111 Stat. 948)*

"Parking cash out" typically means offering cash in lieu of a parking space, and cash income is taxable. As a result, firms that cash out generally will see an increase in their payroll taxes associated with the cash that is provided to employees in lieu of parking. (Note that other cost savings may offset the increase in payroll taxes. See Employer Benefits above.) In order to minimize adverse tax impacts, employers can offer tax-exempt transit passes and vanpool vouchers (these benefits are currently tax exempt up to $105 per month for each employee), and may choose to do so in lieu of a parking space. Employers that want to provide employees with flexible commuter benefits often elect to offer tax-free transit or vanpool benefits, or a combination of cash and transit and vanpool benefits.

Increased Revenues for Government

Parking cash out has the potential to increase tax revenue for the federal government and state and local governments that impose income taxes. Shoup and Willson (1992b) calculated the potential tax revenues associated with parking cash out nationally using 1990 employee Census data. Of 110 million nonagricultural civilian employees, 90 percent are auto commuters. If the average cost of providing parking is $30 a month and 20 percent of commuters opted for the taxable cash back option, taxable income would increase by $6.1 billion per year. At a marginal tax rate of 20 percent, revenues would increase upward of $1.2 billion per year. This revenue increase would be the result of voluntary employee choice, with no change in tax rates. State and local governments in areas where average parking costs far exceed $30 could see substantial revenue gains.

Employee Benefits

Employees benefit from parking cash out because it gives them the option of receiving extra money instead of a benefit.[5] If employees are willing to carpool, use transit, or walk or bicycle to work, they come out ahead financially with parking cash out. Because there is no detrimental effect on employees who continue to drive alone, both employees who drive alone and those who do not perceive the program as fair.

When Parking Cash Out Makes Sense

Any employer that makes subsidized parking available for employees in off-street lots and garages can offer parking cash out. Most parking arrangements for employers that subsidize parking fall into three categories:

- employer-owned parking.
- bundled lease parking (arrangements where the cost of parking is built into the building rent).
- unbundled lease parking (arrangements where parking is paid separately from rent).

The effectiveness of parking cash out depends on the type of parking arrangement employers have, as well as on parking demand. Parking cash out tends to be most effective in the situations described below.

Leased Parking

Parking cash out works best for employers who lease their parking separately from their building and can let go of unused parking without penalty from the lessor. The employer simply leases fewer spaces and transfers the money to employees who do not use the parking subsidy.

Parking cash out is most easily applied by, but is not limited to, employers with unbundled lease parking. These employers can adopt a parking cash out arrangement for their employees at any time. For every employee that accepts the cash out offer, the employer can reduce the number of spaces leased.

Employers with bundled parking and office leases may adopt parking cash out, but they may be unable to immediately reduce their parking costs when fewer employees drive to work. The employer would likely attempt to renegotiate the arrangement to separate parking costs from office space costs so the company can reduce parking costs as employees sign up for cash instead of parking.

Scarcity of Employer-Owned Parking

Employers that own their own parking are the least likely to see immediate parking cost savings from a cash out program. They also may find it somewhat more difficult than other employers to value their parking for the purposes of cash out.

On the other hand, if parking lots are full and the employer

[5] *Note, however, that there is no requirement that an employer offer employees exactly the value of the parking space. The employer may offer any amount, either more or less than the actual value or cost of the space. At least one firm in the Shoup survey offered substantially more than the cost of a space, in part to provide true equity by offsetting the tax bite on the cash out cash.*

is considering building, leasing, or acquiring additional parking, parking cash out can be very attractive regardless of the current parking lease or ownership situation. Rather than building and maintaining or otherwise acquiring additional parking, it may be much less expensive to offer employees cash for not parking. Cash out can also be an opportunity to increase parking spaces for customers, again regardless of lease or ownership arrangements.

Parking cash out also works for employers that own parking and can rent that parking to an outside party or convert it into revenue producing space. In that case, the employer takes any revenue and transfers the money to employees who do not use the parking subsidy. Whenever parking is tight—regardless of parking lease or ownership—an employer may want to offer cash out to avoid having to build or acquire additional parking.

Downtown Employers

Parking cash out will generally be most popular with employees where parking is expensive and the cash option is especially valuable, such as central business districts and other dense urban areas. Transportation alternatives, like transit and high-occupancy vehicle (HOV) lanes, offer their best services to downtown work sites, making it easier to stop driving. In addition, downtown locations typically provide the option of paying for daily parking. This is an important consideration since an employee may wish to accept the cash out offer and take transit, carpool, bicycle or walk to work most days but still have the option to drive to work occasionally if the need arises.

Employers in downtown locations are also most likely to see a direct benefit from reducing the number of employees parking at work. Downtown parking garages are expensive, and parking cash out is most appealing to employers when parking is in short supply and expensive. Downtown parking is also typically sold or leased space by space, making it relatively easy for employers to shift spending between parking, other tax-exempt commuter benefits, and salary.

Suburban Employers

Suburban employers are not usually thought of as obvious cash out candidates because they tend to own or lease parking in large blocks and almost always provide it free of charge to employees. However, suburban employers also have many reasons to consider parking cash out:

- To limit the cost of acquiring new parking.
- To offer customers more parking spaces.
- To reduce maintenance and plowing costs.
- To offer employees more compensation choices.
- To address regional congestion or air quality concerns.

A successful parking cash out program could "retire" enough parking spaces to allow land to be put to other uses. Rather than supplying more space for parking, an employer could use the land for additional office space or rent out space to another company. Past successes redeveloping suburban mall properties into denser retail environments suggest that there is a market for freed-up parking lot land. If the employer owns the parking, the employer will need to have controlled entry points for parking (e.g., parking gates) to ensure that employees do not take the cash and continue to drive to work and park.

Although suburban work sites are often inadequately served by transit, that need not be a barrier to suburban cash out. Studies show that when offered an array of commuter benefit choices, three-quarters of those who leave their cars opt for carpooling and telework. The appeal of parking cash out is not solely dependent on the quality of public transit service to the work site. In fact, the flexibility of providing cash allows employees to choose whatever way makes the most sense for them to get to work.

Smaller Employers

Although firms of all sizes can implement parking cash out, small employers are an important market for cash out. Small firms are much more likely to lease their parking spaces compared to large firms (small firms lease 30 percent of the parking spaces they offer free to employees, while large firms lease only 12 percent of the parking spaces they offer free). Since leased parking spaces are most amenable to being converted into cash, small firms are an important market for cash out. Moreover, small employers may also be able to implement changes in parking policies most easily.

Implementation Issues and Costs

Implementation and administration of parking cash out can be very simple, and usually require only ensuring that the payroll system accounts for the fact that some employees will elect to take additional taxable cash. Generally any complexities associated with this change pose a one-time challenge only.

Low Administrative Requirements

Parking cash out places far fewer administrative burdens on an employer than many other transportation demand management strategies, and produces higher response rates. The

pure form of cash out (e.g., choice of free parking or extra income), for example, imposes no administrative burden in terms of distributing transit and vanpool vouchers.

Added Payroll Costs and Payments to Non-Drivers

There are two potential costs to the employer: additional payroll taxes, and cash out payments to employees who have not been driving to work. Because the parking cash out benefit paid to employees is considered additional salary, the employer's payroll taxes will increase. In order to offset this cost, the employer could lessen the cash payment by the amount of the increased payroll tax. For example, if the parking space is valued at $100, instead of paying the employee $100 and incurring an additional $10 in payroll tax, the employer could pay the employee $90 and put the remaining $10 toward tax payment.

The employer may also have additional costs associated with the cash that is paid to employees who were already commuting to work by alternative means. For most employers with free parking, this figure is small. A study of cash out programs implemented by firms in California found that the increase in employer costs was roughly equivalent to the reduction in parking costs. (Shoup, 1997a)

Combining Parking Cash Out with Transit Benefits

To offset the additional payroll taxes, employers may wish to implement a transit/vanpool benefits program along with parking cash out. For example, suppose an employer values parking spaces at $115 each. Under straight parking cash out, the employer would offer each employee $115 in return for not driving. The employer would have to pay payroll taxes on that $115 increment for every employee that takes the offer, and each of those employees would have to pay taxes on the $115.

However, the employer could offer each employee $105 in transit/vanpool benefits, and the remaining $10 in cash. In this case, the employer would pay payroll taxes only on the $10 increment, since transit/vanpool benefits are not taxable up to $105. Likewise, each employee would pay taxes only on the $10 increment. For more information, see the separate briefing papers on Transit/Vanpool Benefits and Commuter Tax Benefits.

Percentage of Employees Likely to Participate

According to case studies and research, parking cash out tends to reduce driving to work by 20 percent or more. An employer implementing parking cash out should probably expect to see a reduction in solo driving to work of 20 percent, and likely more over time. Absolute targets would depend on starting points. Among eight firms surveyed by Shoup, the solo-driver share fell from 76 percent to 63 percent after cashing out. The firms' 76 percent starting point mirrored the average national mode split for work trips in 1990, but that average hides wide variation; at many firms the drive-alone rate is either 100 percent or close to it.

Guide to Implementation

To implement a parking cash out program, an organization will typically go through the following steps:

1) Analyze Current Parking Conditions and Policies

A first step for any employer will be to examine current parking conditions and parking benefit policies. Key questions to ask include:

- Does the employer currently provide free or subsidized parking to all of its employees or only at certain office locations? (For example, some companies provide free parking to employees at their suburban offices but not at downtown locations).
- What are current parking ownership/lease arrangements? Does the organization own all of its parking? Does it lease parking? Will it be able to reduce the number of parking spaces it leases without penalty?
- If the company owns the parking, does it have controlled entry points? Could it easily be converted to controlled entry?
- How tight is parking? And how expensive is it? Would it benefit the company to reduce the amount of parking it provides to employees?

Understanding current parking arrangements enables employers to develop the most appropriate options for their own circumstances. It helps in identifying the potential costs and cost savings of parking cash out and in selecting the commuter benefit program that is most beneficial to employees and the organization.

2) Determine How to Structure a Commuter Benefits Program

Human Resources staff may wish to meet with employees and management to discuss potential ways to structure the commuter benefits program. The program that is selected

usually depends on the unique circumstances of the company and its existing parking arrangements. Typical program options include:

- Provide employees with the option to accept the choice between taxable cash or a parking space at work (the arrangement typically associated with the term "parking cash out"). This option may be most amenable to employers in semi-urban or suburban locations where carpooling, transit, walking and bicycling are viable options and where parking is tight.
- Provide employees with the option to accept tax-free transit or vanpool benefits, taxable cash, or a combination of both, in lieu of parking at work. In locations with extensive transit or vanpooling, the employer may want to set up a program in which employees are given the option of a tax-free transit/vanpool benefit, taxable cash, or free parking. That way, employees who wish to use transit or vanpools can receive a tax-free benefit, and those who wish to carpool, bicycle, or walk to work can choose to accept taxable income. For example, the employer might provide the employee with the option of free parking, a tax-free $105 transit/vanpool benefit, or $105 in cash each month. Under such a situation, parking may still be subsidized more than other commute options; for example, if parking costs $150 per month, a solo driver receives a higher subsidy than a transit rider.
- Provide employees with a "commute allowance" that provides an equivalent commuter benefit for all employees. Under this option, the employer might provide all employees with a $100 commute allowance, which can be used toward parking, tax-free transit or vanpool benefits, or taken as taxable cash income.

In each case, the employer will need to determine program structure, such as:

- How much cash to offer in lieu of the parking space (e.g., the full value of parking or a lower amount)? If a commute allowance is offered, at what level should it be set?
- Will employees in all offices receive the same cash option or should different cash options be offered in different locations? (e.g., if parking is more expensive at certain offices, should the cash out offer reflect the higher parking costs?)
- Who will be eligible for the program: only employees who currently use parking or all employees?
- At what point will employees be able to change their elections? Monthly, quarterly, or on some other basis?

3) Obtain Senior Management Approval

Senior management will need to approve the policy change.

4) Work with Payroll to Set up Appropriate Payroll Codes

The payroll system will need to be set up to account for the fact that employees will have the option to elect to accept taxable cash (or a tax-free transit or vanpool benefit) in lieu of free parking. The specific actions that need to be made will depend on the type of cash out program implemented, the payroll system used, and whether payroll is outsourced.

5) Develop Process for Employees to Elect their Commuter Benefit

The Human Resources Department will need to set up a procedure for employees to elect their commuter benefit. Again, this will depend on the type of commuter benefit program that is implemented, as well as individual organizational considerations, such as the size of the company and number of offices. An organization might allow employees to select whether they want to cash out via a form submitted to the HR Department or via an election over an intranet system. Employers may also want to provide written information about the benefit in an Employee Manual or Benefits Guide.

6) Publicize and Implement the Parking Cash Out Program

Once parking cash out procedures are in place, the program should be marketed to employees. Some ways to ensure that employees are aware of parking cash out include the following:

- ✓ Company orientation for new employees.
- ✓ Advertisements in places seen frequently by employees (cafeteria, garage, elevators, etc).
- ✓ Distribution of program brochures.
- ✓ Company newsletters.
- ✓ Voicemail or e-mail broadcast.
- ✓ Special promotional days.
- ✓ Awards or prize drawings to recognize employees using transit or carpools.
- ✓ Inserts to paychecks.
- ✓ Company Web site or intranet.

Because parking cash out is not a well-known arrangement, many employees may have questions about it. Employers should ensure that employees have access to information to answer their questions. This could include written materials, as well as a benefits coordinator to whom employees can go with questions.

Employer Questions and Answers

An employer's human resources administrator or business manager, among others, might ask the following common questions when considering a parking cash out program:

What has been the reaction of employers and their employees to parking cash out?

Very positive. Cash out gives employees choice, which is viewed by them as a real benefit. In a study of California employers that have implemented parking cash out, program administrators characterized the program as "a really good experience," "recommended," "fairer," and "loved by employees." Employers consistently remarked that the cash out option is an added fringe benefit that helps to recruit and retain employees. One employer commented, "Employees are grateful and thankful and more motivated. So that's a plus for the company." (Shoup, 1997a, b)

How difficult and costly is it to administer the program?

A study of firms that have implemented cash out programs generally found negligible implementation costs. The study found that cash out programs are simple to organize and implement and that their ongoing administration poses no extra cost to the firm. Asked whether administering the payroll taxes on cash subsidies was a problem, firms uniformly responded that it was not. One representative estimated that she spent only two minutes per employee per month administering the firm's cash out program. (Shoup, 1997a,b)

If I offer my employees a choice of a free parking space or its cash value under parking cash out, do I pay payroll taxes on the cash?

Yes. If the employee opts for cash instead of parking, the employer pays payroll taxes and the employee pays income and payroll taxes on the cash. For tax purposes, this cash is the same as all other regular salary. Employers who want a parking cash out offer to be entirely cost neutral should offer slightly less than the value of the parking as a cash stipend in order to cover their additional payroll taxes.

Employees who opt for the parking do not pay income and payroll taxes on the value of the parking and employers do not pay payroll taxes on the value of the parking, even though the employee has the choice to convert the parking benefit to regular, taxable salary. This recent change to the law makes parking cash out a much more attractive option than it was in the past.

Is there a way to avoid or reduce the additional payroll taxes on the cash out?

There is no way to avoid paying payroll taxes on cash income that is provided to employees in lieu of a parking space. Employers, however, can minimize adverse tax implications by offering tax-free transit or vanpool benefits (currently capped at $105 per month). Employers can offer any combination of cash and transit and vanpool benefits. A cash out offer could consist of a tax-free transit voucher and the rest in taxable cash. An employee receiving a $150 cash out offer could either accept a) the whole cash out in cash, in which case both employer and employee pay applicable federal tax on the full amount or b) accept a transit or vanpool benefit up to $105 tax free and the rest in taxable cash. The balance of $150 minus the $105 tax-free benefit would leave $45 in income subject to employer and employee taxes.

What are the cost implications of implementing parking cash out for my company?

The total financial implications of a cash out program depend on the specific conditions of a company, including existing parking arrangements, needs for additional parking, and current travel patterns of employees.

Many companies may be able to cover the direct cost of offering cash to employees by reducing the amount of parking they lease. For example, an employer who leases parking stalls for $200 per month and charges employees $50 per month could pay $150 per month in cash to employees who vacate spots and then reduce the lease cost by the number of vacated stalls. Instead of paying $150 for a spot ($200 for the lease minus the $50 charge to employees), the employer pays the vacating employee the $150. The only additional cost is the payroll taxes on the $150 income.

In many instances, employers will incur a cost due to the cash out offer, particularly if the company cannot immediately reduce the amount it pays for parking. Moreover, payroll taxes will increase with the program, since the employer pays payroll taxes on cash provided to employees. If a firm offers all employees a parking subsidy or its cash equivalent, it will also end up paying commuters who are already ridesharing or taking transit (i.e., commuters who are not relinquishing a parking spot). In most cases, this will be a small percentage of total employees; 95 percent of employees who receive free parking at work drive to work. Still, the company should be aware of these costs.

It is important to note that additional costs may be more than offset by other significant cost savings. Employers interviewed for case studies consistently remarked that the cash

out helps to recruit and retain employees: "Employees are grateful and thankful and more motivated. So that's a plus for the company." (Shoup, 1997a, b) By equalizing benefits, companies provide a more equitable compensation package for all employees, which may provide them a competitive edge in a tight labor market. In addition, for employees who personally support environmental goals, such benefits may make the company more attractive than one that simply offers free parking and does not address other commute modes. Together, these features may help to reduce recruitment and retention costs for the company.

If I implement a parking cash out benefit, am I required to offer the full value of the parking to my employees as taxable income?

An employer may offer to cash out a parking space in any amount. The tax code says nothing about the value of a cash out offer. A firm may "value" a parking space at any amount.

An employer might value the cash out offer slightly below the cost of paying for a parking space to cover the cost of payroll taxes. For example, if the employer pays $150 per month per employee parking space, then the employer might offer the employee approximately $135 instead of $150 in taxable income in lieu of the parking space. The employer's contribution to Social Security and Medicare would approximate $11 on the $135 cash, for a total cost of $146. By reducing the offer to slightly below the cost of the space, the employer does not incur costs over the original cost of the space. The employer reports the $135 expense as salary to the employee, and both pay their share of federal taxes. On the other hand, a company might cash out a space at above market rates, for several reasons: to increase employee response in order to increase customer parking, to avoid the need for expensive or time-consuming new construction, and/or to level the parking/non-parking playing field by offsetting the tax bite on the cash out cash. At least one firm in California implemented cash out at substantially above market rates.[6]

If I currently give my employees transit passes tax-free, will starting a parking cash out program affect the tax free status of current transit passes?

No. Changes in tax code resulting from the Transportation Equity Act for the 21st Century (TEA-21) allow employers to offer any combination of parking, transit, or vanpool benefits (up to the specified limits), either in addition to present compensation or in lieu of compensation, tax free. Section 132(f)(4) of the Internal Revenue Code now says:

> No amount shall be included in the gross income of an employee solely because the employee may choose between any qualified transportation fringe and compensation which would otherwise be includable in gross income of such employee.

Does my entire company (or organization or agency) need to participate? What if we have multiple work sites?

The entire organization does not need to participate in a parking cash out program. It is up to your organization to decide what works best for you. A company may decide to implement a parking cash out program at only certain work sites, if desired. Sites with limited parking or expensive parking might be most interested in the cash out option. Other organizations may feel that it is important to implement one benefit package for employees regardless of where they work. It is up to the individual organization to decide what works best.

If I offer parking cash out, what happens if an employee takes the cash instead of the parking, but continues to drive to work, parking elsewhere?

From a tax perspective, this situation creates no problem. The cash in lieu of parking does not depend, for tax purposes, on a particular travel mode. Some employers, however, institute parking cash out explicitly in order to reduce driving to work, and may wish to discourage employees from taking the cash incentive and continuing to drive. In areas where parking cash out works best at reducing driving, such as areas where parking is costly, there is unlikely to be free parking near the work site that the employee can use instead of the employer-provided parking. In other cases, employers offer parking cash out to increase employee choice and/or to reduce the need for parking onsite. An employee who voluntarily begins using more distant parking may both save money and help implement the employer's objectives.

I don't currently provide free or subsidized employee parking. Does parking cash out help me?

The goal of parking cash out is to encourage alternatives to driving alone. Since you do not currently subsidize parking, this is not an issue for you. Recent changes in tax law regarding commuter benefits may provide you with other options that may be beneficial for your employees. If you are not already doing so, you may consider a program to allow employees to pay for transit, vanpools, or parking through a pre-tax payroll deduction. You could also implement a program to directly provide employees with transit or vanpool benefits or taxable cash incentives for carpooling, bicycling, or walking to work.

[6] *The firm offered a parking subsidy of $100 per month or $150 in cash. (Shoup, 1997a).*

Do any state or local governments offer any incentives for doing this?

Yes. The State of Maryland offers a 50 percent tax credit up to $30 per employee per month for costs associated with providing employees a cash-in-lieu-of-parking program. Delaware, Connecticut, Oregon, and New Jersey also provide tax credits to eligible companies that implement commuter transportation benefit plans, which could include parking cash out. Each state tax credit is different, so employers are encouraged to inquire about the requirements of tax credit programs that may apply to them.

Employer Case Studies

Because of the state's parking cash out legislation, California employers have been at the forefront of implementing this benefit. Experience with parking cash out has been limited, however, for a number of reasons. Most importantly, tax laws prohibited employers from offering cash in lieu of tax-free parking prior to 1998. Even now, tax law still favors parking since cash income provided to employees for commuting is taxable while parking is tax-free (up to $200 per month).

As a result of this aspect of tax law, many organizations have implemented variations on the cash out concept. For example, since cash income is taxable, many companies have found that it is beneficial to provide transit/vanpool benefits, which are a tax-deductible fringe benefit for the employer, rather than cash. Other firms have implemented "commuter allowance" programs or financial incentives for alternatives to driving that provide more equal benefits for all commute options. When considered broadly, parking cash out has been put into effect in many ways in various parts of the country.

The examples listed below show some of the many ways in which organizations can implement cash out.

City of Pleasanton, California

Suburban Pleasanton initiated a daily form of parking cash out in January 1994. The City offers $2 per day to employees who use a commute alternative instead of driving to work alone. All city employees are eligible to participate with no minimum days required. The program has resulted in annual savings of 20,625 trips, which translates into 12,375 gallons of fuel and 123 tons of CO_2. In 1993, the year before the program was implemented, only 28 employees were commuting to work using alternative modes. Average participation in 2004 was 57 employees per month representing a steady rise in the last ten years.

CALIBRE—Alexandria, Virginia

CALIBRE provides taxable cash incentives to employees who commute to work via carpools or vanpools that are not eligible for the company's transit subsidy program. Employees who carpool with other employees to one of the company's facilities will each receive $32.50 per month in taxable income and must agree to accept a shared company provided parking benefit in lieu of an individual company provided parking benefit. Employees who work at a CALIBRE facility and who do not require any parking will receive $65 per month in taxable income and must agree to waive their right to a company provided parking benefit.

Services that Support Implementation

Emergency Ride Home Programs

One of the barriers that prevents some employees from taking transit, ridesharing, walking or bicycling to work is the fear that they will not be able to get home quickly in the event of an personal emergency, such as picking up a sick child from school, or working unscheduled overtime. Emergency Ride Home (ERH) programs provide commuters who regularly carpool, vanpool, bike, walk or take transit to work with a reliable ride home when an unexpected emergency arises. ERH programs are designed to rescue commuters who are worried about how they will get home when an emergency arises. Knowing there is a ride home in case of emergency gives many people the security to take commuting options like transit and carpools with confidence.

Individual employers may establish ERH programs. Usually the employer will pay for the employee's ride home via taxi or rental car when transit or vanpool services are unavailable. Some MPOs and local governments have also established regional or countywide ERH programs for employees that register for the program. ERH programs tend to be low-cost ways to encourage transit use, especially if a company only "fills in" coverage for areas not covered under a broader regional program. For example, a regional transit agency may provide an emergency ride home for monthly passholders, so a company would have to provide ERH only for carpoolers. More detailed information about ERH is available in a separate briefing paper, Emergency Ride Home Programs.

Associations and Contacts

This section includes information on experts that employers might wish to utilize for expertise in understanding, promoting, or providing technical information on parking cash out. Individual employers are directed to contact EPA and their local MPOs, transit agencies, TMAs/TMOs, or other groups that may be able to assist in developing a cash out program.

Regional Organizations and Transit Agencies

Many regional and local governments provide services to help employers implement parking cash out programs. Metropolitan planning organizations (MPOs), city and county transportation agencies, transportation management associations (TMAs), and transportation management organizations (TMOs) throughout the U.S. provide assistance to employers in starting and maintaining transportation demand management programs like parking cash out. They often provide information to employers about options to reduce driving to work, implementation issues, and local programs that support employer initiatives. The appropriate MPO can be located through the Association for Metropolitan Planning Organizations (202-457-0710 x19); a list of MPOs with Web pages is available at <www.ampo.org/mposnet_old.html>.

State and Local Governments

A few state and local governments have also developed programs that either promote or mandate certain employers implementing parking cash out. They may provide valuable information on implementation issues and marketing approaches. These include:

State of California, Parking Cash Out Legislation
California Air Resources Board
916-327-2980
cashout@arb.ca.gov
<www.arb.ca.gov/planning/tsaq/cashout/cashout.htm>

King County Metro, Commute Trip Reduction (CTR) law
206-684-4444
employer.services@metrokc.gov
<http://transit.metrokc.gov/prog/employer/ctr-law.htm>

City of Santa Monica, Mandatory Parking Cash Out Program
Contact: Jackie Brooks, 310-458-8956
<http://santa-monica.org/planning/transportation/abouttransmanagementtmo.html>

Downtown Minneapolis TMO
612-370-3987
<www.mplstmo.org>

Information on Tax Considerations

The Internal Revenue Code that governs employer-provided commuter benefits is found at 26 USC Section 132(f), and is available on the web at: <www.irs.gov> or <tmi.cob.fsu.edu/act/f_benefit.htm>.

For more information relating to qualified transportation fringes in Section 132(f), visit the Internal Revenue Service (IRS) website at www.irs.gov. This site contains useful information for employers regarding the tax treatment of fringe benefits. Some publications available from the IRS that may be useful include:

- Publication 15a, Employer's Supplemental Tax Guide - Section 6. Employee Fringe Benefits
  www.irs.gov/prod/forms_pubs/pubs/p15a08.htm
- Publication 15b, Employer's Tax Guide to Fringe Benefits - Transportation (Commuting) Benefits
  www.irs.gov/prod/forms_pubs/ pubs/p15b0215.htm
- Final Regulation Concerning Qualified Transportation Fringe Benefits (Issued January 11, 2001)
  frwebgate.access.gpo.gov/cgibin/getdoc.cgi?dbname=2001_register&docid=01-294-filed.pdf

For more information relating to qualified transportation fringes in Section 132(f), send a written request to:

Freedom of Information Reading Room
PO Box 795
Ben Franklin Station
Washington DC, 20044

Or contact Patricia Holtzworth at the IRS at 202-622-6040.

Best Workplaces for Commuters℠

For more information on Best Workplaces for Commuters℠, contact the BWC information request line at 888-856-3131, or visit <www.bwc.gov>.

Emissions and Transportation Benefits

Parking cash out has great potential to reduce vehicle travel and emissions of air pollutants and greenhouse gases. Case studies of firms that have implemented cash out programs

show that *firms cashing out take the equivalent of 1 out of 8 of their employees' commuting cars off the road.*

Benefits at Individual Employment Sites

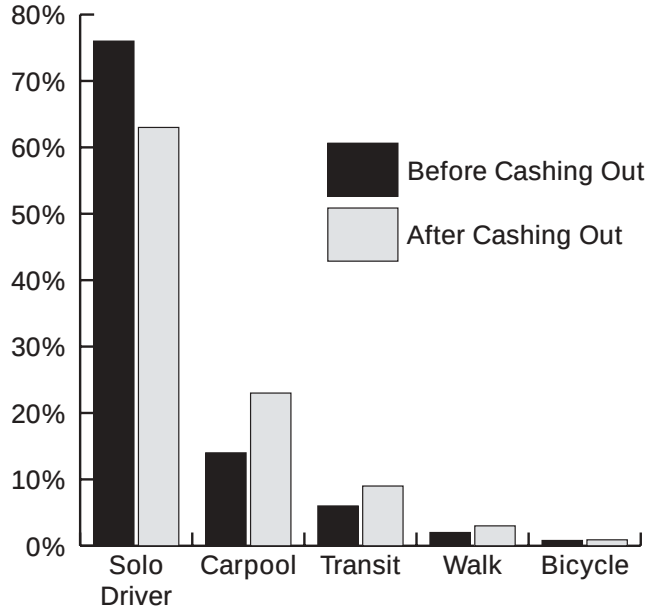
Monitored cash out programs show substantial reductions in single occupancy commuting. These reductions, in turn, reduce automobile emissions, congestion, and parking problems. An analysis of eight California firms implementing cash out by Shoup (1997 a, b) provides the best data on the effects of parking cash out:

Significant decrease in solo driving

As shown in the accompanying chart:

- Solo driving dropped 17 percent: from 76 to 63 percent of employees.
- Carpooling increased by 64 percent: from 14 to 23 percent of employees.
- Transit use rose by 50 percent: from 6 to 9 percent of employees.
- Combined bicycling and walking rose one-third: from 3 to 4 percent of employees.

Commuter Mode Shares:
Before and After Cashing Out



Significant decrease in miles driven[7]

- An average 2.6 fewer miles per employee per workday among all employees offered cash out (not just employees accepting the offer).
- This resulted in an average 12 percent fewer vehicle miles traveled (VMT) per year per employee. This reduction is equivalent to removing one of every eight cars driven to work.

Emission reductions per employee per year tracked VMT reductions: a 12 percent reduction in vehicle emissions from commutes.[8]

The results from these case studies confirm estimates from previous research based on parking pricing at workplaces. A summary of seven studies comparing either: (1) commuting behavior before and after employer-paid parking was eliminated; or (2) the commuting behavior of matched samples of commuters with and without employer-paid parking, found that when commuters paid for parking, they drove an average of 53 cars to work per 100 employees. When commuters parked free, they drove an average of 72 cars per 100 employees, suggesting a likely 26 percent drop when free parking begins to have a price attached. (Shoup, 1995)

Although parking cash out aims to "level the playing field" by eliminating the subsidy for solo drivers, it does not achieve this goal entirely: "cashing out reduces but does not eliminate the tax subsidy for solo driving because commuters must pay income taxes on the in-lieu cash. When commuters are offered the cash option, income taxation reduces the after-tax opportunity cost of taking a free parking space." (Shoup, 1997a) However, we can expect to see impacts rise over time. Shoup (1997a) again explains:

Cashing out is a new practice, and few firms have sufficient years of experience to provide evidence of longer-term effects. Because seven of the eight case studies examined commuters' responses after only one or two years of cashing out, the longer-term reductions in vehicle use may be underestimated. For one firm, records are available for three years after the cash out program began, however, and the solo-driver share fell in each of the following three years.

The firms' representatives offered two practical explanations for this longer-term decline in solo driving. First, new employees who have not already made their commuting choices are more willing to try ridesharing if they can take cash in lieu of free parking. Second, when cashing out is available, word of mouth spreads the idea among fellow workers. Those who have taken the cash describe the deal to others, and more begin to try it.

[7] *VMT determined by multiplying the number of vehicle trips to work by the average round-trip distance.*
[8] *Calculated by multiplying reductions in vehicle trips and VMT by emissions created per trip.*

Substantial Regional and National Potential

Given that most employers provide free parking to their employees, there is large potential for parking cash out to produce significant regional and national reductions in vehicle travel, air pollution, and greenhouse gases. The extent of these impacts will depend on the number of employers that actually adopt cash out programs. Nationally, parking cash out could reduce VMT by between 5 billion miles and 24.9 billion vehicle miles by 2007, depending on adoption rates - a 0.8 to 4.2 percent reduction in commute VMT. Since most reductions in travel are expected in urban areas, the percent reduction in commute VMT in large metropolitan areas would likely be larger, with commensurate congestion benefits.[9] Shoup (1997a) estimates that full national parking cash out "could reduce the equivalent of all vehicle travel and vehicle emissions for commuting by 800,000 households."

Studies have shown that increasing the price of parking is one of the most effective ways to reduce driving. Parking cash out can also be effective since it creates an "opportunity cost" of driving to work—the foregone income—without actually increasing the price of parking.

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[9] *Memorandum from Grant, Gottsman, and Wheeler-Smith of Hagler Bailly to Catherine Preston of EPA, March 9, 1999.*

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For More Information

This guidance document and other information about Best Workplaces for Commuters℠ are available at <www.bwc.gov> or by calling the BWC information request line at (888) 856-3131.

Acknowledgements

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EPA 420-S-01-006
Updated March 2005

Senate Bill No. 582

Passed the Senate July 14, 2011

_____

Secretary of the Senate

Passed the Assembly July 11, 2011

_____

Chief Clerk of the Assembly

This bill was received by the Governor this _____ day of _____, 2011, at _____ o'clock ____M.

_____

Private Secretary of the Governor

CHAPTER _____

An act to add and repeal Section 65081 of the Government Code, relating to transportation.

LEGISLATIVE COUNSEL'S DIGEST

SB 582, Yee. Commute benefit policies.

Existing law requires transportation planning agencies to undertake various transportation planning activities, including preparation of a regional transportation plan. Existing law requires transportation planning agencies that are designated under federal law as metropolitan planning organizations to include a sustainable communities strategy as part of the regional transportation plan for their region. Existing law creates air quality management districts and air pollution control districts with various responsibilities relative to reduction of air pollution.

This bill, beginning on January 1, 2013, subject to certain exceptions, would authorize a metropolitan planning organization jointly with the local air quality management district or air pollution control district to adopt a commute benefit ordinance that requires covered employers operating within the common area of the organization and district with a specified number of covered employees to offer those employees certain commute benefits. The bill would require that the ordinance specify certain matters, including any consequences for noncompliance, and would impose a specified reporting requirement. The bill would provide for the 8 metropolitan planning organizations within the region served by a specified air district to adopt the ordinance only after the district first acts to adopt the ordinance. The bill would exclude from its provisions an air district with a trip reduction regulation initially adopted prior to the federal Clean Air Act Amendments of 1990 as long as it continues to have a regulation that allows trip reduction as a method of compliance. The bill would make its provisions inoperative on January 1, 2017.

The people of the State of California do enact as follows:

SECTION 1. Section 65081 is added to the Government Code, to read:

65081. (a) It is the intent of the Legislature to encourage metropolitan planning organizations and local air quality management districts or air pollution control districts to work with local employers to adopt policies that encourage commuting by means other than driving alone.

(b) Notwithstanding Section 40717.9 of the Health and Safety Code, and except as otherwise provided in subdivision (h), on or after January 1, 2013, a metropolitan planning organization and a local air quality management district or air pollution control district with respect to the common area within their respective jurisdictions may jointly adopt a commute benefit ordinance that requires covered employers operating within the common area of the organization and district to offer all covered employees one of the following choices:

(1) A pretax option: a program, consistent with Section 132(f) of the Internal Revenue Code, allowing covered employees to elect to exclude from taxable wages employee commuting costs incurred for transit passes or vanpool charges, or bicycle commuting, up to the maximum amount allowed by federal tax law.

(2) Employer-paid benefit: a program whereby the covered employer offers employees a subsidy to offset the monthly cost of commuting via public transit or by vanpool. In 2013, the subsidy shall be equal to either the monthly cost of commuting via transit or vanpool, or seventy-five dollars ($75), whichever is lower. This amount shall be adjusted annually consistent with the California Consumer Price Index.

(3) Employer-provided transit: transportation furnished by the covered employer at no cost, or low cost as determined by the metropolitan planning organization, to the covered employee in a vanpool or bus, or similar multipassenger vehicle operated by or for the employer.

(c) Nothing in this section shall prevent a covered employer from offering a more generous commuter benefit that is otherwise consistent with the requirements of the applicable commute benefit ordinance.

(d) An employer offering, or proposing to offer, an alternative commuter benefit on the employer's own initiative, or an employer otherwise required to offer an alternative commuter benefit as a condition of a lease, original building permit, or other similar requirement, if the alternative is not one of the options identified in subdivision (b), may seek approval of the alternative from the metropolitan planning organization. The metropolitan planning organization may approve an alternative if it determines that the alternative provides at least the same benefit in terms of reducing single-occupant vehicle trips as any of the options in subdivision (b). An employer that offers an approved alternative to covered employees in a manner otherwise consistent with this section is not required to offer one of the options in subdivision (b).

(e) The commute benefit ordinance shall provide covered employers with at least six months to comply after the ordinance is adopted.

(f) An employer that participates in or is represented by a transportation management association that provides the employer's covered employees with any of the benefits in subdivision (b), or an alternative benefit determined by the metropolitan planning organization pursuant to subdivision (d) to provide at least the same benefit in terms of reducing single-occupant vehicle trips as any of the options in subdivision (b), shall be deemed in compliance with the regional ordinance, and the transportation management association may act on behalf of those employers in that regard. The metropolitan planning organization and the air quality management district or the air pollution control district adopting the ordinance shall communicate directly with the transportation management association, rather than the participating employers, to determine compliance with the ordinance.

(g) A commute benefit ordinance adopted pursuant to this section shall specify all of the following: (1) how the implementing agencies will inform covered employers about the ordinance, (2) how compliance with the ordinance will be demonstrated, (3) the procedures for proposing and the criteria that will be used to evaluate an alternative commuter benefit pursuant to subdivision (d), and (4) any consequences for noncompliance.

(h) In the region served by the air pollution control district established pursuant to Chapter 5.7 (commencing with Section 40600) of Part 3 of Division 26 of the Health and Safety Code, a

commute benefit ordinance may be adopted pursuant to this section only if it is first adopted by the district and then by all eight metropolitan planning organizations located wholly or partially in that region.

(i) Nothing in this section shall limit or restrict the statutory or regulatory authority of a metropolitan planning organization or an air quality management district or air pollution control district.

(j) On or before July 1, 2016, a metropolitan planning organization and an air quality management district or air pollution control district that implement a commute benefit ordinance as provided under this section shall submit a report to the transportation policy committees of each house of the Legislature that includes, but is not limited to, the following elements:

(1) A description of the program, including enforcement procedures and any sanctions to be imposed on noncomplying employers.

(2) Number of employers confirmed to have complied with the ordinance that did not previously offer a commute benefit consistent with those required by the ordinance.

(3) Number of employees who stopped driving alone to work in order to take transit or a vanpool, or to commute by bicycle, as a result of the commute benefit ordinance.

(4) Number of single-occupant vehicle trips reduced per month, week, or day as a result of the commute benefit ordinance.

(5) Vehicle miles traveled (VMT) and greenhouse gas emission reductions associated with implementation of the commute benefit ordinance.

(6) Greenhouse gas emission reductions associated with implementation of the commute benefit ordinance as a percentage of the region's greenhouse gas emission target established by the State Air Resources Board.

(7) Number of businesses that received a penalty for not complying with the ordinance and a description of the penalties imposed.

(k) An air district with a trip reduction regulation initially adopted prior to the federal Clean Air Act Amendments of 1990 shall be excluded from this section, as long as it continues to have a regulation that allows trip reduction as a method of compliance.

(*l*) A metropolitan planning organization shall not use federal planning funds in the implementation and enforcement of the commute benefit ordinance.

(m) As used in this section, the following terms have the following meanings:

(1) "Covered employer" means any employer for which an average of 20 or more employees per week perform work for compensation within the area where the ordinance adopted pursuant to this section operates, except that a metropolitan planning organization, at its option, may provide for the ordinance to apply solely to employers with 50 or more employees otherwise meeting the requirements of this paragraph. In determining the number of employees performing work for an employer during a given week, only employees performing work on a full-time basis shall be counted.

(2) "Covered employee" means an employee who performed at least an average of 20 hours of work per week within the previous calendar month within the area where the ordinance adopted pursuant to this section operates.

(n) This section shall remain in effect only until January 1, 2017, and as of that date is repealed, unless a later enacted statute, that is enacted before January 1, 2017, deletes or extends that date.

Approved _____, 2011

_____

Governor

California Environmental Protection Agency

Air Resources Board

P.O. Box 2815, Sacramento 95812

California's Parking Cash-Out Program

An Informational Guide For Employers

State law requires certain employers who provide subsidized parking for their employees to offer a cash allowance in lieu of a parking space. This law is called the *parking cash-out program* (Assembly Bill 2109, Katz; Chapter 554, Statutes of 1992). It was enacted after studies showed cash allowances in lieu of parking encourage employees to find alternate means of commuting to work, such as public transit, carpooling, vanpooling, bicycling, or walking. Parking cash-out offers the opportunity to improve air quality and reduce traffic congestion by reducing vehicle trips and emissions. For years, negative tax implications limited the implementation of the law. But in 1998, the federal Transportation Equity Act for the 21st Century (TEA-21) included amendments to the Internal Revenue Code that fixed this problem.

The Air Resources Board is the agency authorized by the Legislature to interpret and administer the parking cash-out law. Board staff has developed this informational guide to help employers determine whether they are subject to the requirements of the law and to answer questions about implementing a parking cash-out program.

The law does not apply to all employers or all employees. Employers with over 50 employees in an air basin designated nonattainment for any state air quality standard must offer a parking cash-out program to those employees who have the availability of subsidized parking that meets certain criteria.

The main provision of the parking cash-out law is less than a page long. But employer parking circumstances are often very complicated, which can make the law complicated to implement. Recognizing this, the goal of this guide is to provide a foundation for employers to carry out the law as it relates to them.

This guide includes: Page

Text of the law 2
Information on parking cash-out (question/answer format)
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(to help determine if employer is subject to the law)

August 2009

Text of Parking Cash-Out Law

§ 43845. Parking cash-out program. California Health and Safety Code.
(a) In any air basin designated as a nonattainment area pursuant to Section 39608, each employer of 50 persons or more who provides a parking subsidy to employees, shall offer a parking cash-out program. "Parking cash-out program" means an employer-funded program under which an employer offers to provide a cash allowance to an employee equivalent to the parking subsidy that the employer would otherwise pay to provide the employee with a parking space.
(b) A parking cash-out program may include a requirement that employee participants certify that they will comply with guidelines established by the employer designed to avoid neighborhood parking problems, with a provision that employees not complying with the guidelines will no longer be eligible for the parking cash-out program.
(c) As used in this section, the following terms have the following meanings:
(1) "Employee" means an employee of an employer subject to this section.
(2) "Parking subsidy" means the difference between the out-of-pocket amount paid by an employer on a regular basis in order to secure the availability of an employee parking space not owned by the employer and the price, if any, charged to an employee for use of that space.
(d) Subdivision (a) does not apply to any employer who, on or before January 1, 1993, has leased employee parking, until the expiration of that lease or unless the lease permits the employer to reduce, without penalty, the number of parking spaces subject to the lease.
(e) It is the intent of the Legislature, in enacting this section, that the cash-out requirements apply only to employers who can reduce, without penalty, the number of paid parking spaces they maintain for the use of their employees and instead provide their employees the cash-out option described in this section.

Related Provisions

Sections 17202 and 24343.5, California Revenue & Taxation Code. Specifies that costs related to a parking cash-out program may be deducted as business expenses for employers.

Section 17090, California Revenue & Taxation Code. States that the cash allowance given to employees must be included in gross income subject to state income and payroll taxes (except any portion used for ridesharing purposes).

Sections 65088.1, 65089, and 65089.3, California Government Code. Requires (1) congestion management agencies to consider parking cash-out when developing and updating the trip reduction and travel demand elements of their congestion management plans, and (2) requires cities or counties to grant appropriate reductions in parking requirements to new and existing commercial developments if they offer parking cash-out programs.

Uncodified language:

The Legislature hereby finds and declares all of the following:
(a) Existing local, state, and federal policies tend to encourage the provision of subsidized parking by employers.
(b) Subsidized parking creates a strong incentive for employees to commute to work in a single occupancy vehicle.
(c) Commuting in a single occupancy vehicle contributes to traffic congestion and air pollution.
(d) In Los Angeles and Orange Counties, more than 90 percent of the commuters receive free worksite parking, but less than 10 percent of employers provide an employee ridesharing or transit benefit.

Information on the Parking Cash-Out Law

Implementation

- *How do I determine whether I am subject to the parking cash-out law?*

  The law applies to employers (public or private) that:
  - employ at least 50 persons (regardless of how many worksites);
  - have worksites in an air basin designated nonattainment for any state air quality standard;
  - subsidize employee parking that they don't own;
  - can calculate the out-of-pocket expense of the parking subsidies they provide; and
  - can reduce the number of parking spaces without penalty in any lease agreements.

  (See page 10 for a questionnaire designed to help you determine whether you are subject to the parking cash-out law and that explains the above parameters of the law in more detail.)

- *When must I implement parking cash-out? When does the program end?*

  The law went into effect January 1, 1993, and includes no sunset provision specifying an ending date to the program. So the law requires all affected employers to offer a parking cash-out program until and unless the law is changed.

- *Where do I start?*

  1. Determine which employee parking is subject to cash-out. (See *Employee Parking* below.)
  2. Determine which specific employees are eligible. (See *Employee Eligibility*, page 4.)
  3. Calculate the appropriate cash allowance for each eligible employee. (See *Cash Allowance*, page 5.)
  4. Inform eligible employees. (See *Informing Employees*, page 7.)

Employee Parking

- *Which employee parking is subject to cash-out?*

  Employee parking is subject to cash-out if <u>all</u> the following apply: (1) you subsidize it, (2) you don't own it, (3) you can calculate the out-of-pocket amount you pay for it, (4) it is not a vanpool or carpool space, and (5) <u>if</u> it is leased parking, the lease allows you to reduce the number of parking spaces without penalty.

- *Is parking that is included ("bundled") in the building lease subject to parking cash-out?*

  If you cannot determine the out-of-pocket expenses of the parking you provide, and you do not make a discreet payment solely for parking occupied by an employee, which is almost always the case with bundled parking, the parking is not subject to parking cash-out.

- *I am the sole tenant of a leased parking garage. The lease agreement stipulates that I am subject to paying for all spaces in the garage. Is the parking subject to cash-out?*

  Since you cannot reduce the number of parking spaces without penalty, the parking is not subject to cash-out.

Employee Eligibility

- *Which employees are eligible for the cash-out option?*

  Employees must be offered the cash-out allowance if they are using, or could use, a subsidized parking space subject to cash-out. Examples include: any employee who is currently using a subsidized space; is offered a subsidized space (now or in the future); or was previously offered a subsidized space but declined, if a subsidized space is still available to him/her.

  (See page 9 for an eligibility checklist.)

- *What about current carpoolers, vanpoolers, transit users, telecommuters and those who walk or bike to work?*

  These individuals are eligible for parking cash-out if a qualifying subsidized parking space for a single-occupancy vehicle is currently available to them.

  NOTE: Carpool and vanpool spaces are not subject to cash-out. This means you *don't* have to offer six members of a vanpool an additional pro-rated $15 cash allowance for a $90/month vanpool space.

- *Can employee eligibility change over time?*

  Yes. An employee is eligible for cash-out based on the parking space he/she is offered. So, an employee's eligibility can change if the employee's parking circumstances change. Example:

  - If an employee changes work sites and goes from a subsidized leased parking space to one that is not eligible (e.g., a space that you own), you are no longer required to offer the employee a cash allowance. And vice versa, if an employee changes from parking in an owned space to a subsidized leased space subject to cash-out, you are required to offer the employee a cash allowance.

- *I don't lease parking, but I reimburse my employees for their commute-related parking costs. Does this trigger cash-out requirements?*

  Yes, if the parking costs are reimbursed on a regular basis. If not, then no. Examples:

  - You have employees who park regularly in a private garage at a cost of $60/month. You reimburse each one the full $60/month. These employees are eligible for a $60/month cash-out allowance in lieu of being reimbursed for their parking.

  - You reimburse employees only for commute-related parking on a sporadic basis related to special circumstances such as having to work overtime. The employees are not eligible for a cash-out allowance because you are not providing a parking subsidy on a regular basis.

- *I provide limited subsidized parking to my employees on a daily first-come, first-served basis. Is this parking subject to parking cash-out?*

  To be eligible for parking cash-out, an employee must have the expectation of having a subsidized parking space, whether assigned or unassigned, in which to park.

  If you lease 100 spaces that are available daily to 400 employees on a first-come, first-served basis, the employees cannot expect to have a parking space in which to park, and would not be eligible for parking cash-out.

  NOTE: Some employers confronted with a similar situation have changed their parking policies, assigning one employee to each parking space and offering a cash allowance equal to the actual cost per space. Others have chosen to begin charging for the parking.

- *How much participation in parking cash-out can I expect?*

  Studies indicate that approximately 12 percent of eligible employees, on the average, will take the cash-out offer, based on an average parking subsidy of $80 (Shoup 1992, 1997). Actual participation at each work site may vary.

- *What if employees who accept the cash allowance ask for their subsidized spaces back? Can employees who don't take cash-out when initially offered take it later?*

  The law simply requires you to give employees the parking cash-out option. Employers may establish reasonable policies for administering this benefit such as quarterly or semiannual review. It is suggested that you make cash-out readily available to employees. Policies that require employees to make irrevocable decisions or respond in an unduly short time period are not compatible with the spirit of the law.

- *How do employee bargaining agreements fit into the parking cash-out picture?*

  The cash-out program changes employee benefits and working conditions. Therefore, most bargaining agreements will require employers to "meet and confer" regarding cash-out implementation. While negotiations with unions may affect parking policies and how employers go about implementing parking cash-out, a bargaining agreement cannot keep an employer from implementing the law and must not result in any policies that are contrary to the law.

Cash Allowance

- *How much cash allowance must be offered?*

  The law requires the cash allowance to equal the parking subsidy -- what you pay for the parking space minus any contribution by the employee. Commute-related subsidies

(e.g., transit pass, ridesharing allowance) may be deducted from the cost of the parking in determining the amount of the cash allowance. Some examples:

- Cost of parking space - $75/mo. Employee pays nothing to park. *Cash allowance = $75/mo.*
- Cost of parking space - $100/mo. Employee pays $20/mo. to park. *Cash allowance = $80/mo.*
- Cost of parking space - $65/mo. Employee does not use space and receives $50 transit pass (subsidy) from employer every month. *Cash allowance = $15/mo. (if transit pass still provided).* If the transit pass were increased to $65/mo., the cash allowance would be $0/mo.

- *Can the amount of the cash allowance change over time?*

  Yes. Since the law requires the cash allowance to equal the parking subsidy, if the subsidy increases or decreases, the cash allowance adjusts to coincide. Some examples:

  - Cost per parking space increases $10/month. You charge your employees an additional $5/month parking fee. The parking subsidy has increased $5/month, so the cash allowance also increases $5/month.
  - You increase the amount your employees pay for parking by $25/month. Your cost per parking space does not change. The parking subsidy has decreased $25/month, so the cash allowance may also be decreased $25/month.

- *How often must I provide the cash allowance?*

  The law requires that you simply provide a cash allowance that is equal to the parking subsidy. The law does not specify how often. However, providing the cash allowance monthly is the norm, since most parking and commute-related subsidies and/or charges are on a month-to-month basis.

- *I have many work sites with different leased parking rates. Can I average the cost per space?*

  Yes. The law would not prohibit you from averaging the cost of subsidized parking subject to the cash-out law and providing one uniform cash-out payment. If you use this method, the cash allowance could also change over time based on the change in the average cost of subsidized parking.

Informing Employees

- *How do I inform employees?*

  Some employees are aware of this law. Others will be learning of it for the first time. All need to know your particular strategies for implementing the cash-out program. Many employers have designated an employee, such as their employee transportation coordinator, to be available to discuss with employees what cash-out means to them. It is also important to inform employees in a positive way, such as giving them an example of how parking cash-out can benefit them and their community -- by adding to their pay check while reducing congestion and air pollution.

- *Can I offer cash-out to employees even if the parking is not subject to the law?*

  Yes. You may implement cash-out voluntarily. And this may make sense when: (1) you own your parking, provide a travel allowance to all employees, and charge a fee for parking at an

equal or greater rate than the allowance, thus keeping costs to a minimum; (2) unoccupied spaces can be used by your patrons; or (3) you lease some parking spaces and thus must offer cash-out to some, but not all, employees.

Tax Consequences

- *Is the cash allowance considered taxable income?*

  Yes. The cash allowance is considered gross income subject to state and federal income and payroll taxes. However, ridesharing subsidies are exempt from state income taxes (Section 17149, Revenue & Taxation Code), and transit or vanpool subsidies up to $100 per month are exempt from federal income taxes (Section 132(f)(2)(A), Internal Revenue Code).

- *Can my costs related to cash-out be deducted as an employer business expense?* Yes.

- *Is the tax-free status of transit, vanpool, and parking subsidies at risk by offering them along with a cash-out allowance?*

  No. Federal legislation was enacted in 1998 allowing employers to offer a combination of cash and tax-free transportation fringe benefits (parking, vanpool and transit subsidies) without losing any of the tax-free benefits. (Note: The cash is still considered taxable income.) This new provision in the tax code is often called the Commuter Choice Program or Commute Benefit Program. For more information on how to use the new federal tax code provisions to your advantage, visit the web sites of the Association for Commuter Transportation at *http://tmi.cob.fsu.edu/act/act.htm* or the web site of the U.S. Environmental Protection Agency's Office of Mobile Sources at *http://www.epa.gov/oms/transp/comchoic/ccweb.htm.*

Federal and state tax laws are constantly changing. For current and reliable information, please contact your tax consultant, the U.S. Internal Revenue Service, or the California Franchise Tax Board.

Enforcement

- *Who administers this program?*

  The cash-out mandate is located in Division 26, Part 5, of the California Health & Safety Code, which the Air Resources Board is authorized to administer. However, the parking cash-out mandate is imposed directly on the employer who must meet the criteria of the statute. This type of statute is often described as "self-implementing."

- *Are there any penalties for noncompliance?*

  Violations of provisions in Division 26, Part 5, of the Health & Safety Code, which includes the parking cash-out law, are subject to civil penalties not to exceed $500 per vehicle per civil action. (See Section 43016, Health & Safety Code.) The Air Resources Board would apply the civil penalty per vehicle in a parking space subject to the cash-out program. The focus of ARB administration of the parking cash-out law would be to facilitate compliance before seeking civil penalties.

Neighborhood Parking Problems

- *What about the potential of spillover parking into nearby neighborhoods?*

  The law provides that employers may develop guidelines to avoid neighborhood parking problems. Employees must comply with these to be eligible for the cash allowance. Such guidelines might prohibit cash-out recipients from parking on specific streets or in specific neighborhoods, or require the recipient to not drive alone to work (e.g., take the bus, carpool, walk, etc.).

- *My cashed-out employees need to drive to work occasionally. To avoid having them park on neighboring streets, can I set aside a few spaces and reduce the cash allowance proportionately?*

  This would be a reasonable policy for accommodating employees and avoiding neighborhood parking problems. Since you would be subsidizing some parking for their use, you could reduce the cash allowance proportionately. (One space set aside for every ten cashed-out employees would equate to a ten percent reduction in the cash allowance.)

Relationship of Cash-Out to Other Transportation Demand Measures

- *How is cash-out related to other ridesharing and transportation demand measures?*

  It is suggested that parking cash-out be incorporated into other trip reduction and ridesharing incentives. If alternate means of commuting are made available and affordable through incentives, employees are more likely to take the cash allowance and not drive solo to work. Studies indicate that the most successful trip reduction programs tend to combine parking management and pricing with subsidies for transit, carpooling, and other alternate modes of commuting.

- *Can I make commuting by an alternate mode other than driving alone a condition of accepting the cash allowance?*

  The law allows for employers to establish guidelines to avoid neighborhood parking problems (see above). Requiring employees to participate in some form of verifiable trip reduction activity would be a reasonable employer policy to avoid such problems. In fact, many employers have implemented the parking cash-out program as a commute benefits program and avoided using the terms “parking cash-out” or “cash allowance,” since the law does not require use of these designations.

- *How can cash-out work for employees who commute by an alternate mode on a part-time basis?*

  Many employers have developed successful transportation demand management programs by rewarding part-time, as well as full-time, use of alternate commute modes. One of the ways parking cash-out can compliment this type of program is by providing for “shared” parking spaces. Just as two employees can team up to carpool and cash-out one parking space, two employees who use alternate modes on a part time basis can coordinate that use, share one parking space and cash-out the other. (Example: One employee telecommutes on Monday and Friday, another employee commutes by bus on Tuesday through Thursday. They share one parking space and cash-out the other.)

- *I have multiple work sites, with some parking subject to cash-out and some exempt. I wish to implement a uniform commute cash reward program for all employees based on the amount of alternate mode use. How do I ensure compliance with the cash-out law?*

  You can ensure compliance if your monthly cash reward for full-time use of an alternate commute mode is at least equal to the average monthly subsidy of your parking spaces subject to cash-out.

Eliminating Subsidized Parking

- *What if I discontinue parking subsidies? Is this a way to comply with the law?*

  Yes. The law was enacted to help balance existing local, state, and federal policies that tend to encourage subsidized parking. So if you stop subsidizing parking, you are no longer subject to the law. Studies show that paid parking has about the same impact on reducing solo driving as providing a cash allowance.

  Some employers have balanced employee compensation by replacing subsidized parking with travel allowances, providing all employees with a choice of how to use their commute subsidy. Other employers have reduced parking subsidies slightly to help defray the costs of the parking cash-out program.

Contacts

- *Who can I call with questions about the parking cash-out program?*

  You may contact Air Resources Board staff person Dennis Wade at (916) 327-2963. Written inquiries should be sent to Air Resources Board, Parking Cash-Out, Air Quality and Transportation Planning Branch, P.O. Box 2815, Sacramento, California 95812. Your local air district, ridesharing organization, or transportation management agency may also be able to answer your questions.

Eligibility Checklist

Determine what parking is subject to cash-out. Employees are eligible for the parking cash-out offer if they are currently using the parking or it is available to them.

Parking
(subject to cash-out if all items checked)

- O Subsidized
- O Not owned
- O Can calculate how much it costs
- O Not a vanpool or carpool space
- O If leased, lease allows the reduction of parking spaces without penalty

Employee
(eligible if one item checked)

- O Is using the parking
- O Is offered the parking (now or in the future)
- O Previously offered the parking but declined, but parking is still available

Parking Cash-Out Program
Employer Questionnaire

Employers answering "yes" to all of the following questions are subject to the parking cash-out law. Employers answering "no" to one or more questions are currently exempt.

	Yes	No
1. Do you employ over 50 persons (regardless of how many work sites)? - Persons are considered "employees" for purposes of parking cash-out if they are considered employees for unemployment insurance, state or federal tax purposes. (For a legal reference, see the definition of "employee" in Sections 621 and 621.5 of the Calif. Unemployment Insurance Code.)	☐	☐
2. Are any of your work sites located in an air basin designated nonattainment for any state air quality standard? - The answer is "yes" if any of your work sites are in a county other than Lake County.	☐	☐
3. Do you subsidize employee parking? - A "yes" means you pay all or part of the cost of parking for any employee.	☐	☐
4. Do you subsidize any employee parking on property that you do not own? - Parking spaces owned by employers are exempt from parking cash-out. - In most cases a "yes" answer means you subsidize employee parking that you lease. But reimbursing an employee on a regular basis for his/her commute-related parking costs in a lot that you neither own nor lease is also a parking subsidy subject to cash-out.	☐	☐
5. Can you calculate the out-of-pocket expense of the parking subsidies you provide? - A "yes" answer for leased parking means your parking costs are separated in your lease agreement, and/or you claimed parking as a separate itemized business expense on your state or federal tax returns.	☐	☐
6. Can you reduce the number of parking spaces in any of your leases without penalty? - If reducing the number of parking spaces would cause you to (1) continue to pay for unused spaces, (2) violate local planning regulations, or (3) break the lease, then the answer is "no." If not, then the answer is "yes."	☐	☐

Commuter Financial Incentives

Parking Cash Out, Travel Allowance, Transit and Rideshare Benefits

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TDM Encyclopedia

Victoria Transport Policy Institute

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Updated 16 March 2011

This chapter describes various financial incentives that can be used to encourage use of more efficient commute modes. These include parking cash out, travel allowance, transit benefits, and rideshare benefits. They are often provided as an alternative to subsidized employee parking.

Description

Commuter Financial Incentives include several types of incentives that encourage alternative commute modes:

- *Employee Parking Pricing* means that companies charge for parking at their parking lots or eliminate existing subsidies for off-site employee parking.
- *Parking Cash Out* means that commuters who are offered subsidized parking are also offered the cash equivalent if they use alternative travel modes (Shoup, 2005).
- *Travel allowances* are a financial payment provided to employees instead of parking subsidies. Commuters can use this money to pay for parking or for another travel mode.
- *Transit and rideshare benefits* are free or discounted transit fares provided to employees (Commuter Check).
- *Company travel reimbursement policies* that reimburse bicycle or transit mileage for business trips when these modes are comparable in speed to driving, rather than only reimbursing automobile mileage.
- *Tax and other government policies* that support such programs, such as tax reforms (Inland Revenue 2004; Commuter Choice Webpage).

Commuter financial incentives can be prorated according to how much employees use alternative modes. For example, employees who drive twice a week would receive 60% of the full Parking Cash Out allowance.

These strategies create more neutral travel incentives. Most employees who commute by car receive a free parking space with a typical value of $50-100 per month (Shoup, 1999; Litman, 1999). Employers offer employees subsidized parking because these benefits are usually untaxed. A typical employee must earn $1,500 or more in pre-tax income to pay for a parking space that costs their employer only $1,000 to provide. In the U.S., transit benefits are tax-exempt up to $100 per month (see the Commuter Choice website at www.commuterchoice.com for information on U.S. federal implementation resources and incentives). This policy has motivated an increasing number of employers to offer transit benefits as an alternative to parking benefits (Commuter Check). In Canada, transit benefits are currently taxable, so few employers offer them (employees would just as well receive cash), but there are efforts to change this policy (CUTA 2005; PBO 2010).

Parking Cash Out and transit benefits represent the savings that result from reduced parking costs. Businesses that own adequate parking may perceive little short-term savings from reduced parking demand. However, over the medium and long term most firms have opportunities to benefit financially from reduced parking demand: to provide additional parking to accommodate growth, to lease or sell excess parking, or to use the land for a new building, equipment storage, or greenspace. Parking Management allows businesses to take advantage of reduced parking demand. To make it easier for businesses to save from reduced employee parking demand, commercial leases can unbundle parking (parking spaces are leased separately rather than automatically included with building space), and list parking as a separate line item (parking rents are listed separately from building rents).

How It Is Implemented

This strategy is usually part of a Commute Trip Reduction program. Employers establish rules that employees must observe to quality for financial benefits, and may require participating employees to sign an agreement that specifies their

responsibilities, such as the number of days per month that they may drive to work and still qualify for a Parking Cash Out bonus.

Appropriate Parking Management strategies can facilitate implementation of this strategy. Minimum parking requirements can be reduced for businesses with Commute Financial Incentives. Transportation Management Associations can serve as brokers for any extra parking capacity.

Travel Impacts

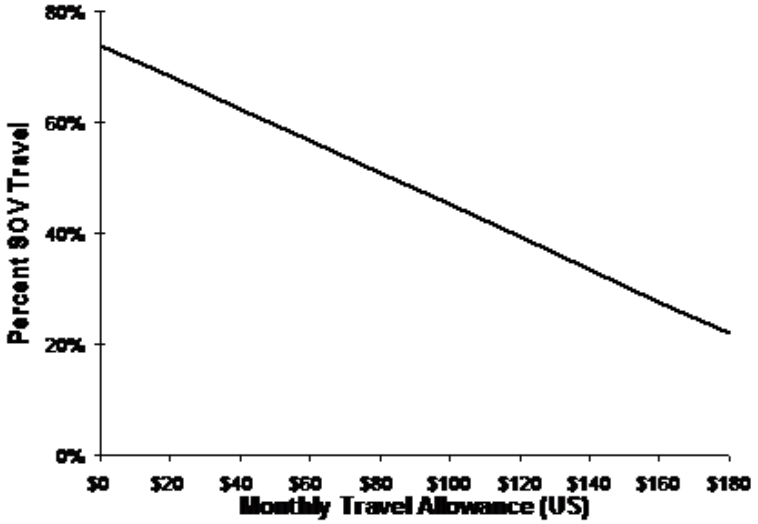
Models are now available which can predict the travel impacts of a specific Commute Trip Reduction program, taking into account the type of program and worksite. These include the *CUTR_AVR Model* (www.cutr.usf.edu/tdm/download.htm), the *Business Benefits Calculator* (BBC) (www.commuterchoice.gov) and the *Commuter Choice Decision Support Tool* (www.ops.fhwa.dot.gov/PrimerDSS/index.htm).

Table 1 Summary of Parking Cash Out Impacts (MTS 2006)

Location	Scope	Employees Affected	Financial Incentive ($1995/month)	Decreased Parking Demand
Group A: Areas With Little or No Public Transportation				
Century City District, West Los Angeles	3500 employees surveyed at 100+ firms	3,500	$81	15%
Cornell University Ithaca, NY	9000 faculty & staff	9,000	$34	26%
San Fernando Valley, Los Angeles	1 large employer (850 employees)	850	$37	30%
Bellevue, WA	1 medium-sized firm (430 employees)	430	$54	39%
Group Totals and Weighted Averages		*13,780*	*$47*	*24%*
Group B: Areas With Fair Public Transportation				
Los Angeles Civic Center	10000+ employees at several organizations	10,000	$125	36%
Mid-Wilshire Blvd., Los Angeles	1 mid-size firm	430	$89	38%
Washington DC Suburbs	5500 employees at 3 worksites	5,500	$68	26%
Downtown Los Angeles	5000 employees surveyed at 118 firms	5,000	$126	25%
Group Totals and Weighted Averages		*20,930*	*$110*	*31%*
Group C: Areas With Good Public Transportation				
University of Washington, Seattle Wa.	50,000 faculty, staff & students	50,000	$18	24%
Downtown Ottawa, Canada	3500+ government staff	3,500	$72	18%
Group Totals and Weighted Averages		*53,500*	*$22*	*24%*
Overall Totals and Weighted Averages		***88,210***	***$46***	***26%***

The travel impacts of a Commuter Financial Incentive program are affected by the magnitude of the benefits, the quality of travel choices, and demographics. In urban areas, travel tends to shifts primarily to transit and walking, while in suburban areas it tends to shift more to ridesharing, telecommuting and cycling. The Transport Elasticities chapter provides information on the travel impacts of various price changes. The figure below illustrates the effect such economic incentives typically have on single occupant vehicle (SOV) commuting.

Figure 1 Effect of Economic Incentives on SOV Rates (Rutherford 1995)



SOV travel decline as economic incentives for other modes increase.

Below is an example from the Trip Reduction Tables chapter, based on information from a major study for the Institute of Transportation Engineers (Comsis Corporation 1993). This indicates the impacts of transit financial benefits on commute trips for various geographic conditions. For example, a $1 (in 1993 U.S. dollars, comparable to $1.50 in 2010 dollars) per day transit subsidy at a transit-oriented activity center is predicted to reduce automobile commute trips by 10.9%, while in a rideshare-oriented Central Business District, the same subsidy would only cause a 4.7% trip reduction. Other Trip Reduction Tables indicate reductions for Transit and HOV subsidies if matched with parking fees.

Table 2 Transit/HOV Subsidy Vehicle Trip Reductions (www.vtpi.org/tdm/tdm41.htm)

Worksite Setting	$0.50/day	$1/day	$2/day	$4/day
Low density suburb, rideshare oriented	0.1%	0.2%	0.6%	1.9%
Low density suburb, mode neutral	1.5%	3.3%	7.9%	21.7%
Low density suburb, transit oriented	2.0%	4.2%	9.9%	23.2%
Activity center, rideshare oriented	1.1%	2.4%	5.8%	16.5%
Activity center, mode neutral	3.4%	7.3%	16.4%	38.7%
Activity center, transit oriented	5.2%	10.9%	23.5%	49.7%
Regional CBD/Corridor, rideshare oriented	2.2%	4.7%	10.9%	28.3%
Regional CBD/Corridor, mode neutral	6.2%	12.9%	26.9%	54.3%
Regional CBD/Corridor, transit oriented	9.1%	18.1%	35.5%	64.0%

This table shows the predicted vehicle trips reduced by a given daily transit subsidy under certain conditions (Based on Comsis Corporation 1993)

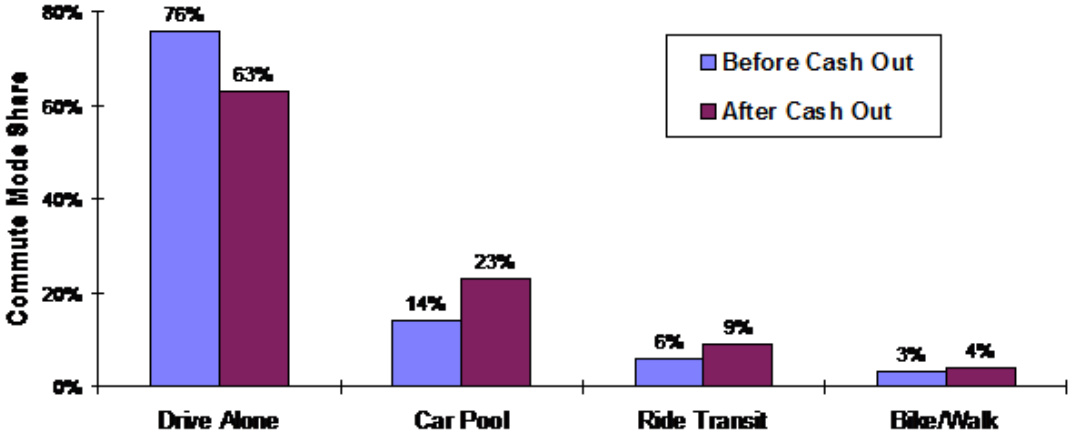
A study of 1,110 Los Angeles area employee commute trip reduction programs found that financial incentives were the most effective of all the strategies evaluated (Cambridge Systematics 1994). The table below summarizes the findings.

Table 3 Effect of Various Financial Incentives on Commute Trips

Type of Benefit	Change in Drive Alone Mode Share
Bicycle Subsidy	-2.7
Vanpool Seat Subsidy	-5.4
Transit Subsidy	-3.1
Other Employee Benefits	-4.1

Transit voucher programs typically shift 20-percentage points of recipients' commute travel from auto to transit (Oram Associates 1995; Schwenk 1995). Shoup (1997) found that total vehicle trips declined by 17% after Parking Cash Out was introduced at various urban and suburban worksites, as illustrated in Figure 2. These automobile trips reductions tend to increase over time: one employer found that solo commuting continued to decline each year after Parking Cash Out was introduced, as more employees found opportunities to reduce their driving and take advantage of the benefit.

Figure 2 Cashing Out Impacts on Commute Mode (Shoup 1997)



Parking Cash Out results in reduced automobile commuting and increases in carpooling, transit and nonmotorized travel.

Mode shifts tend to be greatest if current use of alternative modes is low. In New York City, where transit commute rates are already high, transit benefits only increased transit use by about 20%, while in Philadelphia, where more commuters drove, transit commuting increased 32% among recipients (Schwenk, 1995). Similarly, only 30% of employees who received transit benefits who work in San Francisco increased their transit use, while 44% of those in other parts of the region commuted by transit more (Oram Associates, 1995). These probably represent the lower range of potential mode shifts since they are marketed primarily as an employee benefit and are therefore most attractive to firms with high current levels of transit commuting.

Table 4 Travel Impact Summary

Travel Impact	Cash Benefits	Transit Benefits	Comments
Reduces total traffic.	2	1	Only affects commute trips.
Reduces peak period traffic.	3	2	
Shifts peak to off-peak periods.	0	0	
Shifts automobile travel to alternative modes.	3	2	
Improves access, reduces the need for travel.	0	0	
Increased ridesharing.	3	0	
Increased public transit.	3	3	
Increased cycling.	3	0	
Increased walking.	3	0	
Increased Telework.	2	0	
Reduced freight traffic.	0	0	

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Benefits And Costs

Benefits include:

- Increased Affordability, Transportation Options and Equity for employees who use alternative modes.
- Reduced peak-period automobile traffic, resulting in reduced Congestion, road and parking facility savings, crash reductions and environmental improvements.
- Increased demand for alternative modes can lead to improved Transportation Options (increased ridesharing, more transit service, bicycle and pedestrian improvements, etc.) due to economies of scale and increased public support.
- Employee satisfaction. Employers have praised such programs for their fairness. It can help to recruit and retain some employees.
- Flexible problem solving. Businesses can use this strategy to deal with particular parking problems, to accommodate growing

demand, or make land currently devoted for parking available for other purposes.

- Parking Cost Savings, less land devoted to parking, increased density and reduced impervious surface.
- Increased tax revenue, since taxable cash bonuses replace tax-exempt parking subsidies.

Costs include the financial cost of the benefits and administrative expenses, minus parking cost savings. Administrative costs tend to be small once the program is established and incorporated into the payroll system. A typical Parking Cash Out program requires approximately two minutes per employee per month for administration (Shoup, 1997). Firms that own employee parking facilities may incur financial costs if they pay financial incentives but are unable to lease or sell excess parking capacity or use the land in other profitable ways. Shoup (1997) found that this resulted in a $2 per month average net cost per employee among eight employers studied.

A potential problem with financial incentives is the risk that employees may claim to commute by alternative modes but actually drive and use an off-site parking space, creating spillover parking problems. This may require additional Parking Management.

Table 5 Benefit Summary

Objectives	Rating	Comments
Congestion Reduction	3	Reduces peak-period automobile travel.
Road & Parking Savings	3	Reduces automobile travel and parking requirements.
Consumer Savings	3	Financial rewards to commuters using alternative modes.
Transport Choice	3	Financial rewards to commuters using alternative modes.
Road Safety	2	Reduces automobile travel.
Environmental Protection	2	Reduces automobile travel.
Efficient Land Use	2	Reduces automobile travel, encourages multi-modal travel.
Community Livability	2	Reduces automobile travel, encourages multi-modal travel.

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Equity Impacts

Commuter Financial Incentives increase fairness by giving non-drivers a benefit comparable in value to what motorists receive. Although these programs involve subsidies, these are usually less than current subsidies to driving. They also increase vertical equity since non-drivers are more likely to be lower-income and physically disadvantaged than motorists.

Table 6 Equity Summary

Criteria	Rating	Comments
Treats everybody equally.	3	Gives non-drivers benefits comparable to drivers.
Individuals bear the costs they impose.	1	Involves subsidy, but usually about equal to existing parking subsidies.
Progressive with respect to income.	3	Lower-income employees tend to use alternative modes.
Benefits transportation disadvantaged.	3	Provides financial benefits to non-drivers.
Improves basic mobility.	1	Improves access to employment.

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Applications

Commuter Financial Incentives can be implemented in any geographic conditions, although they are most appropriate and effective in areas with significant traffic, parking or pollution problems and sufficient alternative commute options. It is therefore most common in large urban and suburban centers. Businesses associations and individual businesses can implement this strategy. Developers may reduce parking supply in exchange for this program, and unbundle parking from building leases to make it easier for tenants to Cash Out parking.

Table 7 Application Summary

Geographic	Rating	Organization	Rating
Large urban region.	3	Federal government.	2
High-density, urban.	3	State/provincial government.	2
Medium-density, urban/suburban.	3	Regional government.	3

Town.	2	Municipal/local government.	3
Low-density, rural.	1	Business Associations/TMA.	3
Commercial center.	3	Individual business.	3
Residential neighborhood.	1	Developer.	3
Resort/recreation area.	3	Neighborhood association.	2
Any employment center.	3	Campus.	3

Ratings range from 0 (not appropriate) to 3 (very appropriate).

Category

Incentive to Reduce Driving

Relationships With Other TDM Strategies

Commuter Financial Incentives are often implemented as part of Commute Trip Reduction, Transportation Management Association and Campus Transport Management programs. This strategy supports and is supported by efforts to increase travel options (Transit Improvements, Ridesharing and Nonmotorized Transport), Smart Growth, and Comprehensive Market Reforms. Parking Management allows businesses to capture financial savings from reduced parking demand, and to address spillover problems if they occur. Also see Parking Solutions.

Stakeholders

Commuter Financial Incentive programs can involve employers (which manage and fund the program), employees and labor organizations (who can demand such benefits and negotiate them into contracts), local governments (which can encourage development of such programs and adjust parking requirements in response to their implementation), developers (who can adjust building parking supply in response to such programs), and transit agencies (which support transit voucher programs). Transportation and environmental agencies may encourage and support such programs.

Barriers To Implementation

Although Commuter Financial Incentives are effective at changing travel patterns, they face a number of practical obstacles. Many businesses are unfamiliar with Commute Trip Reduction and Financial Incentives. There are often administrative barriers to providing such benefits, or resistance from employees and labor organizations to some types of incentives (Rankin, 1995). Some businesses may perceive no short-term financial savings from reduced automobile use if they have sufficient parking capacity. Surveys indicate that about 60% of employers own their own parking facilities, and 37% receive parking bundled with building leases (Kuzmyak, Weinberger and Levinson, 2003). Local governments may be unwilling to reduce parking requirements in response to such programs. Some employers may be concerned that employees will abuse these benefits (such receiving Parking Cash Out benefits but continuing to drive). Developers may be afraid of reducing parking supply when constructing buildings. Income tax laws favor parking subsidies over other employee benefits.

Best Practices

Organizations such as the *Association for Commuter Transportation*, *Commuter Check* and the USEPA's *Commuter Choice Program* provide information on establishing and operating Commuter Financial Incentive programs. Best practices include:

- Integrate Commuter Financial Incentives with other TDM efforts, such as transit improvements, ridesharing matching, Guaranteed Ride Home programs, telecommuting, etc.
- Make programs flexible, so employees have an incentive to walk, bicycle, carpool, vanpool and ride transit, and to participate part-time or full-time.
- Prorate benefits according to how frequently employees use alternative modes.
- Including employees in program development and planning to help identify and address practical and equity concerns.

Wit and Humor

A Sunday school teacher is trying to convey to his students the immensity of god. "To god, a million years is like a minute," he says.
The students did not seem adequately impressed, so after a moment he adds, "And to god, a

million dollars is like a penny."
One student raises her hand and says, "If god is so wealthy I think he should share one of his pennies with me."
"He will in a minute," the teacher explains.

Case Studies and Examples

Alameda County Congestion Management Program (www.accma.ca.gov)

The Alameda County (East San Francisco Bay area, including suburban and rural areas) Congestion Management Program enlisted four employers to provide financial incentives to encourage reduced driving. The table below summarizes the results at the four worksites. The program managers conclude that financial incentives alone typically reduce automobile commute trips by 16-20%, and significantly more if combined with other TDM strategies.

Table 8 Alameda County Commute Incentive Program

	Alameda	Albany	Oakland	Pleasanton
Incentive offered	$1.50/day	$2.50/day	$40/mo transit pass	$2.00/day
Average combined fuel savings and financial benefit.	$268/year	$381/year	$407/year	$282/year
Eligible Employees	573	130	400	380
Participants before	12 (3%)	7 (5%)	11 (3%)	147 (40%)
Participants after	108 (19%)	30 (23%)	93 (23%)	130 (34%)

UK Tax Policy Supports Commute Trip Reduction Programs

Tax, National Insurance Contributions and Green Travel (www.inlandrevenue.gov.uk/cars/green_travel.htm)
Since 1999, the following are exempt from UK income tax and employment insurance:

- Buses of 9 or more seats used mainly to bring employees to and from work.
- Subsidies to public bus (but not rail) services used substantially for commuting.
- Bicycles and cycling safety equipment.
- Workplace parking for bicycles and motorcycles.
- Alternative transport for car sharers to get home in exceptional circumstances, such as working late, domestic emergencies etc.
- A cycling business mileage allowance of up to 12p per mile.

Commuter Check Programs (www.commutercheck.com/about/studies.html)

The San Francisco Bay Area Commuter Check Program provides subsidized transit benefits to employees. Three program evaluations are summarized below. The first assessed travel impacts. The second was primarily an employer satisfaction survey. The third assesses how employee value this benefit.

Impacts of the Commuter Check Program

In November 1994, survey cards were sent to 239 Bay Area employers that purchased Commuter Checks for their employees. Approximately 1,800 survey cards were completed and returned by employees from 149 employers. The response rate from these 149 employers was estimated to be 40% to 50%. Key findings of the survey are summarized as follows:

- About a third (31%) of the employees who receive Commuter Checks increased their use of transit. These employees reported an average increase of 3.24 transit trips per week. New transit trips were reported for both commuting and non-work purposes.

- The increase in transit use as a result of Commuter Check was more pronounced at employers outside San Francisco. Employees outside San Francisco reported an increase in transit commute trips of 48% compared to 25% in San Francisco.

- An estimated 17 million vehicle miles were removed from Bay Area roads in 1994 due to Commuter Check, and an estimated 61 million tons of pollutants were avoided.

- Most of the users who increased transit riding as a result of Commuter Check had been non-users or infrequent users.

- A large majority (79%) of respondents noted improved opinions of their employer as a result of receiving Commuter Checks, a third (35%) noted reduced stress from not driving to work or driving less often, and a third (33%) said job satisfaction had improved. Improvements in on-time arrival and productivity were also noted.

Commuter Check Customer Service Survey
In September 1999, the Metropolitan Transportation Commission (MTC) conducted a survey of Bay Area employers participating in Commuter Check. Commuter Check began in the Bay Area in 1991, and by August 1999, Commuter Checks had been sold to over 2000 employers. Through the mid-1990s, the program was expanding by approximately 35% a year. Since the pre-tax employee-paid option became available in June 1998, the rate of growth has exceeded 100%.
The survey was sent to approximately 1,350 employers who had ordered Commuter Checks within the previous 15 months. Key findings of the survey are summarized as follows:

- 38.5% of respondents chose to offer Commuter Check to improve their employee benefits package. 20% chose it to save money.
- 91% of respondents said that there were no major obstacles in implementing Commuter Check.
- 94.5% of respondents rated “excellent” or “good” when asked their overall satisfaction level with Commuter Check.
- 94.8% of respondents said that orders arrived as anticipated.

Chronicle Books Survey
Chronicle Books, an affiliate of the San Francisco Chronicle, has offered Commuter Check to their employees since 1993. Their program began by offering all employee not receiving parking a monthly $30 Commuter Check.

In 1995, Chronicle Books' employees were surveyed about the overall benefits package. Employees were asked to rank 15 benefits by how satisfied they were with each benefit, and also by the importance of each benefit.

The employees ranked Commuter Check second in the level of satisfaction provided, and sixth in importance (behind the heavy hitters of health coverage, vacation, dental plan, 401k and vision care). Approximately 20 percent of Chronicle Books' employees do not receive Commuter Check, suggesting that even higher ratings would have resulted if only the transit users were surveyed.

Kate M. Coldwell, Chronicle Books' Manager of Human Resources, noted, "We thought this was significant, especially given the low cost of the benefit. With Commuter Check, the benefit is immediate and employees are made aware of it every month. In addition, I always appreciate the ease of purchasing and using the vouchers."

California Parking Cash Out Experience
Shoup (1997) summarizes the impacts of eight parking Cash Out programs in Southern California. These programs:
- Reduced single-occupancy commuting by an average of 17%.
- Reduced carbon dioxide emissions by 807 pounds per employee per year.
- Were considered fair and efficient by employers and employees.
- Had a benefit/cost ratio exceeding 4.0.
- Increased income tax revenue.

Spitsmijden: Dutch Experiments With Peak Avoidance Incentives (Donovan 2011)
An series of experiments performed in the Netherlands offered financial incentives between €2 to €7 (Euros) per day to selected travellers if they avoided travelling at peak times. Results suggest the incentives have had a major effect on travel behaviour, with approximately 20-50% of participants either changing their departure time, switching routes, or shifting to another transport mode. Table 6 summarizes these results.

Table 6 Summary of Spitsmijden Experiments (Donovan 2011)

Location	Incentive	Modifications to travel behaviour			
		Departure time	Route changes	Mode shifts	No trips
1. Zoetermeer	€3	35%	-	10%	1%
2. Gouda	€7	4%	-	14%	3%
3. Hollandse Brug	€4-6	16%	9%	7%	6%
4. Moerdijk Brug	€4	15%	28%	5%	6%

Financial incentives caused travelers to change their peak-period automobile travel in various ways.

U.S. Transit Benefits (Baker, Judd and Oram 2010)

U.S. transit benefit policies have evolved gradually over three decades. Below are some highlights.
1984 - Legislation "codifies" use of transit benefits, allowing $15 per month maximum benefit ("cap"); limited to employer subsidy
1987 - First transit voucher plan implemented in New York
1990 - First "Eco-Pass" plan implemented in Boulder and Denver, Colorado
1990s - Self-supporting national transit benefit services emerge
1991 - Inflation adjustment raises transit benefit cap to $21
1992 - New legislation raises cap to $60 per month
1995 - Inflation adjustment raises cap to $65
1998 - Employee-paid pre-tax payroll deduction feature added
2000 - Executive Order mandates transit benefits for Federal employees
2002 - Monthly maximum benefit raises cap to $100
2005 - Inflation adjustment raises cap to $105
2007 - Inflation adjustment raises cap to $110
2008 - Inflation adjustment raises cap to $115
2008- City of San Francisco adopts transit benefit ordinance
2009 - January: Inflation adjustment raises cap to $120
2009 - February: Economic stimulus legislation raises cap to $230, matching the cap for tax-free parking. This increase put the transit benefit on par with the parking benefit, and allows participants to set aside dollars before taxes for commuting costs, resulting in a monthly savings of up to 40%.
2009 - Transit benefit ordinances adopted by City of Richmond, CA, San Francisco Airport Authority, and City of Berkeley, CA

A 2001 *Xylo Report* (www.xylo.com) on work-life issues found that 86% of American workers felt that commuter assistance benefits, such as discount transit passes, ride sharing boards, or parking benefits, were beneficial and useful, although only 17% were offered such benefits. In the Northeast 30% of employees were offered commuter assistance, compared with just 8% in the Midwest.

An April 2007 survey of New York City commuters by Accor Services (www.accorservicesusa.com) found that 20% of respondents said their employers offer tax-free commuter benefits. Of those surveyed, 98% said they would participate if their employer offered this benefit.

A 2009 survey of 450 Human Resources professionals by the Society for Human Resource Management (SHRM) found that only 11% of respondents' organizations offered IRS Sections 132 transportation accounts (pretax transportation reimbursement accounts), but this increased to 17% in September 2008, in response to high fuel prices.

A 2008 National Compensation Survey by the Bureau of Labor Statistics reported that 7.6 million workers in the U.S. received employer-provided commuter benefits, about 5% of all U.S. workers.

UK Company Tax Reform (www.inlandrevenue.gov.uk/cars/cct_eval_rep.pdf)

In the UK, approximately 15% of all car mileage is by "company cars," (vehicles purchased by companies for their employees) and a significant proportion of the second hand car market consists of ex-company cars. The old tax structure had a declining rate which created an incentive to maximize mileage. A new company car tax system implemented in April 2002. based the tax on the level of CO2 emissions they produce (see *Company Car Tax Calculator* at www.inlandrevenue.gov.uk). The business mileage discounts have been removed in order to eliminate the financial incentive which existed under the old system for some company car drivers to do unnecessary business miles. An evaluation study estimated that this reform has led to a reduction in business miles being travelled in company cars in the UK in 2002/03 of between 300 - 400 million miles and that this will continue in subsequent years. The reduction in business miles by company car drivers is estimated to equate to a reduction of 25,000 - 35,000 tonnes of carbon emissions in 2002/03. This represents a reduction in CO2 emissions equivalent to about 0.1% of all CO2 emissions from road transport in the UK.

Intel Corporation (www.epa.gov/oms/transp)

The Intel Corporation in Oregon provides free transit passes to its more than 10,000 employees. The company receives a significant discount on transit pass prices, plus state and federal tax credits.

Atlanta Program Steering the Way People Get to Work (www.cleanaircampaign.com)

ATLANTA, Ga., July 22, 2004 - Cash for Commuters, a regional financial incentive program offered by The Clean Air Campaign, is changing the way metro Atlantans get to work - one commuter at a time.

According to two surveys of Cash for Commuters participants prepared recently by the Center for Transportation and the Environment (CTE) on behalf of the Georgia Department of Transportation, once commuters are motivated to give up their solo commutes, the vast majority continue to use alternatives. This research indicates that getting people to try a commute alternative - and paying them to do it - pays off in both the short term and, more importantly, in the long term.

The first survey questioned participants who had taken part in the initial launch of Cash for Commuters (October 2002 - February 2003). The second survey involved participants from the second offering (May - December 2003). Both surveys were conducted in April 2004, and revealed that of participants who had completed the program three to six months earlier, 74% continue to use a commute alternative, when no incentive is available to them. Of participants who had completed the program nine months to one year earlier, 64% continue to use a commute alternative.

"These results are exciting for several reasons," said Ellen Macht, executive director of The Clean Air Campaign. "First, we're seeing at least as many, if not more people continue to use the program in the short-term after the incentive ends -- in last year's survey of the three to six month group, 71% continued to use an alternative. Also, this is the first time we've been able to survey a group that was a full year out of the program, and the fact that so many are still using alternatives really validates the program and the benefits of commute alternatives. Macht continued, "Finally, even among those who went back to driving alone, most abandoned the change primarily due to factors out of their control, such as losing a carpool partner or changes in work schedules, not because they wanted to go back to sitting alone in traffic."

The vast majority of the former Cash for Commuter participants gave up their solo commute in favor of carpooling, with 68% of both groups carpooling during the three-month incentive phase. Transit was the second most used alternative, followed by telework and bike/walk. Since its initial launch in October 2002, more than 5,000 metro Atlantans have participated in Cash for Commuters. CTE estimates that Cash for Commuters participants in the first two waves have reduced more than 3,000 vehicle trips each day, adding up to a total of more than 19.5 million miles off metro roads from the initial launch through April 2004. These changes also mean tons of smog-forming emissions have been kept out of metro Atlanta's air. Cash for Commuters is the only financial incentive program in the country that pays cash directly to consumers for using alternative transportation. To qualify for Cash for Commuters, residents must not have used an alternative to driving alone - for their work commute -more than five times in the last 90 days. Commuters must live or work in the 13-county metro Atlanta nonattainment area. Once registered, commuters earn three dollars ($3.00) cash for each day they use a qualified commute alternative to travel to and from work within a 90-consecutive day period.

Ernst & Young (www.wageworks.com)

The accounting and management firm Ernst & Young offers a pre-tax commuter transportation and parking benefits to its employees in partnership with WageWorks, starting in 2001. This is projected to save employees 40% of their commuting and work-related parking costs, and reduce the firm's payroll expenses.

"Adding commuter benefits to our innovative benefits offerings is just one more reflection of Ernst & Young's commitment to make the firm a great place to work," says vice chairman of human resources, James L. Freer. "When we surveyed a group of employees regarding what benefits they value, a pre-tax commuter program was the most frequent enhancement by far, with 62% of the respondents asking for it. We are pleased to offer such a program that will make our people's commute to work a bit easier."

CH2M Hill (www.commuterchallenge.org/cc/daw99ch2m.html)

Upon moving into new offices in the Seattle suburb of Bellevue, WA, the 430 employees of the engineering firm of CH2M Hill were offered $40 per month if they walked, bicycled, carpooled or took transit to work; or free parking if they drove alone. The firm's drive-alone rate declined from 89% to 54%, and stayed there, while the percentage biking or walking increased from 1% to 17% (see table below). With parking demand down by 39%, the firm's problem of 'too many parkers for too few spaces' disappeared. This approach reduced costs to the company, reduced traffic and pollution, while increasing tax revenue. The company won the 1999 Commuter Challenge Diamond Award for this program.

	Before		After	
Drive Alone	89%		54%	
Carpool		9%		12%
Bus	1%		17%	
Bike, Walk	1%		17%	

Mobility Mixx (www.mobilitymixx.nl)

Mobility Mixx is a Dutch initiative to encourage more efficient business travel by offering employees a personal Mobility Budget, which increases transportation options beyond the company car to also include public transportation, ridesharing and taxi travel. This has proven to provide cost savings to businesses, more flexibility and efficiency for employees, and reduced traffic congestion, energy consumption and pollution emissions.

Spitsmijden' ('Peak Avoidance') Project

The Dutch *Spitsmijden* (Peak Avoidance) project provided a group of commuters with positive incentives to reduce their peak-period car trips (Ettema, 2008). Incentives included 3 to 7 EURO per day financial rewards or credits to earn a smartphone. Travellers' responses were measured using electronic detection equipment and travel diaries. The project results indicate that positive incentives are able to reduce peak traffic by 60-65%. Travellers mainly shift car trips to off-peak periods. Although the experiment was intended to achieve a structural change in travel behaviour, we observed that travellers returned to the peak period when the incentives ended.

Transit Voucher Programs (www.commutercheck.com)

The New York City region's TransitChek program (the nation's oldest) sells vouchers to 6,000 employers, provides more than $25 million worth of transit benefits (Schwenk, 1995.). The Commuter Check program in the San Francisco Bay area sells $6 million worth of vouchers to about 700 employers. This has increased transit use an average of 31% among those who receive vouchers, resulting in an estimated 17 million miles of reduced automobile travel, and $1.6 million in increased transit revenue in 1994.

Parking Cash Out Programs Sponsored by Local Governments (www.iclei.org/us)

- The City of West Hollywood, CA began cashing out parking in 1990. City Hall employees receive cash benefits of up to $65 per month for not driving to work.

- In 1997, the City of Oakland, CA successfully implemented Parking Cash Out as a short-term solution to the loss of 88 employee parking spaces due to construction. All employees at the site were offered $40 a month in Commuter Checks to not drive to work at least three days a week. Employees who agreed not to drive to work just one day a week were offered a $20 Commuter Check each month. In one year, the program saved 14,650 commute trips, 12,306 gallons of gasoline and approximately 123 tons of CO_2.

- The suburban City of Pleasanton, CA offers $1.50 per day to employees who use a commute alternative instead of driving to work alone. All city employees are eligible to participate with no minimum days required. The program has resulted in an annual savings of 20,625 trips, which translates into 12,375 gallons of fuel and 123 tons of CO2. In 1993, the year before the program was implemented, only 28 employees were commuting to work using alternative modes. Average participation in 1994 was 55 employees per month and grew to 66 participants in 1995.

- One local government requires building owners to include parking costs as a separate line item in leases, and to charge a minimum rate for monthly long-term parking that is equal or greater than the cost of a bus pass. This makes it easier for employers to determine the value of their current parking subsidies.

Vancouver Airport

In 2006 the Vancouver Airport began to offer staff who do not drive alone to work a $50 monthly rebate. Within five months 17% of employees were participating.

Federal Workforce Transportation Executive Order (www.CommuterChallenge.org)

A U.S. Federal policy requires that by October 1, 2000, federal agencies shall implement a transportation fringe benefit program that offers qualified Federal employees the option to exclude from taxable wages and compensation employee commuting costs incurred through the use of mass transportation and vanpools. Federal agencies in the National Capital Region will implement a transit pass fringe benefit program for their qualified Federal employees.

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Commuter Choice Program (www.commuterchoice.com) provides information on Commute Trip Reduction programs and benefits, particularly U.S. income tax policies related to commuter benefits.

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This Encyclopedia is produced by the Victoria Transport Policy Institute to help improve understanding of Transportation Demand Management. It is an ongoing project. Please send us your comments and suggestions for improvement.

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"Efficiency - Equity - Clarity"

#8

Shared Parking

Sharing Parking Facilities Among Multiple Users

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TDM Encyclopedia

Victoria Transport Policy Institute

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Updated 12 March 2013

This chapter provides information on techniques for sharing parking facilities among various users to increase efficiency.

Description

Shared Parking means that parking spaces are shared by more than one user, which allows parking facilities to be used more efficiently. It is a type of Parking Management. Shared Parking takes advantage of the fact that most parking spaces are only used part time by a particular motorist or group, and many parking facilities have a significant portion of unused spaces, with utilization patterns that follow predictable daily, weekly and annual cycles.

There are various degrees of shared parking. A parking space assigned to a specific user is not shared at all. On-street parking spaces located in a busy, mixed use urban area tends to be the most shared. In between are parking spaces that are shared among various employees at a particular worksite, parking that is shared by customers at a variety of businesses located in a mall, or arrangements by one facility to use another facilities parking at certain times, such as a tavern that allows its parking spaces to be used on Sunday mornings by attendees at a nearby church. An assigned employee parking space is typically used about 2,000 hours per year, while an on-street parking space in a busy area often gets three times as much use. Efficient sharing of spaces can allow parking requirements to be reduced significantly.

Specific ways of sharing parking are described below.

Zoned Rather Than Assigned Spaces

Parking can be shared among a group of employees or residents, rather than assigning to individuals. For example, 100 employees or residents can usually share 60-80 parking spaces without problem, since not all employees will drive to work at one time.

This strategy complements other TDM strategies that encourage people to reduce their vehicle ownership and use, such as Commute Trip Reduction and Location Efficient Development. This type of sharing can be a consumer option. For example, motorists could be offered an assigned space for $100 per month, or a shared space for $60 per month. This allows individuals to decide whether they are willing to pay extra for an assigned space, or capture the savings that result from shared parking.

Share Parking Between Sites

Parking can be shared among different buildings and facilities in an area to take advantage of different peak periods (see Table 1). For example, an office complex can efficiently share parking facilities with a restaurant or theaters, since offices require maximum parking during weekdays, while restaurants and theaters require maximum parking during evenings and weekends. As a result, the total amount of parking can be reduced 40-60% compared with standard off-street parking requirements for each destination (Smith, 1983). ITE (1995) provides specific recommendations for shared parking implementation.

Table 1 Peak Parking Demand

Weekday Peaks	Evening Peaks	Weekend Peaks
Banks	Auditoriums	Religious institutions
Schools	Bars and dance halls	Parks
Distribution facilities	Meeting halls	Shops and malls
Factories	Restaurants	
Medical clinics	Theaters	

Offices Professional services		

This table indicates peak parking demand for different land use types. Parking can be shared efficiently by land uses with different peaks.

Public Parking/In Lieu Fees

Parking can be shared by relying on public parking facilities rather than having each building provide private off-street parking, since each public space can serve many users and destinations. As a result, 100 public parking spaces can be equivalent to 150 to 250 private parking spaces. Developers or building owners can be allowed or required to pay in-lieu fees that fund public parking facilities as an alternative to minimum requirements for private off-street parking (Shoup, 1999b). On-street parking tends to be the best type of public parking facility for sharing, since it is visible and convenient. It is therefore helpful to manage on-street parking for maximum use, particularly in busy Commercial Centers.

Geographic Considerations

Shared Parking is limited by the proximity of destinations that share a parking facility. Exactly how close they must be depends on the type of land use and the type of user. Table 2 summarizes acceptable walking distances for various types of activities. Acceptable walking distance is also affected by the quality of the pedestrian environment, climate, line of site (longer distances are acceptable if people can see their destination), and "friction" (barriers along the way, such as crossing busy traffic).

Table 2 Acceptable Walking Distances (Parking Evaluation)

Adjacent (Less than 100 ft)	Short (less than 800 ft)	Medium (less than 1,200 ft)	Long (less than 1,600 ft)
People with disabilities Deliveries and loading Emergency services Convenience store	Grocery stores Professional services Medical clinics Residents	General retail Restaurant Employees Entertainment center Religious institution	Airport parking Major sport or cultural event Overflow parking

This table indicates maximum acceptable walking distance from parking to destinations for various activities and users. It assumes good pedestrian conditions (sidewalks, crosswalks, level terrain) that are outdoors and uncovered, with a mild climate.

In general, the potential for sharing parking is greatest in areas where land use activities are Clustered, and the benefits from sharing parking are greatest due to high parking costs. Priorities for sharing parking are listed below.

1. *On-street parking on commercial streets.* These are the most convenient parking spaces and so should be managed for maximum turnover to serve short stops (shopping and other errands), by limiting time or applying short-term pricing. This usually means limits of less than 2 hours.

2. *Off-street public parking facilities and on-street parking outside the commercial streets.* These are less convenient parking spaces and so should be managed for longer stops, including parking by employees, long-term visitors and residents.

3. *Off-street private parking facilities.* These are often the most convenient parking spaces for a particular site, but may also be convenient for other nearby users. They tend to be used to serve other nearby facilities with different peaks. For example, since a bar has peak demand during Saturday night and a church has peak demand during Sunday morning, they can efficiently share parking if located near to each other (usually within a block or so).

The concept of Shared Parking is well known, but it is often discouraged by current planning practices. Conventional planning often reflects an assumption that communities want the greatest possible supply of parking provided at the lowest possible price. Standards used in most communities require each building or facility include a minimum amount

of off-street parking supply, based on studies of peak-period demand. Transportation professionals and public officials often prefer generous, simple and consistent minimum parking standards because they are easy to administrate and minimize spillover problems. All of these factors contribute to inefficient use of parking resources: many parking lots are seldom or never full, even during peak periods, and most parking spaces are unused most of the time.

These practices are well established, but are beginning to change, particularly in growing urban communities. Increasingly, communities have objectives to encourage infill development, use of alternative modes and reduce the portion of land that is paved.

How it is Implemented

Shared Parking is usually implemented by municipal government policy to allow and encourage it, with sharing arrangements actually made between individual facility developers and managers. It may require changes to zoning codes (see below), and development of appropriate standards and practices that local transportation planners can use to evaluate, manage and enforce shared parking arrangements. It can be encouraged by establishing parking sharing brokerage services to match potential sharing partners, which can be provided by a Transportation Management Association or local government agency.

Shared parking can also be implemented by providing public parking as a substitute for private parking. This can be done by:

- Providing a maximum amount of on-street parking in an area.
- Providing public off-street parking.
- Managing public parking faculties so the most convenient spaces are available to priority uses (such as customers).
- Addressing barriers, such as inadequate walkways that limit use of public parking.
- Encouraging more Clustered development.
- Allowing or requiring in lieu fees instead of private off-street parking.

Model Shared Parking Code

Below is an example of wording to allow shared parking in municipal parking ordinances.

Introduction

Cumulative parking requirements for mixed-use occupancies or shared facilities may be reduced where it can be determined that the peak requirements of the several occupancies occur at different times (either daily or seasonally). The submittal requirements for a parking reduction request vary according to the method used to determine the parking reduction. The reduction methods and accompanying submittal requirements are outlined in this section. In all cases, a shared parking operations plan must be prepared to the satisfaction of the Department of Planning showing that parking spaces most conveniently serve the land uses intended, directional signage is provided if appropriate, and pedestrian links are direct and clear. On-street parking spaces wholly adjacent to the property may be included in the required minimum.

Three methods for determining a parking reduction are as follows:

A. Intermittent or Seasonal Nonconflicting Uses

(1.) When required parking reductions are predicted as a result of sharing between intermittent or seasonal uses with nonconflicting parking demands (e.g. a church and a bank), then the reduction can be considered for approval by the Planning Commission without demand calculations or a parking study. Individual spaces identified on a site plan for shared users shall not be shared by more than one user at the same time.

(2.) If a privately owned parking facility is to serve two or more separate properties, then a "Shared Parking Agreement" shall be filed with the City of Fayetteville for consideration by the Planning Commission. Unless explicitly stated to the contrary, the property owner of the parking facility accepts responsibility for operating, maintaining and accepting liability for personal injury and property damage.

B. Parking Occupancy Rate Table

When the parking reduction has been shown to be feasible by using the demand calculations as determined by Table 3,

Parking Occupancy Rates, the applicant shall submit a parking demand summary sheet showing the process for calculating the reduction as outlined in this section. (Note: The default rates from the Table 3, Parking Occupancy Rates are set to include a small "safety margin" of parking beyond that minimally needed to serve an average peak demand. Therefore a local study of parking demand may yield a greater reduction in parking required.)

(1.) The minimum number of parking spaces that are to be provided and maintained for each use shall be determined based on standard methods for determining minimum parking supply at a particular site.

(2.) The gross minimum number of parking spaces shall be multiplied by the "occupancy rate" as determined by a study of local conditions (or as found in Table 3), for each use for the weekday night, daytime and evening periods, and weekend night, daytime and evening periods respectively.

(3.) The gross minimum numbers of parking spaces for each of the purposes referred to for each time period shall be added to produce the aggregate gross minimum numbers of parking spaces for each time period.

(4.) The greatest of the aggregative gross minimum numbers of parking spaces for each period shall be determined.

Table 3 Parking Occupancy Rates

Uses	M-F	M-F	M-F	Sat. & Sun.	Sat. & Sun.	Sat. & Sun.
	8am-5pm	6pm-12am	12am-6am	8am-5pm	6pm-12am	12am-6am
Residential	60%	100%	100%	80%	100%	100%
Office/ Warehouse /Industrial	100%	20%	5%	5%	5%	5%
Commercial	90%	80%	5%	100%	70%	5%
Hotel	70%	100%	100%	70%	100%	100%
Restaurant	70%	100%	10%	70%	100%	20%
Movie Theater	40%	80%	10%	80%	100%	10%
Entertainment	40%	100%	10%	80%	100%	50%
Conference/Convention	100%	100%	5%	100%	100%	5%
Institutional (non-church)	100%	20%	5%	10%	10%	5%
Institutional (church)	10%	5%	5%	100%	50%	5%

This table defines the percent of the basic minimum needed during each time period for shared parking. (M-F = Monday to Friday)

C. Local Parking Study

When the parking reduction has been shown to be feasible by using a local parking demand analysis, the following three items must be submitted:

(1.) A parking demand analysis prepared by a qualified parking or traffic consultant, a licensed architect, city planner, or urban planner or civil engineer, which substantiates the basis for granting a reduced number of spaces. A local parking study shall be subject to the approval of the Director of Planning and Planning Commission. The study shall take into account the following three factors:

(a.) Existing parking surveys. Parking surveys shall determine parking occupancy rates of morning, afternoon and evening peaks on the seven different days of the week. The seven days of observation may take place over the span of two consecutive, typical weeks. In the case of new construction or addition of new uses, the surveys shall observe another circumstance with similar mixed uses. A combination of similar circumstances may be necessary to cover all the proposed land uses. The approximate square footages of the various land uses of the specimen projects shall be compared to the proposed project to allow the ratios of uses to be rated accordingly. In the case of an enlargement, or substitution of existing uses, the surveys shall document the occupancy rates of the existing parking facility.

(b.) Proximity and convenience factors. The following factors may influence the Planning Commission’s approval of the parking reduction figures:

• Distance between sharing uses and the parking facility
• Pedestrian connections among sharing uses and the parking facility

• Vehicular connections
• Whether parking will be paid
• Location--proximity to the CBD and general development density.
• Proximity to major transit corridors or stations.
• Special trip reduction programs, such as subsidized vanpooling, transit, shuttle or telecommuting
• Need for any reserved parking spaces. (Parking spaces to be shared cannot be reserved for specific uses or individuals except during off-peak hours.)

(c.) Captive market parking requirements. Parking requirements for retail, restaurant, hotel, convention and conference uses may be reduced where it can be determined that some portion of the patronage of these businesses comes from other uses (e.g., employees of area offices patronizing restaurants) located within a maximum walking distance of 500 feet. Parking requirements may be reduced up to 90 percent as appropriate. Whenever practical, such a reduction should be supported by surveys at similar establishments.

(2.) A covenant must be executed guaranteeing that the owner will provide the additional spaces directly or by payment of in-lieu fees if the City, upon thorough investigation of the actual use of parking spaces at the building within two years of initial occupancy, recommends to the Planning Commission that the approved reduction be modified or revoked. Said covenant shall meet the same requirements for covenants set forth in other sections of this document. The City must document insufficient parking supply by showing occupancy rates over 98 percent for a least two consecutive hours on at least three separate days within a single month.

(3.) Fee of guarantee. The owner shall pay a fee which will be applied towards the cost of a parking study of actual parking accumulation to be carried out within one to two years of occupancy.

(4.) Exception: The covenant guaranteeing either additional spaces or payment of in-lieu fees (2. above) and the fee for follow-up parking study (3. above) may be waived when the Planning Commission will certify that previous experience of similar shared parking projects indicates it is unlikely a serious deficiency would result.

d. Covenants. When a covenant between parties is required by this Ordinance, the following standards shall apply:

(1.) Be executed by the owner of said lot or parcel of land the parties having beneficial use thereof.

(2.) Be enforceable by either of the parties having beneficial use thereof, or both.

(3.) Be enforceable against the owner, the parties having beneficial use and their heirs, successors and assigns, or both.

(4.) Be first duly recorded in the Office of the Recorder of Deeds.

E. Parking Lot Location Standards. The location of all required and nonrequired parking lots with five or more spaces shall meet the location requirements below. All conditional uses hereunder shall be granted by the Planning Commission in accordance with Chapter regulations governing applications of conditional uses; procedures.

1. Permitted Locations by Right. Parking lots shall be located within the same zoning district as the use they serve. Required parking lots for uses allowed by right within a zoning district are allowed as a use by right in the same zoning district.

2. Permitted Locations as a Conditional Use. Remains the same.

3. Off-Site Locations. If off-street parking cannot be provided on the same lot as the principal use due to existing buildings or the shape of the parcel, parking lots may be located on other property not more than 600 feet distant from the principal use, subject to conditional use approval by the Planning Commission. Parking spaces serving residential units must be located within 300 feet of the dwelling unit entrances they will serve whether they are off or on the site. Clear, safe pedestrian connections must be provided, requiring no crossing of an arterial street except at a signalized intersection along the pedestrian pathway.

When Parking Requirements Must be Met
Parking requirements shall be met at the time any building or structure is erected, enlarged, or increased in capacity,

changed in use, or an applicable outdoor use is established or enlarged. In mixed-use developments, or developments affected by co-operative agreements between different uses on neighboring properties, changes in use will require a parking demand analysis using Table 3 or a Local Parking Study to demonstrate the change in parking demand patterns. A forecast deficiency greater than 10% must be met by the construction of additional parking spaces, payment of in-lieu fees, or support of shuttle service or other trip reduction program satisfactory to the city. If a parking study results in a forecast deficiency of less that 10%, no covenant or guarantee payment is required.

Maximum Number Allowed
Parking lots may contain up to 20% more spaces than the required minimum. Any additional spaces above 20% shall be allowed only as a conditional use and shall be granted in accordance with City zoning governing applications of conditional uses; procedures, and upon the finding that additional spaces are needed.

Travel Impacts

Shared Parking does not directly reduce vehicle travel if it substitutes for increased parking supply. To the degree that it increases the available supply of parking and reduces parking prices it can encourage automobile travel. To the degree that Shared Parking allows more Clustered Development it can encourage use of alternative modes.

Table 4 Travel Impact Summary

Travel Impact	Rating	Comments
Reduces total traffic.	0	Depends on parking cost and land use impacts.
Reduces peak period traffic.	0	"
Shifts peak to off-peak periods.	0	"
Shifts automobile travel to alternative modes.	0	"
Improves access, reduces the need for travel.	0	"
Increased ridesharing.	0	"
Increased public transit.	0	"
Increased cycling.	0	"
Increased walking.	0	"
Increased Telework.	0	"
Reduced freight traffic.	0	"

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Benefits And Costs

Shared Parking can reduce parking facility costs (including aesthetic and environmental impacts), allows greater flexibility in facility location and site design, and encourage more efficient land use. Marshall, Garrick and Hansen (2008) found that low-speed urban streets with on-street parking tend to have lower traffic speeds, and so conclude that on-street parking is, “a tool to help create places that are safer, more walkable, require less parking, and have more vitality.” Costs include reduced motorist convenience and prestige, and increased automobile travel if it increases total parking supply. For more information see Parking Policy Evaluation.

Table 5 Benefit Summary

Objective	Rating	Comments
Congestion Reduction	0	Depends on parking cost and land use impacts.
Road & Parking Savings	3	Can provide significant parking facility savings.
Consumer Savings	2	Can provide savings to consumers.
Transport Choice	0	Depends on parking cost and land use impacts.
Road Safety	0	Depends on parking cost and land use impacts.
Environmental Protection	2	Reduces paved area.
Efficient Land Use	2	Allows more clustered land use.
Community Livability	2	Allows more clustered land use.

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Equity Impacts

The Equity impacts of Shared Parking depend on how it is implemented and what is assumed to be the alternative. If Shared Parking reduces total parking costs it can increase horizontal equity by reducing cross subsidies from non-drivers to drivers. If it provides savings that are passed on to lower-income people it can be progressive. If it helps create more Accessible land use it can benefit people who are transportation disadvantaged and improve basic mobility.

On the other hand, zoning codes may be considered most equitable if they are applied consistently. Flexible standards, which are required for Shared Parking, may be considered unfair to competitors, and may create spillover problems if they fail (for example, if employees parking on residential streets rather than using a parking lot several blocks away as arranged by their employer).

Table 6 Equity Summary

Criteria	Rating	Comments
Treats everybody equally.	0	Varies depending on circumstances.
Individuals bear the costs they impose.	0	"
Progressive with respect to income.	0	"
Benefits transportation disadvantaged.	0	"
Improves basic mobility.	0	"

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Applications

Shared Parking can be applied in many situations (Evaluating Parking). It is particularly appropriate where:

- A specific parking problem exists.
- Land values and parking facility costs are high.
- Clustered development is desired.
- Traffic congestion or vehicle pollution are significant problems.
- Excessive pavement is undesirable.

Table 7 Application Summary

Geographic	Rating	Organization	Rating
Large urban region.	3	Federal government.	0
High-density, urban.	3	State/provincial government.	1
Medium-density, urban/suburban.	3	Regional government.	2
Town.	3	Municipal/local government.	3
Low-density, rural.	2	Business Associations/TMA.	3
Commercial center.	3	Individual business.	3
Residential neighborhood.	3	Developer.	3
Resort/recreation area.	3	Neighborhood association.	3
		Campus	3

Ratings range from 0 (not appropriate) to 3 (very appropriate).

Category

Land Use Management

Relationships With Other TDM Strategies

Shared Parking is a type of Parking Management and a Parking Solution. It is often implemented as part of TDM, Commute Trip Reduction, Transportation Management Associations and Campus Trip Reduction programs. It supports and is supported by Pedestrian and Cycling Improvements, Transit Improvements, Smart Growth, New Urbanism, Clustering and Transportation Pricing Reforms. It is important for Location Efficient Development.

Stakeholders

Shared Parking is primarily implemented by local government policies and agencies, and by individual developers and businesses. Implementation often involves changing current planning, enforcement and design practices, sometimes with the support of professional organizations. Transportation Management Associations can provide parking facility brokerage services (for example, maintaining a system to match businesses that can share parking facilities).

Barriers to Implementation

Shared Parking require overcoming the traditional assumption that society benefits from a maximum supply of free or low-priced parking, and the resistance from land use and transportation planning institutions that are accustomed to inflexible minimum parking standards. Some public officials consider Shared Parking difficult to administrate (since it requires flexible parking standards, verification and enforcement), unfair (since some developers benefit more than others), and risky (since they could create spillover problems. Users accustomed to assigned spaces may object to this practice. There may be inadequate capacity during unusual peak demand periods.

Best Practices

Best practices for Shared Parking are described in various reports listed below. They include:

- Establish standard procedures for implementing Shared Parking which specify how to calculate minimum parking requirements for different combinations of land uses, acceptable walking distances, requirements for sharing agreements, verification and enforcement.
- Educate planning officials and developers as the potential for Shared Parking and procedures for implementing it.
- Provide a maximum amount of on-street parking, and public off-street parking as a substitute for private off-street parking. Encourage use of in lieu fees to substitute for private off-street parking.
- Use Transportation Management Associations or local planning agencies to provide Shared Parking matching and brokerage services.
- Insure that there is good pedestrian access and appropriate signage for users concerning Shared Parking.
- Perform regular parking studies and feedback from users to identify problems with Shared Parking.
- Anticipate potential spillover problems, and respond with appropriate regulations and enforcement programs.

What Street Parking Can Do For Downtowns
By Norman W. Garrick and Wesley Marshall (www.courant.com/news/opinion/commentary/hc-plcgarrick0511.artmay18,0,2436671.story).

As in other parts of the country, Connecticut towns and cities are struggling to revitalize their downtowns. Some of the planning and design decisions made in the 1950s and 1960s make this goal more difficult. One such decision is the elimination of street parking from many of our town centers.

Although this practice of not accommodating street parking is now routine, there has been little research done to assess its impact on urban centers. However, a growing number of urban planners have pointed out that centers that have retained street parking, along with other compatible features of pre-1950s town centers, are some of the most successful downtowns in the country.

In order to address this dichotomy between conventional practice and emerging urban theory, we at the University of Connecticut designed two studies of on-street parking and its impact on

downtowns. One was based upon case studies of six New England town centers (West Hartford; Northampton, Mass.; Brattleboro, Vt.; Avon Center; Glastonbury Center and Somerset Square in Glastonbury). In the second study, we investigated how street design affected vehicle speeds and safety, based on a study of more than 250 Connecticut roads.

What we found through these studies was that on-street parking plays a crucial role in benefiting activity centers on numerous levels. Here are some of the main benefits.

• *Higher efficiency:* Users of the downtowns consistently selected on-street parking spaces over off-street surface lots and garage parking. The on-street spaces experienced the most use and the highest turnover.

• *Better land use:* Using the curbside for parking saves considerable amounts of land from life as an off-street surface parking lot. Medium-sized town centers can save an average of more than two acres of land by providing street parking. This efficiency can allow for much higher-density commercial development than is possible if the center relies solely on off-street surface lots.

• *Increased safety:* We showed conclusively that drivers tended to travel at significantly slower speeds in the presence of features such as on-street parking and small building setbacks. Slower vehicle speeds provide pedestrians, cyclists and drivers more time to react, and when a crash does occur, the chance of it being life-threatening is greatly reduced. In short, on-street parking can help to create a safer environment.

• *Better pedestrian environment:* Our study results showed that centers with on-street parking and other compatible characteristics such as generous sidewalks, mixed land uses, and higher densities recorded more than five times the number of pedestrians walking in these areas compared with the control sites, which lack these traits.

Nearly every town in the state has the street space available that could be used for on-street parking. Town leaders should consider it. Our results suggest that on-street parking is a tool that can help create a vibrant and safe town center environment.

Norman W. Garrick is an associate professor of civil and environmental engineering and director of the Center for Transportation and Urban Planning at the University of Connecticut. Wesley Marshall is a doctoral candidate in transportation engineering and urban planning at UConn.

Examples and Case Studies

Shared Parking at Portland Transit Stations

The Tri-Met (Portland area) Park & Ride Policy encourages Shared Parking near transit stations as an efficient and cost effective way to provide parking while minimizing the amount of land devoted to parking facilities. Park & Ride lots are shared with apartment complexes, a regional justice center, churches and movie theaters at more than three dozen sites. With some Transit Oriented Development projects, Tri-Met allows the total supply of off-street parking to decline. For example, if a Park & Ride facility is replaced by a new Transit Oriented Development of at least 30 residential units per acre, at least 75 employees per acre, or other comparable high-density development (Tri-Met, 2001).

City of Monrovia Downtown Parking Management

By Dick Singer, City of Monrovia Public Information Officer

It seemed a risk worth taking - locating a 12-screen, 2,400-seat movie theater in the middle of Monrovia's Old Town without providing the usual adjacent parking structure.

It made sense. Monrovia's Old Town business district is compact (six blocks long and two wide) and abutted by residential neighborhoods on three sides. Medium and high-density housing (mainly senior citizen) had been developed immediately adjacent to the commercial properties. Both MTA and Foothill Transit buses provide service to the edges of Old Town and Monrovia has an active dial-a-ride service providing door-to-door public transportation.

Old Town was redeveloped in the 1970s as a pedestrian-friendly "main street" shopping and service district. Free public parking lots and street parking combined to provide more than 1,200 spaces scattered throughout the district that were never more than 80% filled. For several years, a Friday night Family Festival street fair - running weekly from March through to Christmas - drew as many as 8,000 people on a typical summer night with very little overflow parking into residential neighborhoods. Additionally, most of the businesses using public parking for their employees closed at 5 p.m. and few stores stayed open past 7 p.m., meaning that a shared parking plan seemed feasible - daytime use for office workers and nighttime use for theater goers.

The theater was to go up on one of the public parking lots, so those spaces had to be replaced, and were by the expansion of another City-owned lot and the re-configuration of a sidestreet adjacent to both that lot and the theater site. When the theater opened, there were more spaces than before the project began. In its first six months of operation, the theater has attracted good crowds and the parking has yet to be a problem. Lot and street parking is sufficient to handle the demand and convenient enough so movie-goers will happily walk two-to-three blocks between their cars and the theater to stroll past shops and restaurants.

The shared-parking plan has worked well in the project's early stages. The second phase of our plan is now about to begin. Theater crowds are drawing a new business mix to the district (as planned) and we are aware that more nighttime business use will develop over the next year. An assessment district is now in the works to finance more Old Town parking - either a structure or an additional street-level lot - to handle the expected increase.

Wit and Humor
Bars and churches are an ideal combination to share parking. Bars have their peak demand Saturday nights and churches have peak demand Sunday mornings. Bar patrons who stay late can simply leave their cars in the parking lot and walk to church early the next morning to pray for forgiveness.

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- *Parking Solutions* (130 pages) includes six documents that describe modern approaches to parking management.
- *Shared Parking* (133 pages) includes more than thirty documents concerning shared parking, parking in-lieu fees, parking requirement reductions and exemptions, and downtown district special parking requirements.
- *Green Parking Lot Design* (66 pages) includes three documents that describe ways to improve parking lot environmental performance including landscaping, stormwater management and reduced heat island effects.
- *Permeable Pavement and Bicycle Parking* (38 pages) includes five documents concerning the use of permeable parking lot pavement materials and five documents concerning bicycle parking requirements and design.

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This Encyclopedia is produced by the Victoria Transport Policy Institute to help improve understanding of Transportation Demand Management. It is an ongoing project. Please send us your comments and suggestions for improvement.

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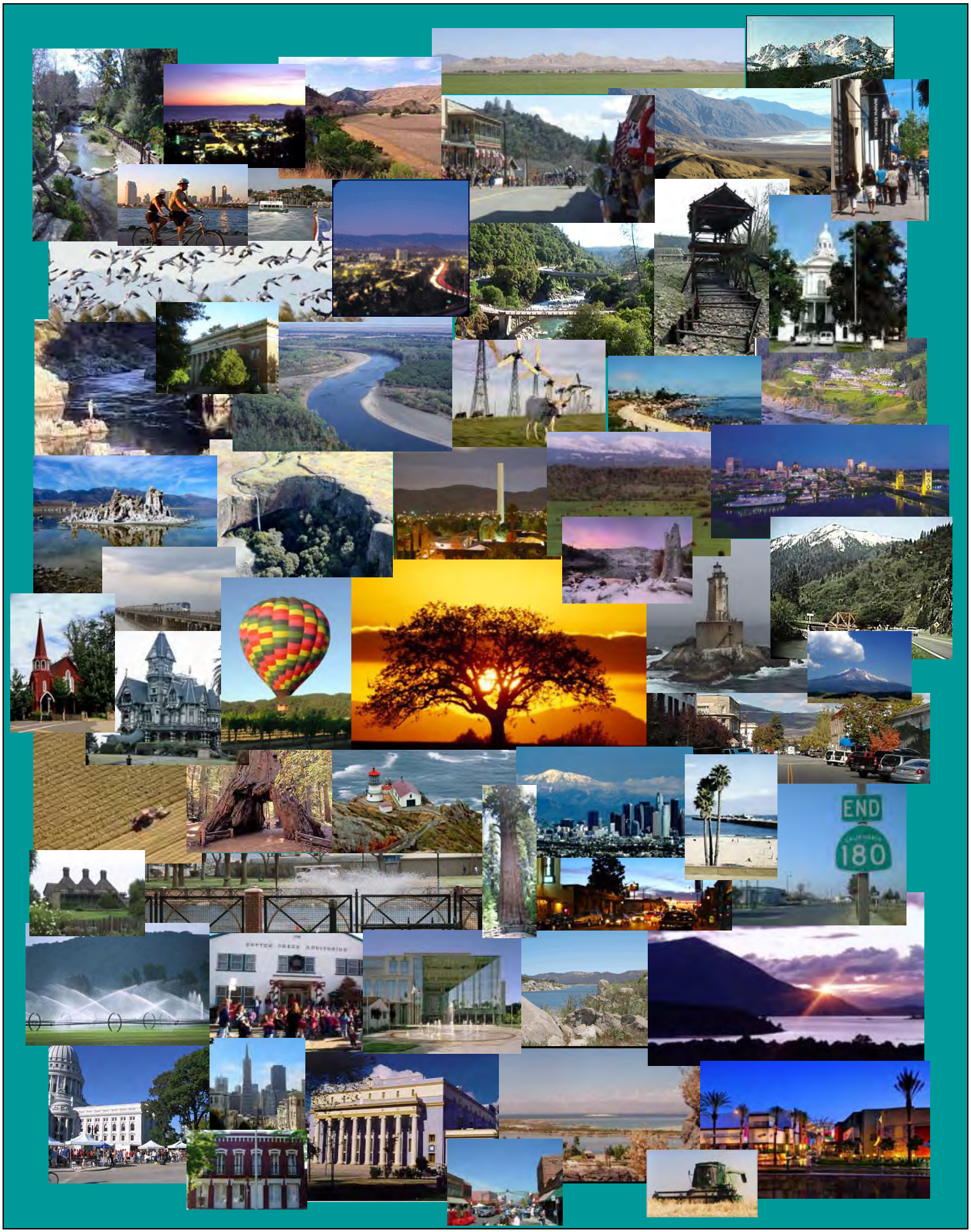
CAPCOA

CALIFORNIA AIR POLLUTION CONTROL OFFICERS ASSOCIATION

Model Policies for Greenhouse Gases in General Plans

A Resource for Local Government to Incorporate General Plan Policies to Reduce Greenhouse Gas Emissions

June 2009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Disclaimer

The California Air Pollution Control Officers Association (CAPCOA) has prepared this white paper consideration of model policies for addressing greenhouse gas emissions in General Plans to provide a common platform of information and tools to support local governments.

This paper is intended as a resource, not a guidance document. It is not intended, and should not be interpreted, to dictate the manner in which a city or county chooses to address greenhouse gas emissions in the context of its General Plan.

This paper has been prepared at a time of flux in California law and regulation, as well as accepted practice, regarding how climate change should be addressed in government programs. There is pending litigation that may have bearing on these decisions, as well as active legislation at the federal level. And finally, our understanding of the science of climate change continues to evolve, too. In the face of this uncertainty, local governments are working to understand the new expectations, and how best to meet them. This paper is provided as a resource to local policy and decision makers to enable them to make the best decisions they can during this period of uncertainty.

Finally, this white paper reviews requirements, discusses policy options, and highlights methods, tools, and resources available, but it is not intended to provide legal advice and should not be construed as such. Questions of legal interpretation, or requests for legal advice, should be directed to the jurisdiction's counsel.

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Approved For Release by the CAPCOA Board of Directors

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Meaning
AB 32	Assembly Bill 32 Global Warming Solutions Act of 2006
AFV	Alternative Fuel Vehicle
AG	Attorney General
AMI	Advanced Metering Infrastructure
ARB	Air Resources Board
APCD	Air Pollution Control District
APS	Alternative Planning Strategy
AQMD	Air Quality Management District
BAAQMD	Bay Area Air Quality Management District
BOF	Board of Forestry
Cal/EPA	California Environmental Protection Agency
Cal Fire	California Department of Forestry and Fire Protection
CAISO	California Independent System Operator
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resource Board
CAS	Climate Adaptation Strategy
CAT	Climate Action Team
CCA	Community Choice Aggregation
CCAP	Climate Change Action Plan
CCAR	California Climate Action Registry
CCC	California Conservation Corps
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CDFA	California Department of Food and Agriculture
CH_4	Methane
CIWMB	California Integrated Waste Management Board
CO_2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
CPUC	California Public Utilities Commission
DOC	Department of Conservation
DFG	Department of Fish and Game
DGS	Department of General Services
DPC	Delta Protection Committee
DTSC	Department of Toxics Substances Control
DWR	Department of Water Resources
EIR	Environmental Impact Report
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPIC	Environmental Protection Indicators for California
EPS	Emissions Performance Standard

List of Acronyms and Abbreviations

Acronym/ Abbreviation	Meaning
ESP	Energy Service Provider
FAR	Floor Area Ratio
GHG	Greenhouse Gas
GWP	Global Warming Potential
HFC	Hydrochlorofluorocarbons
HSR	High Speed Rail
HOV	High Occupancy Vehicle Lanes
ICLEI	International Council for Local Environmental Initiatives (now known as Local Governments for Sustainability)
IOU	Investor Owned Utility
IPCC	International Panel on Climate Change
LAFCO	Local Area Formation Commission
LEED	Leadership in Energy and Environmental Design
LCFS	Low Carbon Fuel Standard
LNG	Liquefied Natural Gas
LUSCAT	Land Use Subgroup of the Climate Action Team
$MMTCO_2e$	Million Metric Tons Carbon Dioxide Equivalent
MPO	Metropolitan Planning Organizations
MWh	Megawatt hour
MVAC	Motor Vehicle Air Conditioning
NAS	National Academy of Sciences
NAST	National Assessment Synthesis Team
N_2O	Nitrous Oxide
NO_X	Oxides of Nitrogen
ODS	Ozone Depleting Substances
OFA	Office of Fleet Administration
OPAR	Caltrans Office of Policy Analysis and Research
OPC	California Ocean Protection Council
OPR	State Office of Planning Research
PIER	Public Interest Energy Research Program
PFC	Perfluorocarbon
PHEV	Plug-In Electric Hybrid Vehicles
PG&E	Pacific Gas & Electric
POU	Publicly Owned Utilities
PM	Particulate Matter
PPB	Parts Per Billion
PPM	Parts Per Million
PPT	Parts Per Trillion
RHNA	Regional Housing Needs Assessment
RPS	Renewable Portfolio Standards
RTAC	Regional Targets Advisory Committee
RTP	Regional Transportation Plan

List of Acronyms and Abbreviations

Acronym/ Abbreviation	Meaning
RTIP	Regional Transportation Improvement Program
RTPA	Regional Transportation Planning Agency
S-3-05	Executive Order S-3-05
SABRC	State Agency Buy Recycled Campaign
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCEA	Sustainable Communities Environmental Assessment
SCS	Sustainable Communities Strategy
SCSA	State and Consumer Services Agency
SDG&E	San Diego Gas & Electric
SEA Change	Strategic Energy Alliance for Change
SJVAPCD	San Joaquin Valley Air Pollution Control District
SF_6	Sulfur Hexafluoride
SLOAPCD	San Luis Obispo Air Pollution Control District
SMAQMD	Sacramento Metropolitan Air Quality Management District
SRI	Solar Reflectance Index
SWAMP	Surface Water Ambient Monitoring Program
SWIM	System for Water Information Management
SWRCB	State Water Resources Control Board
TBD	To Be Determined
TMM	Traffic Mitigation Measures
TPP	Transit Priority Projects
UGB	Urban Growth Boundary
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
WCI	Western Climate Initiative
ZEV	Zero Emissions Vehicle

Executive Summary

Global climate change has been clearly documented and is predicted to have substantial effects on the world we live in, not only in parts of the world that are far away, but here in California. Emissions of greenhouse gases (GHGs) must be curtailed if we hope to minimize the extent and impact of climate change. The majority of GHG emissions come from combustion of fossil fuels for energy and transportation. While renewable energy sources, cleaner fuels, and green technology will help to reduce GHG emissions, we also need significant changes in how we design and construct our "built environment" to meet our climate protection goals.

The General Plans developed and implemented by cities and counties must be at the heart of any effort to change our built environment, and many of these local governments have stepped up to the challenge. In order to support their important efforts, the California Air Pollution Control Officers Association (CAPCOA) has prepared this report of Model Policies for Greenhouse Gases in General Plans. The report is intended to serve as a resource for cities and counties. It discusses General Plan structure and options for including GHG policies in existing General Plan Elements, or by creating a separate GHG Element and/or GHG Reduction Plan. The Model Policies Report contains a menu of model language for inclusion in the General Plan Element(s). The report does not dictate policy decisions, rather, it provides cities and counties with an array of options to help them address GHGs in their General Plans.

The statutory and regulatory landscape affecting GHG emissions and climate planning in California has evolved considerably over the last several years. The Governor's Executive Order 2-3-05, and the Global Warming Solutions Act of 2006 (AB 32) establish the broad policy goals for the state for 2020 and 2050. To meet these goals, the Air Resources Board (ARB) has identified discrete Early Action Measures that will be adopted and enforceable by 2010, and approved a Scoping Plan that lays out the longer term strategy for rulemaking and market mechanisms to reduce GHG emissions. The Scoping Plan specifically includes reductions from local government operations and land use decisions. In addition to this core framework, there are a number of other important statutes and regulations affecting GHGs from motor vehicles, fuels, energy production and use, and land use planning, among others. In particular, SB 375 (Steinberg) was signed by the Governor in 2008, and puts in place the framework for regional targets for GHG reductions, and improved regional planning to meet them. There are also new sources for incentive funding to support clean energy and transportation, and reductions of GHG emissions. And the implementation of some programs that have been in place for a long time, such as the building standards in Title 24 and the California Environmental Quality Act (CEQA), is evolving in response to our heightened concern about climate change.

The role of local governments is increasingly in the spot light as we choose our path to a greener and more sustainable future. There are a number of ways cities and counties can reduce GHG emissions. Reductions need to be made in GHG emissions from local government operations, including energy use, waste and recycling, water delivery and wastewater treatment, transportation, and the built environment. Local governments also have a key role to play in educating local businesses and communities, and supporting

their efforts to reduce GHG emissions. Cities and counties can also ensure the impacts of GHG emissions are mitigated when projects are reviewed under CEQA. And, of course, GHG reduction polices can be incorporated into the regional and local planning efforts, including the General Plan.

Integrated regional planning (as supported by Steinberg's SB 375) can provide a framework for cities and counties to contribute to GHG reductions needed for the region to meet the target set by ARB. Cities and counties can also make explicit local commitments to reduce GHG emissions, and adopt Climate Action Plans to make those reductions happen. Policies can be incorporated into existing General Plan Elements. Alternatively a separate element can be created specifically to address GHGs and climate change. In order to be effective, local planning efforts alternatives must be evaluated for consistency with regional plans, including Blueprint Plans, Air Quality Management Plans, and Regional Transportation Plans. The robust and coordinated planning effort envisioned here provides important opportunities to streamline the CEQA review process while ensuring the environment is protected.

As we plan for and implement GHG reduction strategies, it is critical that we review our progress, not only to ensure that we are reaching our goals, but also to ensure that we are not creating unintended and potentially adverse outcomes. Air quality and public health must still be protected, and we must ensure equal protection for all Californians regardless of their income status or ethnic background.

General Plans are, in a broad sense, comprised of goals, objectives, policies, standards, and/or implementation measures, as well as a set of maps and diagrams that describe a vision for the community's future development. The law requires that the General Plan be internally consistent, and there are specific measures of that consistency. Because of this, new policies for GHG need to be considered in the context of the existing elements. These include the mandatory elements, including land use, conservation, circulation, open space, housing, noise, safety, and, in certain circumstances, air quality, as well as non-mandatory elements, such as energy, economic development, capital improvements and public facilities, community design, water, and agriculture. The way the different elements interrelate is an important consideration when incorporating policies for GHGs in the General Plan, and ensuring that those policies are internally consistent throughout the Plan.

The majority of this report is comprised of model policies for GHG reduction that can be incorporated into a jurisdiction's General Plan. Model language is provided in nine major categories: GHG Reduction Planning (overall); Land Use and Urban Design; Transportation; Energy Efficiency; Alternative Energy; Municipal Operations; Waste Reduction and Diversion; Conservation and Open Space; and Education. In addition to the model language, the report provides a worksheet in the form of a table to facilitate the evaluation of the policies for local use, considering specific local factors and criteria. The table also has links to examples of plans that have incorporated the model policy, or a similar policy, to provide a more in-depth understanding of what has been done, under what circumstances, and how.

Finally the report contains technical appendices that provide more detailed information about greenhouse gases, programs that address them, the projected impacts of climate change, climate science, the top ten actions local governments should take, the roles of different agencies on climate and GHG, and examples of plans and policies that have been adopted in California as well as other resources.

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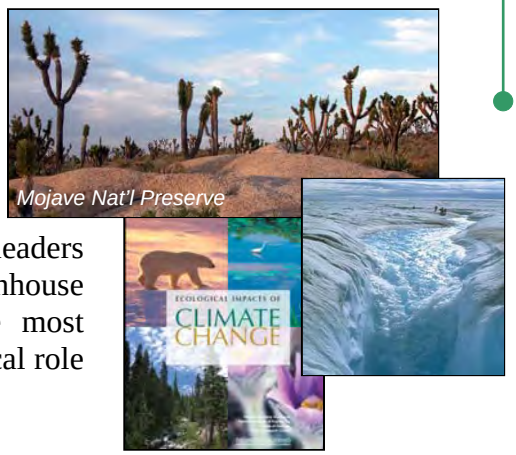
Chapter 1: Introduction



NAS Brochure

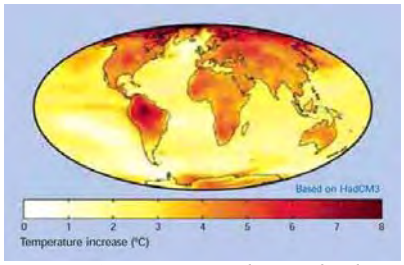
Climate change has already begun to have real and significant impacts on our world and our lives. Some of the changes seem trivial, while others are alarming. As the climate changes more over the next decades, the impacts we see will affect us in increasingly dramatic ways. Recognizing this, the public and government leaders have called for action to reduce emissions of greenhouse gases in the hope that we can stave off the most catastrophic effects. Local government has a critical role to play in this effort.

Because the vast majority of greenhouse gas emissions come from burning fossil fuels, there is tremendous interest in alternative fuels, renewable energy, green technology, and energy conservation as means to cut emissions. There is great promise in these solutions, however alone they are not enough. Studies show that in order to cut emissions to the levels needed, in time to make a difference, we will have to make significant changes in how we live our daily lives, and specifically in how we organize our communities and infrastructure. The key to this organization, and to changing it, is the General Plan that cities and counties develop and implement.

Addressing climate change in a General Plan is no small task. Historically, local air districts have assisted cities and counties in developing the Air Quality Element of their General Plans. In the last few years, air districts across California have been asked by cities and counties for help integrating greenhouse gas emission reduction strategies into their General Plans as they update them. In response, the air districts have pooled their resources through the California Air Pollution Control Officers Association (CAPCOA) to develop a series of Model Policies for Greenhouse Gases in General Plans, and supporting material. CAPCOA would like to acknowledge the Climate Focus Group at ICF Jones & Stokes, and Rimpo and Associates, for their assistance in collecting and compiling information on policies that have been adopted to address GHG emissions.

General Information on Climate Change

An understanding of climate change, and its current and potential future effects on our communities and resources, is essential to good decision making. A detailed description of the science and implications of climate change is provided in the technical appendices at the end of this document. The following provides a basic summary of the issue.



Source: www.scienceschools.org

Climate change is a shift in the "average weather" that a given region experiences. This is measured by changes in the features that we associate with weather, such as temperature, wind patterns, precipitation, and storms. Global climate change means change in the

climate of the Earth as a whole. The Earth's natural climate has always been, and still is, constantly changing. The climate change we are seeing today, however, differs from previous climate change in both its rate and its magnitude.

Human activities are exerting a major influence on some of the key factors that govern climate by changing the composition of the atmosphere and by modifying the land surface. The concentration of carbon dioxide (CO2) in the atmosphere has risen about 30 percent since the late 1800s (National Assessment Synthesis Team [NAST], 2001). This increase has resulted from the burning of coal, oil, and natural gas, and the destruction of forests around the world to provide space for agriculture and other human activities. Concentrations of other greenhouse gases caused by human activities have also increased significantly: for example methane has risen nearly 20% and nitrous oxides over 150% during the same period. Average global surface temperatures have shown a corresponding increase of more than 1° F over the past 100 years, with an average increase of 9° F in the polar regions. The nine warmest years on record have all occurred in the last decade. Figure 1 (right) shows the change in temperature over the last one thousand years. Figure 2 (below) provides thermal maps representing the high and the low in the range of predicted changes in temperature.

Figure 1: Temperature History

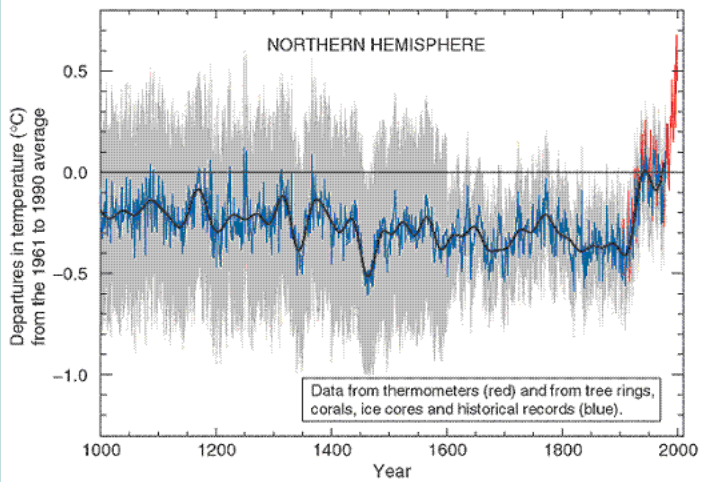
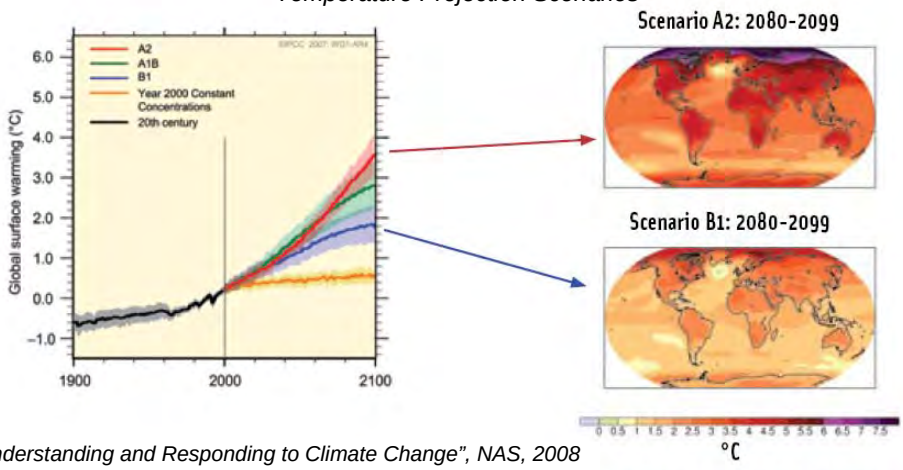


Figure 2:
Temperature Projection Scenarios

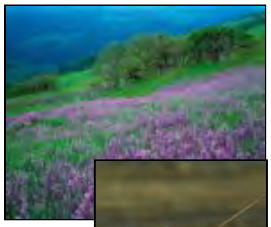


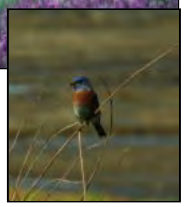
Source: "Understanding and Responding to Climate Change", NAS, 2008

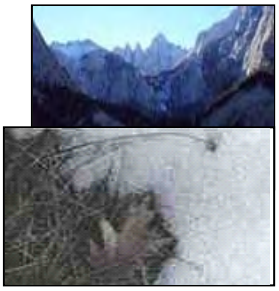
Global projections of population growth and assumptions about energy use indicate that the CO2 concentration will continue to rise, likely reaching between two and three times its late-19th-century level of 280 ppm (parts per million) by 2100, depending on the level and timeliness of preventative actions taken by California and the rest of the world. Such increases in CO2 and other GHGs in the atmosphere and the resulting increase in average global temperatures are predicted to have significant consequences worldwide that will vary in nature and severity depending on location. Impacts predicted for California are summarized below.

Projected Climate Change Impacts in California

In California and throughout western North America, signs of a changing climate are evident. During the last 50 years, winter and spring temperatures have been warmer, spring snow levels in lower- and mid-elevation mountains have dropped, snowpack has been melting one to four weeks earlier, and flowers are blooming one to two weeks earlier. These regional changes are consistent with global trends. If left unchecked, by the end of the century CO2 concentrations could reach levels at which climate change impacts would severely impact our public health, economy, and environment.



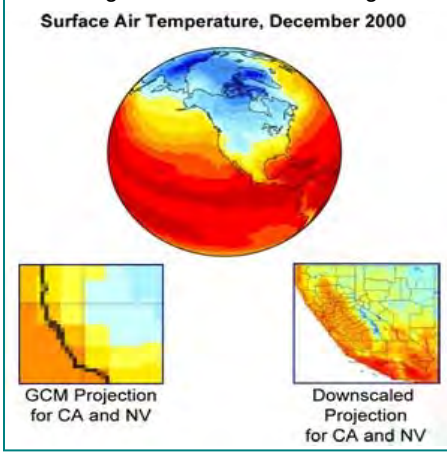




State of the art climate modeling was performed for the California Energy Commission (CEC) to determine potential future impacts of climate change in California under three different scenarios: a low emissions scenario that assumes aggressive action is taken to reduce GHG emissions, a medium emissions scenario assuming a moderate level of GHG reductions, and a high emissions scenario that assumes little action is taken to reduce emissions. The range of potential impacts modeled was summarized in a 2006 CEC document called: *"Our Changing Climate: Assessing the Risks to California."* This document outlines the growing severity of consequences predicted statewide as temperature rises, and also identifies those impacts that may be unavoidable and for which we will need to develop coping and adaptation strategies. The report contains significant existing climate change scientific evidence to support the need for regulating GHG emissions. The CEC prepared a biennial update on the risks to California from climate change, and has summarized key points in the brochure: *"The Future is Now."*

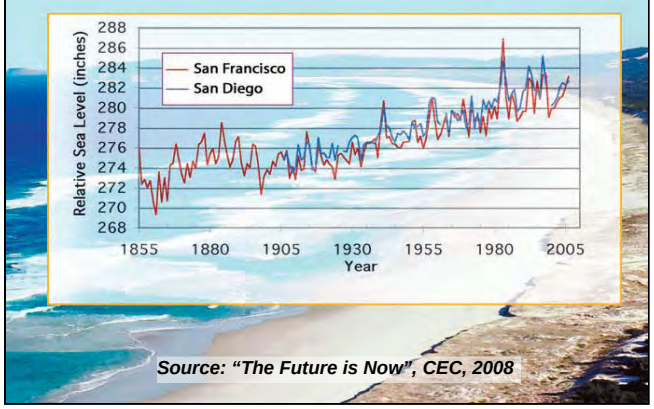
As the atmospheric concentration of GHGs increases, California can anticipate increased average temperatures of 1 to 2 degrees F in the next few decades, and perhaps as much as 10°F by the end of the century. Figure 3 (right) shows results of thermal modeling performed for the CEC, including grid scales for the western region of the U.S., downscaled to California and Nevada. The higher temperatures will increase the formation of smog during summer months with the number of days with unhealthy air more than doubling under the worst-case scenario. In addition, there will be as many as 100 more days each year where temperatures exceed 90°F, and a corresponding rise in illness and death from extreme heat. While total annual precipitation in the state is not expected to change substantially, a much greater percentage will fall as rain instead of snow, with a corresponding decrease in snowpack and the spring runoff that supplies water to the state's agriculture and major urban centers. Reduced water supplies and increased temperatures will directly impact which crops can be grown in California, and this may lead to a greater incidence of disease and pest damage. This damage will also affect the state's forests which will likely sustain a sharp increase in catastrophic wildfires. Finally, as shown in Figure 4, the predicted rise in sea level from 1 to 3 meters by the end of the century will drastically alter California's extensive coast, as well as low-lying inland areas, and land along tributaries, inlets, and bays. A more detailed discussion of predicted impacts is presented in Appendix D.

Figure 3: Thermal Modeling



Source: "Climate Change Impacts Assessment: Second Biennial Science Report to the California Climate Action Team", CEC, 2008

Figure 4: Projected Sea Level Rise



Source: "The Future is Now", CEC, 2008

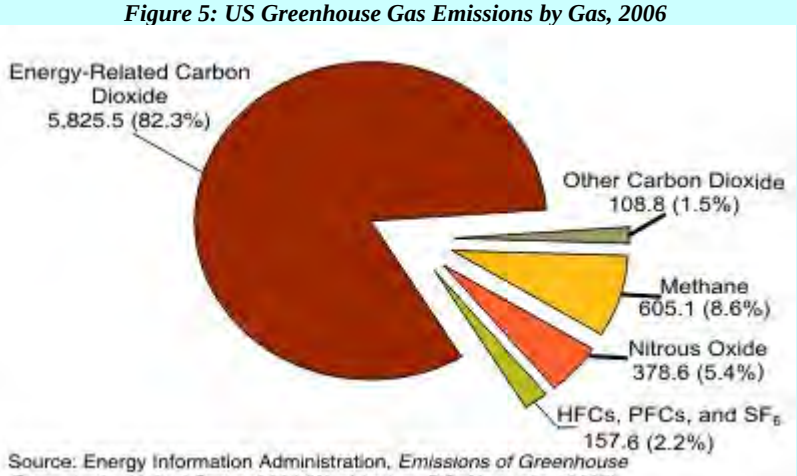
Greenhouse Gases and Their Sources

Carbon dioxide is the most dominant greenhouse gas; however a number of other gases also contribute significantly to climate change, including methane (CH4), nitrous oxide (N2O), sulfur hexafluoride (SF6), hydrochlorofluorocarbons (HFCs) and perfluorocarbons (PFCs). Each gas has a different heat trapping capacity compared to CO2. For instance, methane is 21 times more effective at trapping heat in the atmosphere compared to the same mass of CO2, while some of the fluorocarbons have thousands of times more heat trapping capacity as CO2. To account for these differences when

comparing emissions for the different compounds, the emissions are generally expressed in terms of CO2 equivalents (CO2e). Thus, generic references to GHG emissions generally mean CO2 equivalent emissions.

As shown in Figure 5, CO2 makes up approximately 84% of total GHG emissions by volume, with nitrous oxide and methane contributing about 6% and 7% respectively. SF6, HFCs and PFCs, collectively referred to as high global warming potential (GWP) gases, represent the remaining 3% of statewide GHG emissions. High GWP gases are compounds with significantly higher heat-trapping capacity than CO2.

Figure 5: US Greenhouse Gas Emissions by Gas, 2006



Source: Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2006* (Washington, DC, November 2007)

From a land use standpoint, carbon dioxide and methane are the most important GHGs that local government has the potential to significantly influence and will be the primary focus of the recommended policies and reduction strategies identified in this document.

Increasing CO2 concentrations in the atmosphere primarily result from increased combustion of fossil fuels. Fossil fuel combustion accounts for 98 percent of California CO2 emissions, generating 360 million metric tons of CO2 in 2002; this represents approximately 7 percent of total U.S. emissions from this source category. The transportation sector is the largest contributor in California, accounting for 38% of CO2 emissions, with gasoline combustion the greatest portion of those emissions.

Methane accounted for approximately 6 percent of California's total GHG (CO2e) emissions in 2002. Methane is produced during anaerobic decomposition of organic matter in biological systems. Decomposition occurring in landfills accounts for the majority of anthropogenic CH4 emissions in California and in the United States as a whole. Agricultural processes such as enteric fermentation, manure management, and rice cultivation are also significant sources of CH4 in California.

What Is The Land Use Connection?

Land use planning is a critical element in developing vibrant and livable communities, increasing property values, ensuring economic vitality, addressing potential human health issues, promoting transportation efficiency, ensuring affordable housing, and improving environmental protection. The distribution of different types of land uses, their design, their accessibility, and their intensity can have profound effects on energy use, water use, and vehicle miles of travel.

When properly designed and located, compact, accessible, mixed-use development using energy and water-saving design techniques requires less energy and less vehicle travel than the typical development patterns over the past 60 years. Thus, land use planning is an area of opportunity for guiding development and land use decisions in a manner that considers the heat-trapping emissions of human activity and aims to reduce such emissions. Unfortunately, there is no "one size fits all," cookie cutter approach to effective land use planning. A project that might be beneficial, and reduce VMT and other energy needs, in one situation can actually work in the negative, increasing VMT and energy demands, if sited without proper regard to the circumstances and needs of the site, the community, and the region. For this reason, recommended strategies and approaches should always be considered in context, and evaluated for their appropriateness based on the specific circumstances in which they would be implemented.

What Does This Document Contain?

The California Air Pollution Control Officers Association (CAPCOA) Model Policies for GHGs in General Plans (Model Policies Report) is a resource document intended to help cities and counties address climate change and GHG emissions in their General Plans. The Model Policies Report provides a variety of useful information, including a toolbox of policies, strategies and model language that can be used in General Plans. The Model Policies Report identifies the various issues related to GHG emissions that may cut across several elements of a General Plan; interrelationships of these elements were considered when developing the set of potential development policies for consideration. In addition, the Model Policies Report reviews and analyzes the efficacy of the different goals, objectives, policies & implementation measures available to reduce GHG emissions.

Finally, the Model Policies Report provides model language for GHG policies in General Plan elements, including a list/menu of approaches that are currently being used so that jurisdictions can choose which approaches are most appropriate to them. The Model Policies Report is intended to offer flexible guidance to allow for different approaches to address GHG in General Plans.

This document is focused on issues surrounding the reduction of greenhouse gas emissions. An equally important challenge related to climate change is planning for adaptation to environmental change (such as sea level rise and other climate effects) that is inevitable, regardless of success in reducing greenhouse gas emissions. Local land use planning should also consider how to plan for climate-resilient communities in light of foreseeable environmental change, but that is not the focus of this document.

What Is the Purpose of This Document?

This document provides local jurisdictions with relevant information for considering climate change and GHG reductions in General Plan development and updates. Since the passage of the Global Warming Solutions Act of 2006 (Assembly Bill 32, or AB 32), and Executive Order S-03-05 (EO S-03-05), there has been substantial interest at the State level in finding ways to reduce statewide GHG emissions. The California Air Resources Board (ARB) is given the primary responsibility to develop strategies and regulations to reduce California's overall GHG emissions to 1990 levels by 2020. As required under AB 32, the ARB adopted a Scoping Plan calling for targeted reductions of CO2 from various sectors, including a proposed 2 million metric ton reduction from land use and local government.

The California Attorney General's Office (AG) has taken an active role in the cause of climate change and GHG emissions reductions. The AG has written over 20 extensive project comment letters concerning climate change, some of which were directed toward cities and counties addressing climate change in their General Plans. As an example of his commitment to this role, the AG litigated San Bernardino County based on its failure to analyze in its General Plan Environmental Impact Report (EIR) the increased greenhouse gas emissions that would result from the county's proposed General Plan update. The suit was settled, and although not binding on other communities, the precedent-setting settlement between the AG and San Bernardino County has led many to believe that an EIR for a General Plan must inventory GHG emissions, describe impacts due to the forecasted emissions, and identify feasible mitigation measures to reduce those emissions. Further, mitigations adopted in a General Plan EIR often will require the amendment of General Plan goals, objective, policies, or implementation measures in order to feasibly reduce GHG emissions.

Local governments will face many challenges ahead in reducing GHG emissions. To help provide foundational information, in January 2008, CAPCOA published a white paper entitled, "CEQA & Climate Change"-- a resource document developed to assist public agencies in establishing procedures for reviewing GHG emissions from projects subject to the California Environmental Quality Act (CEQA). This Model Policies Report

continues CAPCOA's efforts to provide meaningful information and tools to local jurisdictions in response to the rapidly evolving regulations in regards to GHGs and climate change. When developing the Model Policies Report, CAPCOA took into account the range of requirements a community must address in preparing or updating a General Plan: internal consistency; equal status among elements; consistency between elements; consistency within elements; area plan consistency; and long-term perspective.

For Whom Is This Document Intended?

This document is intended for use by local city and county policy and decision makers. The State of California requires each city and county to prepare a comprehensive, long-term General Plan. One of the main purposes of a General Plan is for the jurisdiction to articulate its development goals, objectives, principles and policies for all land areas under its control. Decision and policy makers may find this document useful when evaluating how to incorporate policies and goals related to climate change in their General Plan. Planners and General Plan practitioners may also find this document useful as a general reference.

Colusa County

Over the last several years, a number of new programs have been established to reduce emissions of GHGs. While most of these do not operate directly on or through General Plans, they create a strong foundation upon which General Plan elements for GHGs can be built. This section of the report provides a brief summary of the key programs. Appendix B provides additional description of programs specifically implementing AB 32. Additional information on other programs is summarized in Appendix C. The appendices also provide links to respective program websites where more detailed information can be found.

State Reduction Targets for GHGs (Executive Order S-3-05)

The first comprehensive state policy to address climate change was established through an Executive Order of the Governor of California. In 2005, Governor Schwarzenegger issued California Executive Order S-3-05, which established ambitious GHG reduction targets for the state: reduce GHG emissions to 2000 levels by 2010, reduce to 1990 levels by 2020, and reduce emissions 80% below 1990 levels by 2050. These targets reflect the world-wide emission reduction trajectory identified by the International Panel on Climate Change (IPCC) as being necessary to avert catastrophic global climate change. Under the Executive Order, each state agency is directed to identify and pursue actions within their purview that could contribute to the necessary emission reductions. The Secretary of the California Environmental Protection Agency (Cal/EPA) has the role of coordinating the emission reduction efforts, through the Governor's Climate Action Team, which the Secretary chairs.

On April 1, 2009, California's Climate Action Team released a draft of its second report to the Governor and the Legislature.

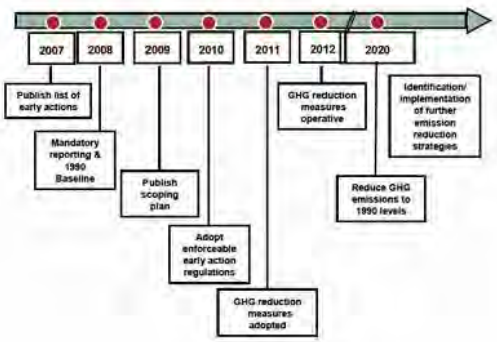
This Executive Order is binding only on state agencies, and has no force of law for local governments; however, S-3-05 was important for two reasons. First, it obligated state agencies to implement GHG emission reduction strategies. Second, the signing of the Order sent a clear signal to the Legislature about the framework and content for legislation to reduce GHG emissions.

Global Warming Solutions Act of 2006 (AB 32)

California AB 32, the "Global Warming Solutions Act of 2006," codifies the State's GHG emissions target by directing the ARB to reduce the State's global warming emissions to 1990 levels by 2020. ARB regulations must begin phasing in by 2012. AB 32 was co-authored by Assembly Member Fran Pavley and Assembly Speaker Favian Núñez; it was signed and passed into law by Governor Arnold Schwarzenegger on September 27, 2006.

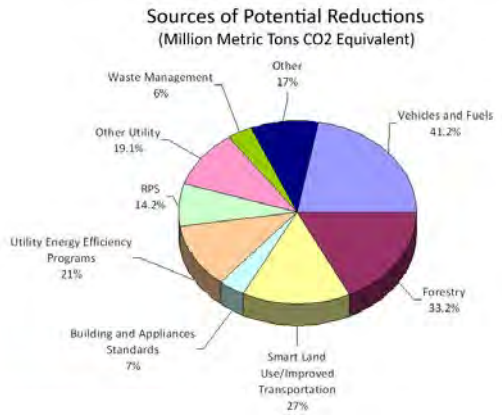
As shown in Figure 6, AB 32 defines a number of milestones to be met in the effort to achieve the 2020 emissions target. It vests the principle authority to implement the program in the ARB, but provides that the Secretary of Cal/EPA will coordinate across state agencies. The cornerstone of the program is the development and adoption by ARB of a Scoping Plan that identifies specific reduction strategies, implementation mechanisms, and timelines. The statute requires that ARB adopt the Scoping Plan by the end of 2008, and that regulations to implement the Plan's strategies must be enforceable by 2012. The statute also requires the ARB to adopt discrete early action measures in 2007, and to study the feasibility and effectiveness of market mechanisms to achieve the needed emission reductions. Finally, it provides that progress towards attainment of criteria air pollutant standards should not be impaired by the climate program, nor should the program create or exacerbate impacts on communities. Figure 7 shows the key GHG emitting sectors of California's economy.

Figure 6: AB 32 Timeline



Source: ARB Staff Report on Early Action Measures

Figure 7:



Source: March 2006 Climate Action Team Report

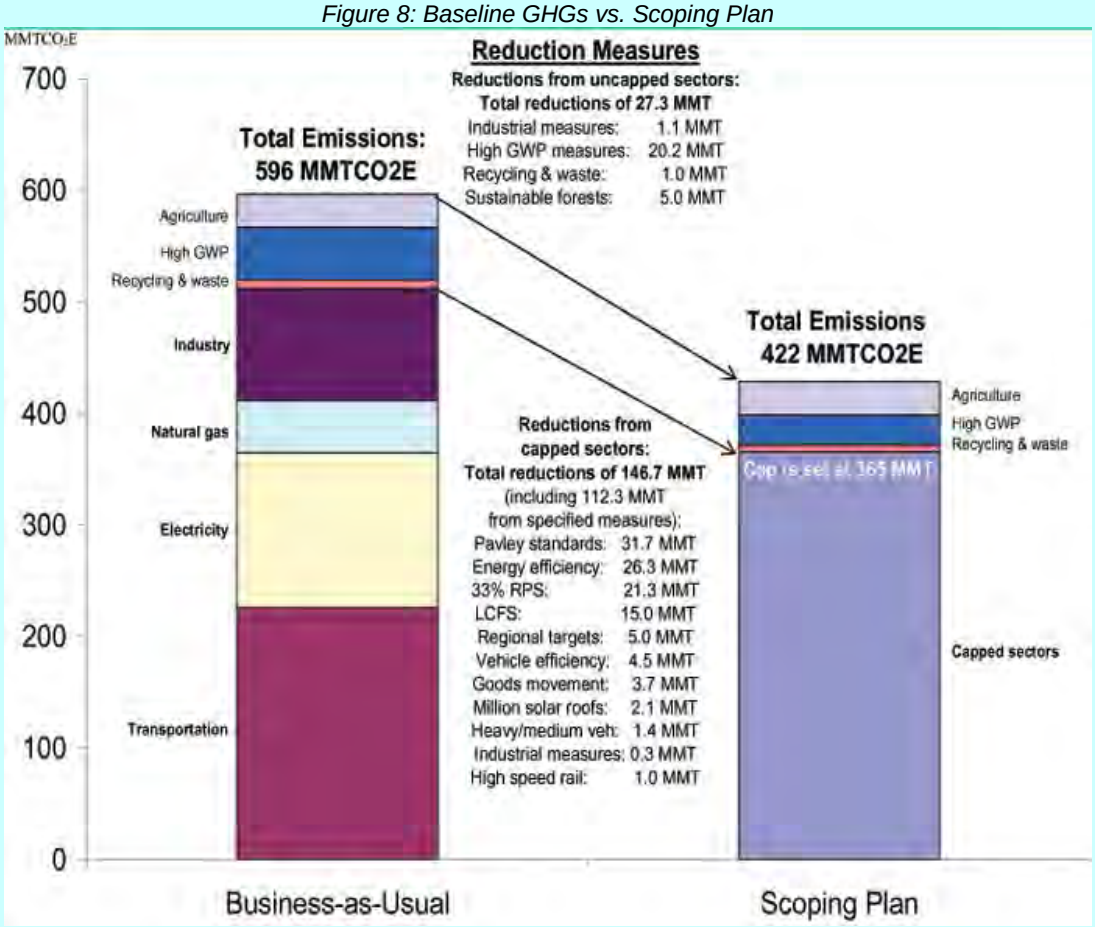
Early Action Measures:

The ARB approved a package of discrete early action measures in June, 2007. The core measures are three proposed rulemakings, including the codification of the Low Carbon Fuel Standard called for in the Governor's Executive Order S-1-07 (see discussion later in this chapter), the capture and recovery of refrigerants with high global warming potential during the servicing of automobile air conditioning systems, and the capture and recovery of methane from landfills, with additional reductions to come from other smaller scope regulations, and as co-benefits from criteria pollution rulemaking efforts. In October, 2007, the ARB added measures to the list, including reductions anticipated from improved energy efficiency at cement manufacturing plants, rulemaking on refrigerants, tire inflation programs, and other programs in trucking and at the ports. Further details on these programs are provided in Appendix B of this report.

Scoping Plan: The Scoping Plan was approved by the ARB Board in November, 2008. The Plan does several things. First, it specifies the target level of GHG emissions that must be achieved by 2020, and estimates the levels that would occur in the absence of measures to reduce emissions – the "business-as-usual" scenario. The difference represents the quantity of emissions that must be reduced by the measures in the plan. Second, the Plan identifies a mix of strategies to achieve the mandated reductions, and estimates the emission reductions that can be expected from each strategy or measure. Finally, the Plan provides general direction for the implementation of key strategies, recognizing that the details of the requirements will be developed through the public rulemaking process.

In December of 2007, the ARB approved the baseline inventory analysis of the GHG emissions in California in 1990; total GHG emissions were 427 MMTCO2(e). ARB estimates that under the business-as-usual scenario, GHG emissions will rise to 596 MMTCO2(e) by 2020. In order to comply with the mandates of AB 32, California must implement strategies sufficient to remove 169 MMTCO2(e). This represents an overall reduction of 30% from business-as-usual, and about 10% from the levels emitted today.

Figure 8: Baseline GHGs vs. Scoping Plan

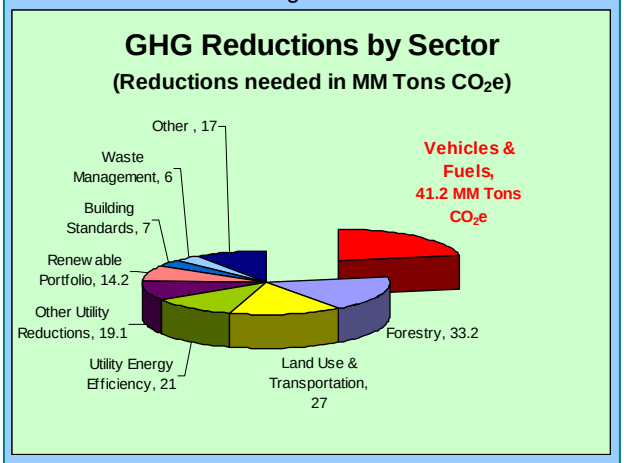


Source: ARB Scoping Plan, Fig. 3, p. 21

On a per capita basis, each Californian will be responsible for nearly 14 tons of CO2(e) in 2020 under a business-as-usual scenario, and that needs to be reduced to about 10 tons for each man, woman, and child. Figure 8 shows the GHG emissions under baseline conditions, and as they are projected to be in 2020, with full implement-tation of the Scoping Plan.

The Scoping Plan identifies measures and strategies in 19 basic categories, and Figure 9 shows the reductions needed from key categories. The greatest contribution comes from the transportation sector, which is responsible for about 60.2 MMTCO2(e) in reductions.

Figure 9



Data from CEC

The reductions (shown parenthetically in MMTCO2(e) for each category) come from implementation of GHG emission standards for vehicles (31.7), the Low Carbon Fuel Standard (15), vehicle efficiency measures (4.8), goods movement improvements (3.7), reductions from medium and heavy duty vehicles (2.5), and implementation of high speed rail (1). The electricity sector is the second largest contributor, with a total of 49.7 MMTCO2(e), coming from energy efficiency measures (26.4), acceleration of the Renewable Energy Portfolio Standard (21.2), and deployment of SB 1 (Murray) the Million Solar Roofs Initiative (2.1). Other sectors include reductions in emissions of GHGs with high global warming potential (16.2), sustainable forestry (5), efficiencies in water movement, treatment, and storage (4.8), improvements in land use (5), direct local government actions to reduce GHGs (15% reduction below present levels; tons TBD), control of methane at landfills (1), and methane capture at large dairies (1). The amount of reductions from the large industrial sector is yet to be determined, and the balance of the needed emission reductions is expected to come from the market-based cap and trade program (34.4).

Specifically in regard to reductions from improvements in land use, the Scoping Plan discusses establishing Regional Targets for GHG reduction, and requiring an integrated planning process for transportation, air quality, and General Plans. This approach is further supported by SB 375 (Steinberg), which the Governor signed in September, 2008. The legislation is discussed below, and the concept of Regional Targets and integrated planning is further explored in Section 4 of this report.

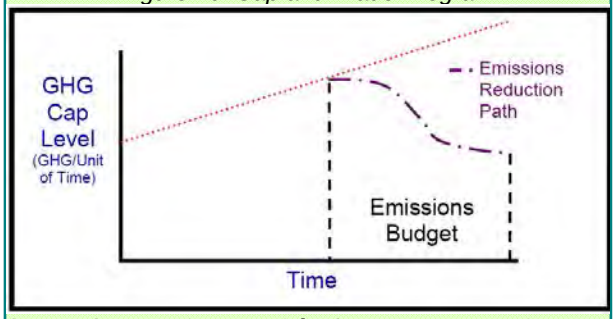
Toolkit available at: www.coolcalifornia.org

The Scoping Plan discusses two primary ways in which local governments can achieve direct GHG reductions (that is, reductions that do not result from improved land use planning). Local governments can take actions to reduce energy use at their own facilities, increase their recycling, reduce their waste and water use, reduce the energy used in the handling and treatment of waste and

water, and reduce the carbon emissions from their vehicle fleets and from trips to and from their facilities. Similarly, local governments can adopt policies that support reductions in these same areas by businesses and residents within their communities. These kinds of local government actions form the fabric of the Model Policies, and the effective development and integration of thee strategies is the focus of the remaining sections of this report.

There has been considerable interest in the market-based elements of the AB 32 program. Although many of the details remain to be determined through public rulemaking, the Scoping Plan provides certain basic information about market-based efforts. Market-based programs generally fall into three categories: incentives, fees and fee-bates, and cap-and-trade systems. The Scoping Plan envisions a role for all three. Incentives are contemplated for broad, consumer-based programs, such as installation of solar technology, or early adoption of energy efficiency technologies. Fees are envisioned primarily as a mechanism to fund program administration, not as an emission reduction strategy; however, some consideration is given to establishing a fee on upstream carbon (attached to distribution of fuels and electricity) as a backstop measure. The greatest attention is given to a cap-and-trade market mechanism, a system in which a limited number of "allowances" to emit GHG are available, and emitters must either reduce emissions to match the allowances they hold, or they must purchase allowances from another emitter who holds more than needed to cover emissions. The total available allowances would decrease as the 2020 deadline approaches. The Scoping Plan proposes a market that would initially cover a subset of sectors, but would expand to include essentially all sectors over time. The Plan also contemplates a market that is initially linked throughout the western U.S. and Canada, and in which initial allowances are assigned through a combination of targeted allocation and open auction, but which transitions to a market where all allowances are auctioned. It is not yet clear how local governments would be covered under a market system. Figure 10, above, gives a graphical representation of the baseline emissions over time (shown in red) compared to the declining cap (shown in purple). Additional discussion of the cap-and-trade program is provided in Appendix B.

Figure 10: Cap and Trade Program



Source: ARB Meeting Materials- AB 32 Program Design Technical Stakeholders Meeting, April 25, 2008, p. 3

Greenhouse Gas Emission Standards for Vehicles (AB 1493)

Passed in 2002, before the overarching climate program was established, AB 1493 (Chapter 200, Statutes of 2002) was authored by Assembly Member Fran Pavley. The bill required ARB to develop and adopt the nation's first GHG emission standards for automobiles, and the emission

limits it requires are commonly referred to as the Pavley Standards. The ARB approved GHG emission limits for light duty vehicles in 2004. The standards become effective in 2009 and would reduce GHG emissions from California passenger vehicles by about 22 percent by 2012 and about 30 percent by 2016.

Although the federal government generally reserves the authority to establish tailpipe emission standards for motor vehicles, the federal Clean Air Act provides that California may establish such standards; however, any standards adopted by the state must be granted a waiver from the federal preemption by the U.S. EPA before they can be enforced. In December, 2007, EPA denied California's waiver request for the Pavley standards and in early 2008 California's Attorney General filed a petition in federal court to challenge that denial. Seventeen states supported the petition, and the U.S. Congress lodged inquiries into the EPA decision. The Obama administration agreed to review the matter, and in February, 2009, the Administrator of EPA requested comments on the reconsideration of the waiver petition.

In addition to the waiver denial, implementation of the standards has also been challenged in court in a lawsuit filed by automobile manufacturers. The suit alleges that the standards are de facto fuel efficiency standards, which are the exclusive purview of the federal government.

The Pavley standards account for about 19 percent of the emission reductions specified in the Scoping Plan. Although the federal government has adopted new fuel efficiency standards, ARB estimates that between 2009 and 2016, Pavley standards will achieve 56% more reduction in GHG emissions in California (about 19 million metric tons) compared to the federal standards, and by 2020 the difference is 49%. Figure 11 compares the total national emission reductions achieved by different implementation scenarios for the Pavely standards. If the Pavley standards are not ultimately

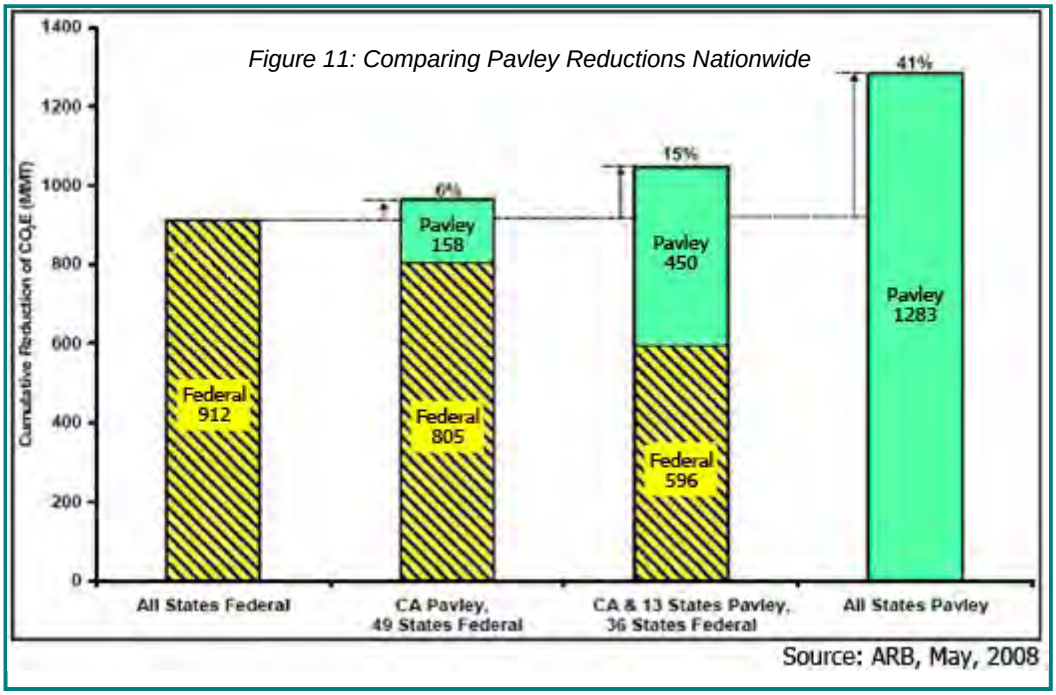


Figure 11: Comparing Pavley Reductions Nationwide

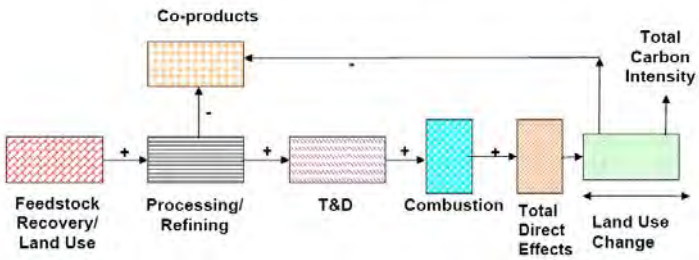
implemented, the lost reductions of GHG will need to be recovered through additional measures, beyond the reductions already identified in the Scoping Plan. ARB suggests the use of a carbon fee on the sale of new vehicles with GHG emissions greater than would have been allowed under the Pavley standards; the fees would be rebated back to the purchasers of vehicles with GHG emissions lower than the Pavley standards. The fees would have to be established at a price point that would inventivize purchasing behavior that results in the same emissions profile as the Pavley standards would have.

Low Carbon Fuel Standard (Executive Order S-1-07)

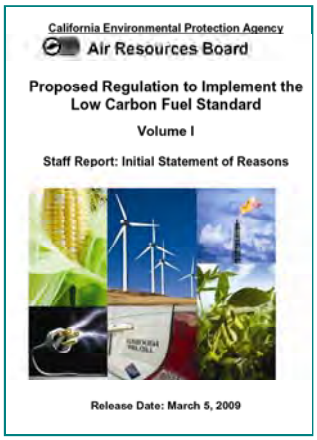
In his January 2007 State of the State message, Governor Schwarzenegger asserted California's leadership in clean energy and environmental policy by establishing a Low-Carbon Fuel Standard (LCFS) by Executive Order. This first-in-the-world greenhouse gas standard for transportation fuels will spark research in alternatives to oil and reduce GHG emissions. Executive Order S-1-07, the Low Carbon Fuel Standard (LCFS) (issued on January 18, 2007), calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. The carbon intensity of a fuel is a direct measure of the GHGs emitted during the full life-cycle of the fuel, including directly emitted CO2 as well as other GHG associated with each step in the fuel cycle (a.k.a., “well-to-wheels” for fossil fuels and “seed-to-wheel” or “field-to-wheel” for biofuels). Figure 12 shows the components of a combustion fuel life cycle. The Executive Order instructed the California Environmental Protection Agency to coordinate activities between the University of California, the California Energy Commission and other state agencies to develop and propose a draft compliance schedule to meet the 2020 target. Furthermore, it directed ARB to consider initiating regulatory proceedings to establish and implement the LCFS.

Figure 12:

Block Diagram for the various Components for a Fuel Pathway



source: ARB LCFS Staff Report



In response, ARB identified the LCFS as an early action item with a regulation to be adopted and implemented by 2010. The standard was approved by the Board in April, 2009. It establishes a baseline level of carbon intensity for affected providers, and places a declining cap on that intensity where each year fewer GHGs may be emitted. This is a market-based program that uses carbon intensity credits for fuels sold, where fuels that have lower carbon intensity than required yield “excess” credits that may be used to offset other, higher intensity fuels, or may be banked for use in future years, or sold to other providers who have not been able to reduce the intensity of their fuels to meet the cap.

Renewable Energy Portfolio (SB 1078 and SB 107)

Established in 2002 under SB 1078 (Sher, see: Chapter 516, Statutes of 2002) and accelerated in 2006 under SB 107 (Simitian, see: Chapter 464, Statutes of 2006), California's Renewable Portfolio Standard (RPS) obligates investor-owned utilities (IOUs), energy service providers (ESPs) and community choice aggregators (CCAs) to procure an additional 1% of retail sales per year from eligible renewable sources until 20% is reached, no later than 2010. ARB's Scoping Plan identifies a target RPS of 33% by 2020.

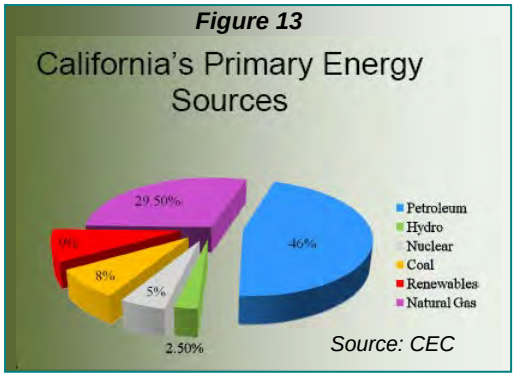


Figure 13

The California Public Utilities Commission (CPUC) and California Energy Commission (CEC) are jointly responsible for implementing the program. Figure 14a shows the mix of energy sources in California in 2008, and Figure 14b shows progress towards the RPS goals. As of July, 2008, the largest IOUs in California had renewable portfolios as follows: Pacific Gas and Electric (PG&E) - 11.4% ; Southern California Edison (SCE) - 15.7%; San Diego Gas & Electric (SDG&E) - 5.2%.

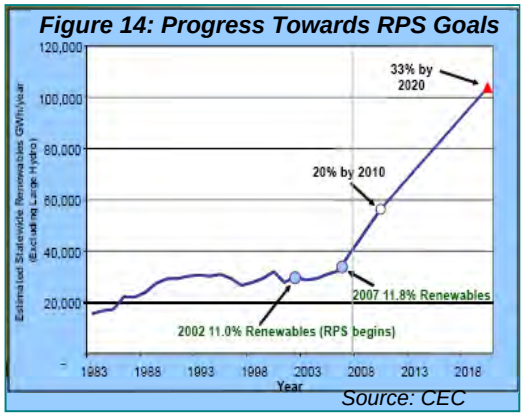


Figure 14: Progress Towards RPS Goals

Improved Land Use Planning (SB 375)

In September, 2008, the Governor signed Senate Bill 375 (Steinberg). This bill has five main provisions:

1. It requires ARB to establish regional targets for reductions in greenhouse gas emissions from use of light duty vehicle (passenger cars and small trucks) associated with land use decisions.

2. It requires that metropolitan planning agencies (MPOs) create a Sustainable Communities Strategy (SCS) in their Regional Transportation Plans (RTPs) to meet the reduction targets established by ARB.

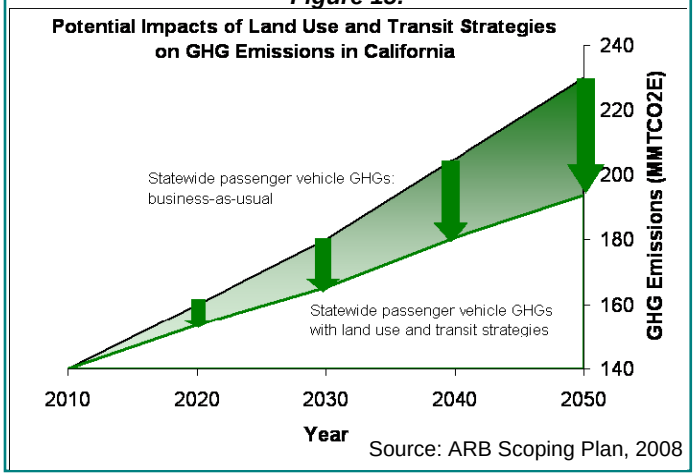
3. It requires that funding decisions for regional transportation projects be internally consistent within the RTP.

4. It aligns the Regional Housing Needs Assessment (RHNA) with the RTP.

5. It provides CEQA relief, in the form of streamlining and exemptions, for projects that are consistent with the SCS.

Targets- ARB is required to approve regional GHG emission reduction targets by September 30, 2010, and to review them, and update them as appropriate, on an eight-year schedule. The targets may be expressed in terms of total tons of emissions to be reduced, reductions per capita, per household, or another metric identified by the air board. ARB has already indicated that the reductions attributed to land use in the Scoping Plan are not, necessarily, the same as the reduction targets that will be assigned to regions under SB 375. ARB believes the Scoping Plan is not an enforceable commitment (unlike the State Implementation Plan for attaining national ambient air quality standards, for example); rather, it is a best estimate, and a general road map. ARB believes the SB 375 process will result in more accurate and specific assessments of the magnitude of reductions that are achievable through sustainable transportation planning. Figure 15 shows the emissions projected from passenger vehicles between 2010 and 2050, and the reductions targeted in the Scoping Plan for that sector.

Figure 15:



Source: ARB Scoping Plan, 2008

To guide the establishment of the regional targets, from which all other provisions flow, SB 375 creates a Regional Targets Advisory Committee (RTAC) with representation from affected stakeholders, including local government, air districts, and MPOs. The committee will make recommendations to ARB on the factors to be considered by ARB in setting the targets, and on the methodologies to be used. The RTAC does not give explicit recommendations about the targets themselves; however, individual MPOs may make recommendations regarding their own specific target. The RTAC recommendations are due to the ARB by September 30, 2009, which leaves the ARB one year to establish the targets after the RTAC makes its recommendations.

Sustainable Communities Strategy- Metropolitan Planning Organizations (or their subdivisions) are required to develop a Sustainable Communities Strategy that will constitute the land use element of the Regional Transportation Plan. The SCS is required to do all of the following:

- Identify the general location of uses, residential densities, and building intensities within the region;

- Identify areas within the region sufficient to house all the population of the region, including all economic segments of the population, over the course of the planning period of the RTP (i.e., 25 years), taking into account net migration into

the region, population growth (presumably referring to natural increase), household formation, and employment growth;

- Identify areas within the region sufficient to house an eight-year projection of the regional housing need (i.e., an eight-year RHNA);
- Identify a transportation network to service the transportation needs of the region;
- Gather and consider the best practically available scientific information regarding resource areas and farmland in the region;
- Consider state housing goals;
- Forecast a development pattern for the region, which when integrated with the transportation network and other transportation measures and policies, will achieve, to the extent practicable, the targeted greenhouse-gas emission reduction from automobiles and light trucks, while also permitting the RTP to comply with the Clean Air Act;
- In doing all of the above, consider spheres of influence that have been adopted by Local Area Formation Commissions (LAFCOs).

The SCS will also embody the plan to achieve the GHG reductions needed to meet the region's target. It must contain all feasible measures to reduce GHG, but the determination of feasibility is left to the MPOs. The MPOs are required to quantify the emissions reductions that will result from implementation of the SCS, and compare the expected reductions to what is required to meet the targets established by ARB. The bill acknowledges that implementing all feasible strategies under the SCS may not yield sufficient emission reductions to meet the regional target. If that is the case, the MPO is required to develop an Alternative Planning Strategy (APS) that includes additional strategies (including those that were rejected from the SCS on the basis of feasibility) sufficient to reach the target.

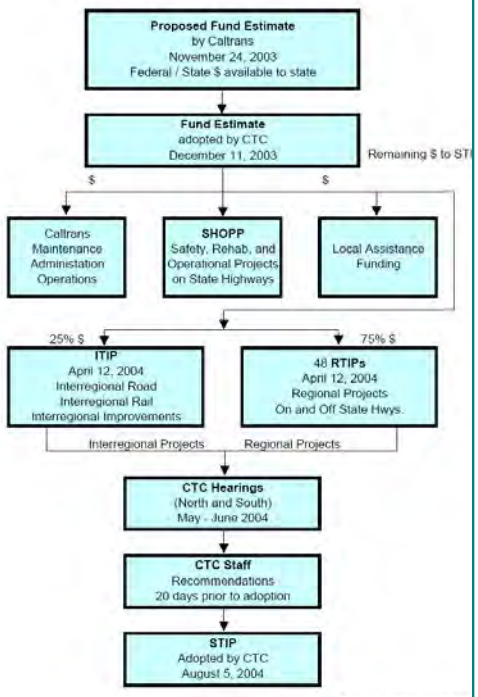
Because the SCS is part of the RTP, it is tied to federal transportation planning law and structures. The bill specifies, however, that the SCS is *not* a land use plan, and SB 375 does not confer land use authority on the MPOs. Technically, SB 375 does not require the local General Plan to conform to the SCS. Conformity is strongly encouraged, however, through funding incentives and CEQA streamlining. It is important to note here that the APS is not part of the SCS, and is therefore not part of the RTP. Under SB 375, the APS is not a binding

commitment; however, consistency with the APS can provide some streamlining and regulatory relief under CEQA. Finally, both the SCS and the APS are subject to approval by ARB, but ARB's role is limited to a determination of whether the measures included in the SCS and/or the APS will achieve the target ARB established for the region.

Funding- Although SB 375 does not explicitly direct transportation funding to specific types of projects or measures, it does affect the flow of transportation dollars indirectly. The bill requires that the RTP be internally consistent, meaning that transportation funding allocated under the umbrella of the RTP must be allocated consistent with the programmatic elements of the plan, including the SCS. So if the SCS calls for or prioritizes a specific type of transportation project, funding must be allocated to that type of project, rather than a project type that is not included in the RTP or has been awarded low priority. The same construct does not extend to the APS, however, because it is explicitly not part of the RTP. Figure 16 is a diagram of the process by which the RTIP is created in the Bay Area; for further information, see www.mtc.ca.gov.

Figure 16:

2004 STIP PROCESS
(State Highway Account)



Source: MTC

Affordable Housing- The bill makes specific changes to the requirements for the housing element of the General Plan, to align the Regional Housing Needs Assessment (RHNA) with the RTP. Broadly, it does the following:

- In areas where the RTP is on a four-year review cycle, the bill changes the review cycle under RHNA to eight years, such that the RTP and the RHNA will be reviewed together on a regular basis. In areas where the RTP remains on a five-year review cycle, the RHNA cycle remains at five years.

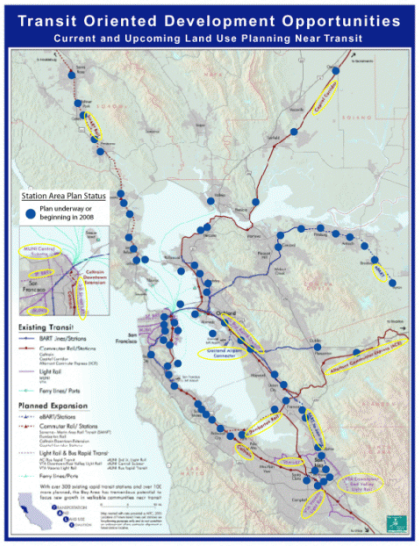
- Requires that the concurrent review of the RTP and the RHNA begin in the first RTP update after 2010, and that two assessments be consistent. Cities and counties are required to amend the Housing Element in their General Plans within the specified time frame, or to be placed on a more frequent four-year RHNA review cycle.

- Establishes a timeline for completing zoning changes to reflect the RHNA, and severely restricts the local authority on project review for affordable housing if the timeline is not met. Specifically, the local authority may only act to disapprove a project, and only if the project would result in a serious health risk.

Streamlining of CEQA- To incentivize projects that are consistent with the SCS or APS, the bill provides certain exemptions from, or streamlining of, requirements under CEQA. Specifically, streamlining is provided for residential projects meeting certain criteria, and for projects that fall under the newly defined category of "transit priority project."

Residential Projects Consistent with SCS/APS: The bill reduces CEQA requirements for a residential development (or a mixed-use development that devotes at least 75% of the square footage to residential uses) if it meets both of the following requirements: 1) the project is consistent with an SCS or APS that ARB has determined will achieve the regional targets, and 2) the project implements the mitigation measures required under an applicable prior environmental document. A project meeting these criteria does not have to describe or discuss in any CEQA document growth-inducing impacts, any project-specific or cumulative vehicle impacts on global warming or the regional transportation network, or a reduced residential density alternative to vehicle impacts.

Transit Priority Projects: The bill defines a new category of project, "Transit Priority Projects," and establishes a categorical exemption from review under CEQA for such projects, provided they meet additional specified criteria. Projects that meet the definition of the category, but not the additional criteria, are afforded other streamlining of CEQA requirements, but are not fully exempt. The definition of "Transit Priority Projects" is based on four factors:



- The project is consistent with the SCS or APS, whichever has been determined by ARB to meet the assigned reduction targets; and
- The project meets specified mixed-use criteria; and
- The project has a minimum net density of at least 20 units per acre; and
- The project is within a half mile of a major transit stop (existing or planned), or a "high quality" transportation corridor.

A categorical exemption is provided for TPPs that conform to all criteria on a specified list, as well as at least one additional criterion from a list of options. The TPP must meet all of the following criteria:

- The project is no larger than 8 acres and not more than 200 units;
- The project can be served by existing utilities and has paid all applicable in-lieu and development fees;
- The project does not have a significant effect on historical or environmental resources (e.g. natural habitat);

- The project has remediated any environmental hazards to applicable standards and is not subject to significant and defined catastrophic risks;

- The project is not located on developed open space;

- The buildings in the project are 15 percent more energy efficient than required by California law and the project is designed to achieve 25 percent less water usage than the average household use in the region;

- The project does not result in the net loss of affordable housing units in the area;

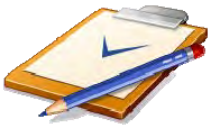
- The project does not include any single-story building larger than 75,000 square feet;

- The project incorporates mitigation measures from previous environmental impact reports;

- The project does not conflict with nearby industrial uses.

To meet the categorical exemption, the TPP must also conform to at least one of the following:

- At least 20 percent of the housing units will be sold to families of moderate income, or not less than 10 percent of the housing will be rented to families of low income, or not less than 5 percent of the housing will be rented to families of very low income and the developer commits to the continued availability of the non-market units (55 years for rental units, 30 years for ownership units); **or**



- The developer pays in-lieu fees equivalent to costs of meeting the first requirement; **or**

- The project provides public open space equal to or greater than five acres per 1,000 residents.

TPPs that do not meet the criteria for a full categorical exemption from CEQA can qualify for streamlining under a Sustainable Communities Environmental Assessment or by implementing approved Traffic Mitigation Measures.

A TPP may be reviewed under a Sustainable Communities Environmental Assessment (SCEA) if the project incorporates all feasible mitigation measures, performance standards, or criteria from an applicable prior environmental impact report. The SCEA is similar to an EIR, but it does not have to address potential growth-inducing impacts, any project-specific cumulative impacts on climate change from the use of light duty

vehicles, or any other cumulative effects of the project that have been addressed and mitigated in prior environmental documents. In addition to this streamlining, the bill provides that a legal challenge of the SCEA is to be reviewed under a standard of "substantial evidence" rather than under the "fair argument" standard that is generally applied to EIRs.

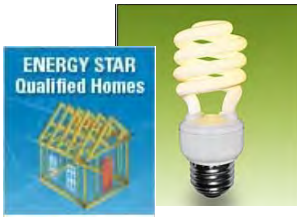
The bill also authorizes cities and counties to adopt specific Traffic Mitigation Measures (TMMs) to apply specifically to TPPs. The TMMs include such measures as requirements for the installation of traffic control improvements, street or road improvements, transit passes for future residents, or other measures that will avoid or mitigate the traffic impacts of transit priority projects. Any TPP that implements the approved TMMs is not required to identify or implement any additional measures to mitigate traffic impacts under CEQA.

Alternative and Renewable Fuel & Vehicle Technology Program (AB 118)

In October 2007, Governor Schwarzenegger signed AB 118 (Nunez, Statutes of 2007), into law. AB 118 provides approximately $200 million annually through 2015 for three new programs to fund air quality improvement projects and develop and deploy technology and alternative and renewable fuels. The bill creates a dedicated revenue stream for the programs via increases to the smog abatement, vehicle registration, and vessel registration fees. The three new programs are: the Air Quality Improvement Program administered by ARB, the Alternative and Renewable Fuel and Vehicle Technology Program administered by the California Energy Commission, and the Enhanced Fleet Modernization Program administered by the Bureau of Automotive Repair.

The Air Quality Improvement Program will provide about $50 million per year for grants to fund clean vehicle and equipment projects which reduce criteria and toxic air pollutants as well as research on the air quality impacts of alternative fuels and advanced technology vehicles. ARB will be developing guidelines for the Air Quality Improvement Program and the Alternative and Renewable Fuel and Vehicle Technology Program to ensure that both programs complement efforts to meet the federal and state ambient air quality standards and to reduce air toxics.

California Energy Efficiency Standards (Title 24, Chapter 6)



Title 24, Part 6 (California's Energy Efficiency Standards for Residential and Nonresidential Buildings) of the California Code of Regulations was first established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and

incorporation of new energy efficiency technologies and methods. These standards are mandatory and thus new building permitted by City and County governments must comply with the standards in effect at the time. These standards also promote cost-effective means to reduce energy use and thus GHG emissions for new development relative to business as usual conditions.

The Energy Commission adopted the 2008 Standards on April 23, 2008, and the Building Standards Commission approved them for publication on September 11, 2008. These new Standards will be in effect as of July 1, 2009. The requirement for when the 2008 Standards must be followed is dependent on when the application for the building permit is submitted. If the application is submitted after 7/1/09, the 2008 Standards must be met.

California Environmental Quality Act

The California Environmental Quality Act (CEQA) (Pub. Res. Code §21000 et seq.) is not specific to GHG regulation and does not create specific new mandates for General Plans; however, its basic goal is to ensure that environmental impacts of proposed projects are evaluated, and significant impacts are mitigated and disclosed to the public. CEQA substantially influences the approval process for General Plans. The evaluation is done through an Environmental Impact Report (EIR) which provides State and local agencies and the general public with detailed information on potentially significant environmental impacts a proposed project is likely to have and ways to mitigate those impacts, and also to evaluate potential alternatives to the project.

Because of the global nature of the climate change problem, most projects will not result in GHG emissions that are individually significant. CEQA also requires consideration of whether impacts are *cumulatively* significant, however. The determination of significance is made by the agency with primary jurisdiction over the project. CEQA allows the agency to establish thresholds for significance, based upon sufficient scientific evidence, but thresholds are not required.

In January of 2008, CAPCOA released a resource document called *CEQA and Climate Change*, that reviewed the various options available to lead agencies to determine significance of a project. The document also evaluated tools and methodologies, and provided a list of mitigation strategies. A more comprehensive discussion of CEQA and its applicability to GHG emissions is provided in that document.

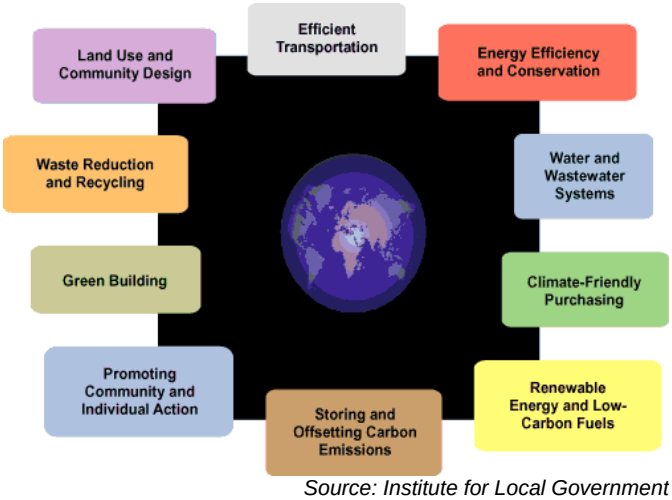
On April 13, 2009, the Governor's Office of Planning and Research sent proposed amendments of the CEQA Guidelines to the Secretary of the Resources Agency for promulgation. The proposed amendments contain

recommended changes to fourteen sections of the existing guidelines, including: the determination of significance as well as thresholds; statements of overriding consideration; mitigation; cumulative impacts; and specific streamlining approaches. Overall, the proposal includes the same basic approaches covered in the CAPCOA document. The proposed Guidelines also include an explicit requirement that EIRs analyze GHG emissions resulting from a project when the incremental contribution of those emissions may be cumulatively considerable. A copy of the full proposal, as well as the letter of transmittal, may be found at: www.opr.ca.gov.

An important consideration of CEQA with respect to planning is the growing consensus that a robust effort to address GHG emissions at the General Plan level can substantially streamline subsequent project review under CEQA, provided the project is consistent with the GHG reduction policies in the Plan. This is specifically allowed in the OPR proposal, and is being further developed in the context of SB 375. Although the specifics of what is entailed here have yet to be established, the concept is important to consider in shaping the policies included in the General Plan.

Local government has an enormously important role to play in reaching the goals of AB 32, and more importantly, in the achieving the greater long term goal of preventing catastrophic climate change. There are many strategies a local government can undertake that will reduce GHG emissions, and help minimize the extent of climate change that does occur. Some of the strategies depend on coordinated action with other agencies and levels of government; others can be implemented independently.

This section of the report is mainly focused on the more immediate actions local governments can take, including direct reductions from local government operations; the role of local government in fostering reductions in the business sector and in local communities; and lead agency obligations to address GHG emissions under CEQA. This chapter also touches briefly on the crucial, longer term role of local government: establishing over-arching plans that will achieve reductions through changes to land use and transportation, resource management, and the efficiency of the built environment. The Institute for Local Government provides resources and a forum for sharing ideas on many of these important topics (see www.cacities.org). The role of local government in planning for GHG reductions is explored more fully in Chapter 4.



Source: Institute for Local Government

Reductions in Local Government Operations

There are five core areas of local government operations that are responsible for GHG emissions. These include: energy use, waste and recycling, water delivery and wastewater treatment, transportation, and the build environment.

In addition, there are actions the local government can take to preserve open space and undertake reforestation, for example, that can mitigate or offset the emissions resulting from operations.

A brief discussion of each operational area is included below. These lists are not exhaustive; rather, they provide a sampling, and links are provided in the References section of this report where additional information and examples can be found. Finally, the discussion here is limited to emissions from operations as opposed to those associated with policies governed by the General Plan, a discussion of which follows.

Energy Use: The buildings, equipment, and infrastructure of local government all use energy. In general, newer purchases and installations tend to be more energy efficient, but there are plenty of opportunities to enhance efficiency and cut energy use. Buildings can be made more efficient by upgrading insulation and installing low emissive glass, using high-efficiency lighting with timers and sensors, installing cool roofs, and simply adjusting heating and cooling levels. Alternative energy sources can be developed, such as installation of solar collectors, or landfill gas to energy projects. Local governments can also change the emissions profile of the energy they purchase from their energy providers. Equipment that heats and cools buildings can be upgraded to the most efficient models, as can computers, telecommunications, and office equipment. And infrastructure such as street lighting and traffic signals can be upgraded with state-of-the art technology such as halogen bulbs and solar collectors and storage at power or signal poles. Lifecycle carbon costs of maintaining infrastructure as diverse as roads, bridges, and transit facilities can be evaluated so that the least carbon-intensive materials and procedures are used.

Waste and Recycling: There are GHG emissions associated with the energy involved in waste handling, and due to methane from waste decomposition as well as some GHG with high global warming potential from foam products and refrigerants released during the handling of these materials. Local governments are users of waste and recycling systems for their own operational waste. To reduce emissions from their own operational waste stream, jurisdictions can enhance employee access to recycling, create purchasing guidelines to emphasize recycled materials, less packaging, and to avoid products that release more potent GHGs. In one creative example, the City of San Francisco is replacing bottled water at coolers and in dispensers with filters on drinking fountains. Local governments also may operate or exercise contractual control over waste handling programs, depending on how these services are structured and provided in their jurisdictions. Emissions from this portion of the waste stream can be reduced through methane recovery, recovery of potent GHG from foam and refrigerant systems, and other adjustments to collection systems.

Water Delivery and Wastewater Treatment: Movement, storage, and treatment of water and wastewater use significant amounts of energy. Local governments can reduce their own water use by installing low-flow fixtures, by inspecting, repairing and replacing leaking components, especially irrigation and other water supply at remote sites that often go unnoticed for long periods, and through xeriscaping. Water reclamation and graywater systems can also trim the carbon footprint from water use, and managing time of demand with large water users can significantly alter the energy needs at peak delivery times.

Transportation: Local governments can reduce the GHG emissions of their vehicles by replacing older vehicles with the highest efficiency vehicle that can perform the needed function. They can also reduce the overall size of the fleet by increasing the use of pooled vehicles instead of assigned vehicles, and encouraging carpooling when on government business. As employers, local governments can institute programs to increase employee use of alternate modes of transportation, such as transit, carpooling, biking, and walking to work, and they can offer compressed work schedules, telecommuting, and even satellite offices. If properly designed, many of these strategies can also help decrease GHG from the public accessing the jurisdiction's services, as can offering access to services online.

The Built Environment: Commitments to highly efficient construction in their own new facilities is one way local governments can reduce carbon emissions from the built environment. Many local governments are building or retrofitting their facilities to LEED certification standards. The siting of new facilities is also an opportunity to improve access by employees and the public and reduce transportation related emissions. In addition, when it establishes the building codes for its jurisdiction, local government has the opportunity to significantly alter the energy used in constructing, maintaining, and using the built environment. A careful review of local needs and practices can identify opportunities for energy performance well beyond what is required under California's Title 24 standards.

Mitigation Projects: Separate from its core operational mission, a local jurisdiction can undertake projects or actions for the purpose of mitigating or offsetting GHG emissions. Examples of these projects include securing the development rights to land that might otherwise be developed (especially where the site does not lend itself to sustainable transportation planning) and undertaking reforestation projects either in open space that has been previously deforested, or through urban forestry efforts. Advanced technology demonstration projects can also ease the transition to new technologies and enhance public acceptance of them, for example purchasing or leasing a plug-in hybrid, fuel cell, or full electric vehicle and demonstrating its use at public events. Some local governments purchase emissions offsets for certain transportation-related emissions, such as

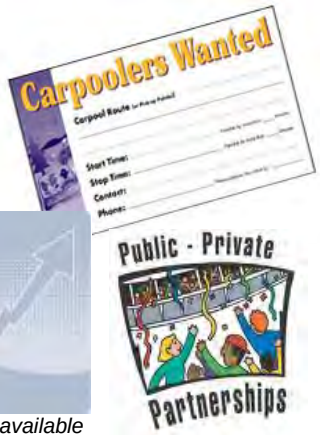
air travel, although any GHG emissions can be offset. When offsets are purchased, the jurisdiction should take extra precaution in verifying the value of the offsets, as some are of dubious origin.

Fostering GHG Reductions in the Business and Community Sectors

In addition to implementing programs to reduce its own carbon emissions, local government has an important role to play in bringing others to the table and helping them to reduce their GHG emissions. Local governments can develop public education and outreach programs, can establish public-private partnerships and programs to publicly recognize achievements, and offer incentives (non-monetary as well as financial) for actions that reduce GHG emissions. Examples of these types of actions are also provided as model policies in Chapter 6, but they can also be implemented without the benefit of an overarching plan.

Education and outreach programs would include events such as conferences, workshops, or fairs, featured speakers, public service announcements, print messages, and online information or interactive sites. Ideally, topics will span a broad range, including the fundamentals of climate change and how our actions contribute to it, down specific actions or projects, such as a "lights out" campaign, a "green tip of the day" or a how-to workshop on gardening with drought-tolerant, native plants. Programs involving schools are also beneficial, and model units on climate and conservation are available; events like poster contests and recycle drives are a good way to get children involved.

Local governments are also in a unique position to work with local businesses on climate protection projects and partnerships. Many of the GHG reduction strategies that rely on improved efficiency in energy, water, fuel use, or waste reduction, can generate significant cost savings for businesses over a fairly short time frame. A local government that has implemented some of these strategies in its own municipal operations is in a good position to demonstrate savings, but even if the government does have data of its own to share, it can encourage business participation in these types of programs.



Small Business Toolkit available at: www.coolcalifornia.org

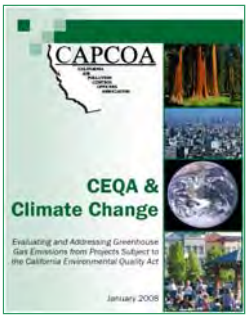
Suggestions include working with the local chamber of commerce, business associations, or business-focused civic groups to establish a forum to share efforts and results, such as

newsletters, or a monthly breakfast meeting or luncheon. Local government can also help establish demonstration projects, and can publicly recognize local leaders with awards or in public service messages.

Incentives are another important tool to encourage actions that reduce GHG emissions in the near term. To be effective, the incentive does not have to be monetary. As noted above, public recognition can be a powerful motivator, but local governments have other tools they can use to promote GHG emission reductions. Examples include preferred parking for electric or alternative fuel vehicles, and express permitting of projects on a "green project" list. Financial incentives can be small or large, beginning with free compact fluorescent light bulbs or reduced transit fairs on a designated "don't drive" day, to rebates for high efficiency toilets and electric lawn mowers, to creative financing for energy efficiency improvements or installation of solar panels. In some cases, the government can partner with the private sector for sponsorship of these kinds of efforts, which can help defray some of the costs.

Mitigating Impacts through Project Review

Local governments review proposed projects under CEQA, either as a lead or a responsible agency. Until recently, climate change was not considered an environmental impact under CEQA, and GHG emissions associated with projects were not quantified, disclosed, or mitigated. This has changed, however, and there is now broad recognition that these are potentially significant impacts, either individually or cumulatively, and that they do need to be addressed. Some jurisdictions recognized this early on and began to evaluate climate impacts during their CEQA review process. Following the passage of AB 32 in 2006, greater attention was paid to this issue, and in 2007, California's Attorney General put local governments on notice that these impacts could no longer be overlooked. There was a fair amount of confusion, however, about how to quantify GHG emissions, at what level they would be considered significant, and what steps could be taken to mitigate them.



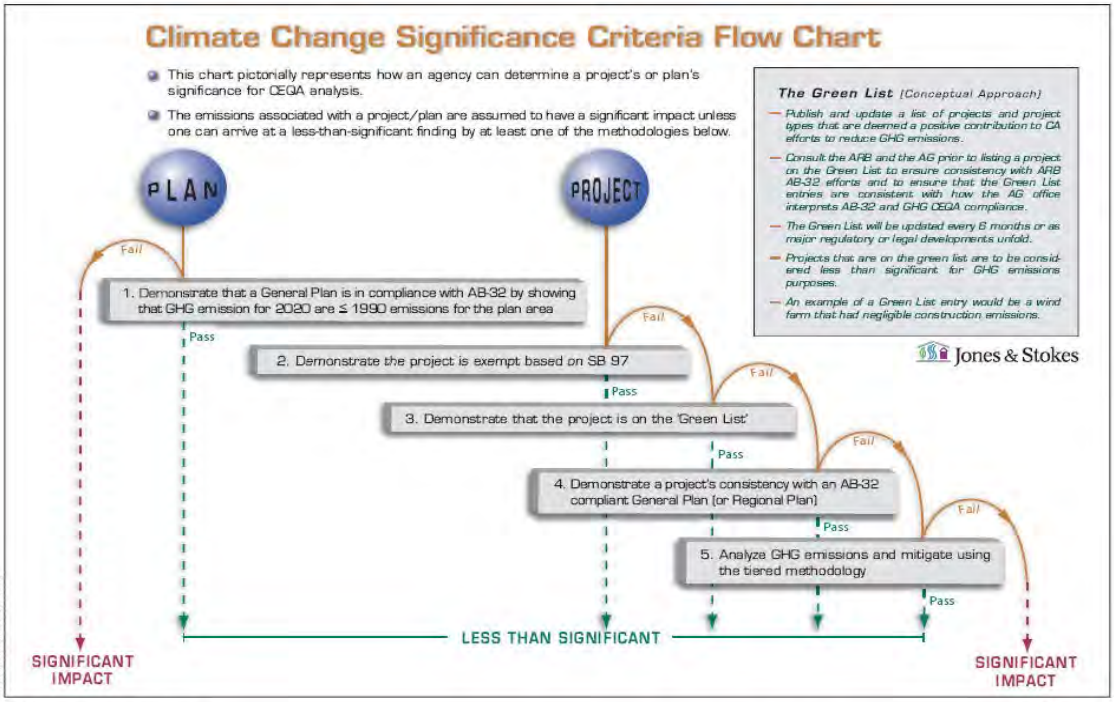
In January of 2008, CAPCOA released a resource document, *CEQA and Climate Change*, that collected and presented information to support local governments as they undertake a review of GHG emissions from projects subject to CEQA. The document considered approaches to determining significance of emissions, evaluated available methodologies and tools for quantifying GHG emissions, and provided a summary of GHG mitigation measures for projects.

Three approaches to determining significance are explored in the CAPCOA document, including the benefits and potential concerns associated with each. Significance can be determined without first establishing a significance threshold; in this case, the determination will be made on a case by case basis, which creates uncertainty and may be

vulnerable to challenge. A significance threshold can be set at zero, on the premise that any GHG emissions contribute in a cumulative way to the global problem; this approach is simple in its construct and provides certainty, but the work associated with preparing and reviewing EIRs on all projects is likely to overwhelm the system and lessen the effectiveness of review across the board. A significance threshold can be set at an emission level other than zero; the chief challenge for this approach is to identify and scientifically support an appropriate threshold, and the CAPCOA report evaluates several different options for doing this. Of particular interest are two elements discussed in the non-zero approach. These are: the role of robust treatment of GHG emission reduction policies in the General Plan, and the creation of a "Green List" of projects that will reduce or mitigate GHG emissions, both which could be used to substantially streamline the review process under CEQA. Figure 17 presents these non-zero threshold concepts in a flow diagram.

The CAPCOA report also evaluates a number of technical models and tools currently

Figure 17



Source: CEQA and Climate Change, CAPCOA 2008

available for quantifying GHG emissions, as well as several that are still under development. The report concludes that there is currently sufficient information to quantify GHG emissions for the purposes of evaluating projects under CEQA, but that improvements in several key areas will greatly improve the sensitivity and usefulness of available methods.

Finally the CAPCOA report compiles and presents information on measures to mitigate GHG emissions. It includes tables that provide information on measure applicability, jurisdiction, feasibility, effectiveness, secondary effects, and cost.

CAPCOA will provide a supplement to its report in 2009, with a summary of new developments in CEQA review of GHG, including policies and thresholds adopted since the original report, advances in methods and tools, and innovative strategies to mitigate impacts. Readers interested in additional information about mitigating emissions of GHGs from projects subject to CEQA are encouraged review CAPCOA's report and the 2009 supplement. Readers should also keep in mind that many of the mitigation strategies that are summarized in the CAPCOA report can be implemented even if there is no project subject to CEQA review, on a voluntary basis.

Finally, as discussed in Chapter 2, on April 13, 2009, the Governor's Office of Planning and Research recommended CEQA Guidelines changes to the Secretary of Natural Resources. The proposed changes include a new section that specifies that previously established standards of mitigation apply to GHG emissions. They also address the use of General Plans to streamline mitigation requirements, and specify that in order to use this approach, the General Plan must be specific enough in its treatment of the project type in an actual measure. The OPR package also proposes revisions to Appendix F that contain specific energy efficiency measures that may reduce GHG emissions.

Reducing Emissions through Planning

Historic & Projected Urbanization
Source: Climate Action Team draft 2009 Report to the Governor & Legislature

Transportation and energy use account for most of the emissions of GHGs. In order to achieve substantial and lasting reductions in these emissions, we need technological advances and we need policy advances. On the technology front, development alternative energy sources and low carbon fuels, more efficient vehicles and products that use less energy, and mechanisms to recover energy lost without beneficial work, or to capture and sequester or destroy emissions, will make a significant cut in the GHGs emitted by living and working in our world as we do now. But that is not enough to avoid the worst impacts of global climate change. We also need innovative policies that change the patterns of our lives to produce fewer GHGs. This means creating communities that are designed to decrease the use of single occupancy vehicle travel, to encourage the use of local products, and to minimize waste. The key to creating these communities is the General Plan.

Powerful forces and competing needs have combined to create the land use patterns we see today across California. It is neither quick nor easy to change these patterns, and

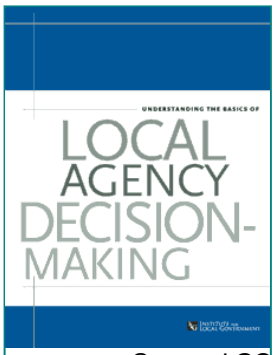
there are significant obstacles to overcome. Funding is one of the obstacles. In the Scoping Plan, ARB commits to work with other State agencies and with local governments to secure funding to support the planning needed to achieve real changes. Another obstacle is the uncertainty about outcome. Notwithstanding such obstacles, some local governments have moved forward with creative planning that has revitalized the urban core zones in their areas with transit-oriented, mixed-use, high-density development of brownfield sites. The results are vibrant, livable, walkable communities where local residents work, shop, and play, and which attract visitors and bring economic vitality along with quality of life. Examples can be seen in both urban settings such as Sacramento, as well as in suburban areas like Fruitvale in the San Francisco East Bay, and even more rural settings, such as Petaluma and Windsor in Sonoma County. By encouraging more of these models of sustainable design, we can demonstrate that they are not only feasible, but successful. In its Scoping Plan, ARB suggests that one possible use of revenue from the auction of credits in a cap and trade system, or from carbon fees, would be to provide incentives for sustainable land use design. Opportunities to support sustainable planning should be cultivated, to ensure that the most successful approaches are recognized and replicated.

The planning that local governments undertake, namely the General Plan, and any specific Area Plans or Climate Action Plans, can form the basis for thoughtful and effective actions to reduce GHG emissions from local activities. When this planning is undertaken in concert with broader regional planning, such as “Blueprint” planning, regional transportation planning, and air quality planning, the impact of GHG reduction efforts is multiplied many times. Chapter 4 discusses the role of these planning efforts, and how they interrelate to effectively respond to the challenge of climate protection.

Introduction

The commitment to reduce GHG emissions under AB 32, in and of itself, highlights the importance of effective long-term planning by local government to minimize GHG produced by land use and transportation patterns, use of natural resources, and the built environment. When it is considered together with the newly approved changes to regional transportation planning under SB 375, there is an overwhelming call to enhance our planning efforts and remake our communities so that they are sustainable, and sustaining. We have the tools to accomplish this, and now we have a substantial statutory underpinning to support the effort.

There are several key planning approaches a local agency can rely on to address climate protection goals. The intersection of AB 32 and SB 375 will result in regional GHG reduction targets in most metropolitan areas, with accompanying regional planning. This effort will be most effective if local governments support and reflect GHG reduction policies in their own local planning efforts. Local governments can also adopt separate Climate Action Plans that focus on an overarching commitment to greenhouse gas emissions reduction, and set forth the specific policies and mechanisms to achieve that reduction. Jurisdictions can incorporate climate protection goals into their General Plans, either through a stand-alone element or by integrating into existing elements. They can also rely on, draw from, and align with the measures in other regional plans, including "Blueprint" plans, air quality plans, and transportation plans. These options are not mutually exclusive; in fact, they will provide the most robust reductions in greenhouse gases if they are implemented in concert, with careful attention to coordination of goals and optimizing limited resources. An added benefit of a more comprehensive approach is the potential to simplify the administrative process associated with review of projects under CEQA, while ensuring the highest standard of environmental protection.



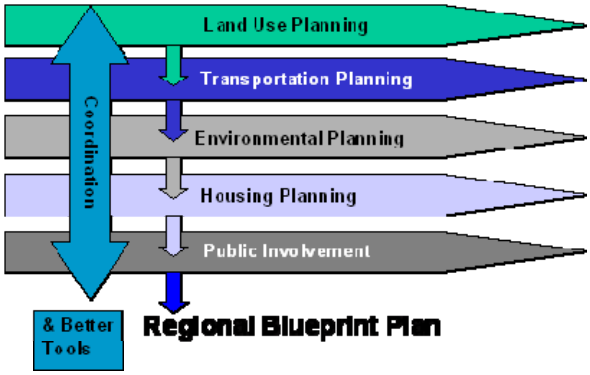
Source: LGC

Finally, as this coordinated planning effort moves forward it is important not to lose sight of the potential for unintended consequences, and to ensure a mechanism to review progress and outcomes, and to ensure those consequences, specifically any that would harm environmental justice goals, are addressed with prompt, mid-course corrections.

Regional Targets and Planning

Recent studies with models of land use and transportation related emissions show that improved planning and design can reduce GHG from this sector by a significant amount. In the near term, that is by 2020, the emission reductions are relatively modest, on the order of 4% from the business-as-usual scenario. But because the benefits from these types of improvements accrue incrementally over time, as new planning policies are implemented and transportation patterns and habits change in response, the emission

reductions in out years are much greater. By 2030, reductions are projected to double, and by 2050, could be as much as 18%.



Source: www.fhwa.dot.gov

In order to actually achieve these reductions, air quality, land use, and transportation planning will need to be integrated regionally. These efforts have already begun in several large metropolitan areas, using a "Blueprint" planning model. This model allows the cities and counties within the region to collectively select future growth scenarios for land use and transportation that lead to more sustainable communities and cleaner air, including fewer emissions of GHGs. The plans are developed through a public process and provide for local accountability. Each jurisdiction incorporates the agreed-upon growth scenario into its General Plan. The success of the effort depends on the robustness of the Blueprint plan, the faithful incorporation into each General Plan, and on each jurisdiction making project-level decisions that are consistent with its General Plan. It is important to point out here that the planning needs to be highly specific and consider a number of important factors, including (but certainly not limited to) where current jobs, housing, and transportation infrastructure are placed, and the relationship of those things to the residents the project is intended to serve. While "high density" development is generally considered a product of "good" planning, if it is the wrong project, in the wrong place – that is, if it is implemented without consideration of all of the elements that contribute to the current pattern of land use and transportation – that high density project could actually exacerbate existing problems.

Recognizing the potential for long-term, durable reductions, ARB has proposed to establish regional GHG emission reduction targets. According to the Scoping Plan, ARB envisions a regional planning process that will: (1) Use integrated scenario modeling to align regional transportation plans and local General Plans; (2) Take into consideration other State policy goals; (3) Incorporate performance indicators to monitor progress; (4) Coordinate local and regional planning efforts to achieve maximum emission reductions; and (5) Establish priorities for and direct State resources to help local and regional governments meet the regional GHG targets.

As discussed in Chapter 2 of this report, SB 375 (Steinberg) establishes a statutory framework for this integrated regional planning approach. The Steinberg bill requires that ARB assign regional GHG reduction targets to specified metropolitan areas. Among other things, the bill also provides that ARB must approve the emission reduction quantification that underpins the Sustainable Communities Strategy (SCS) developed by these regions, or their alternate plan that contains additional reduction measures if the primary strategy fails to meet the assigned targets.

Under SB 375, the ARB is not given the authority or responsibility to determine the land use and transportation policies for any given region, nor is the regional planning body (the MPO) given any specific land use authority under SB 375. Land use decisions are still vested in the local city or county government. Because the SCS is part of the Regional Transportation Plan, however, and because SB 375 requires that funding allocated under the RTP be consistent with the programmatic and policy elements of the RTP, the bill essentially ties transportation funding for the RTP to implementation of the SCS policies.

Another important clarification is that the Alternate Plan is not part of the RTP, and therefore transportation funding is not linked to implementation of this plan. In order to incentivize its implementation, the bill provides exemptions from certain CEQA review requirements for projects consistent with SCS and ACS that achieve the regional target reductions in GHG emissions, as approved by ARB.

Finally, while there is material overlap between the policies that will be embodied in the regional SCS and the GHG reductions from measures in the city or county's General Plan or Climate Action Plan, they are not the same. The SCS is a transportation driven strategy, whereas the General Plan and the Climate Action Plan address other important opportunities for GHG reduction in addition to transportation. In the best case, the measures in the SCS will be reflected in and complemented by the measures in the General Plan and the Climate Action Plan.

Source: www.sacregionblueprint.org

Climate Action Plans and Commitments

In the Scoping Plan, ARB recognizes the value of local Climate Action Plans and commitments to reduce GHG emissions. Climate Action Plans provide an overarching policy direction for local governments committed to reducing GHG emissions within their jurisdictions. Many areas have

already established these plans; examples and references are included in Appendix G.

An effective Climate Action Plan will have several core elements, including an inventory of emissions, a target for reductions, timeframes, milestones, and tracking and accountability mechanisms, and strategies for achieving the reductions. First, as its foundation, the Plan will rely on a complete inventory of GHG emissions in what will become the Plan's base year. Although AB 32 identifies 1990 as a base year for California, most local jurisdictions do not have the underlying data necessary to establish GHG emissions in 1990. Rather than approximate emissions in that year, local governments are better served by selecting a year for which they have complete and accurate data on energy use, vehicle miles traveled, and other key parameters that affect GHG emissions. In selecting the year, it is helpful to also choose a year that is not heavily influenced by an unusual event or circumstance.

The inventory should include GHG emissions from three aspects of the local jurisdiction. There are emissions that result directly from local government operations, emissions associated with local government policies and decisions, and emissions from the community within the jurisdiction. Working with ICLEI and CCAR, ARB has adopted a reporting protocol for local government operations' GHG emissions. Information on calculating emissions associated with policies and decisions (essentially, land use and transportation emissions, as well as other sectors address in the General Plan) can be found in the CAPCOA report, *CEQA and Climate Change*, in the section on Analytical Methodologies. ARB is currently developing a reporting protocol for local communities, as well as a "Local Government Toolkit" which is available at www.coolcalifornia.org. Examples of Climate Action Plans that have baseline inventories are provided in Appendix G. There are also businesses and organizations that provide consulting services in this area.

In choosing emission reduction targets, the jurisdiction should consider the statewide GHG reduction targets, any assigned regional targets, and what is feasible for the jurisdiction to achieve. ARB has estimated that reductions of 28% from business-as-usual are needed on a statewide basis to reach the goals of AB 32. But the business-as-usual scenario may be difficult for a local jurisdiction to calculate. If the goals of AB 32 are presented as a reduction from the average statewide GHG emissions between 2002 and 2004, a reduction of almost 10% is needed. If a local government can establish a baseline looking at average annual emissions between 2002 and 2004, a reduction target to reduce the total GHG emissions from the jurisdiction by 10% by 2020 would be

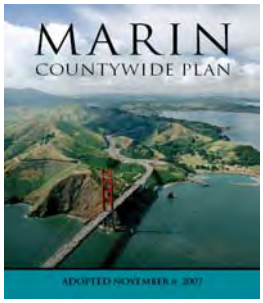
consistent with AB 32. While 10% may not sound like a large number, it is important to remember that the current trend is one of significant emissions growth. Regional targets for metropolitan areas will be developed and assigned pursuant to SB 375. Local feasibility will need to be assessed based on the jurisdiction's inventory and in consideration of local input through a public process.

AB 32 provides a fairly straightforward timeframe for achieving reductions in GHG emissions. Areas that adopted Climate Action Plans before the passage of AB 32 may have identified other deadlines for reaching their targets. For those areas, it may be useful to review their reduction targets and deadlines to ensure that the local commitments are consistent with statewide goals to the extent feasible. In addition to overall deadlines, however, intermediate milestones are important, and the Plan should specify mechanisms to measure progress, as well as make midcourse corrections if reductions are not being realized as anticipated. Milestones can be based on actual reductions in GHG, but because some analysis is needed to determine GHG emissions and reductions, there should also be performance milestones that reflect progress implementing plan elements.

Climate Protection in General Plans

Whether or not a local government adopts a Climate Action Plan, its General Plan should address climate change, its potential impacts, and local contributions to the problem. The Governor's Office of Planning and Research (OPR) is preparing guidance on this, which will be forwarded to the California Resources Agency for formal adoption. In addition, the California Attorney General has challenged the EIRs for General Plans that have failed to address climate change. Policies to mitigate climate change should be incorporated into the General Plan either within existing elements, or in a separate Greenhouse Gas Reduction element.

Incorporating Policies into Existing General Plan Elements- Existing General Plans will invariably contain policies (and any associated goals, objectives, policies, standards and implementation measures) that help to reduce GHG emissions. However, they are just as likely to contain policies that work against that goal. There are opportunities to strengthen existing General Plan policies and/or incorporate new policies that reduce emissions. Several options exist for integrating additional policies, including the three discussed below.



Policies may be incorporated into a jurisdiction's existing General Plan elements through a General Plan amendment. In this scenario, no additional elements would be necessary. Identifying existing policies in each General Plan element that already do or could help reduce GHG emissions would be a critical first step in assessing the type and nature of new policies needed. Categorizing existing helpful policies by their function would greatly aid this assessment; the following are important categories to include: land use, circulation, energy efficiency, alternative energy, municipal operations, waste reduction, conservation, and education. Incorporation of these policies should include a comprehensive review of all elements of

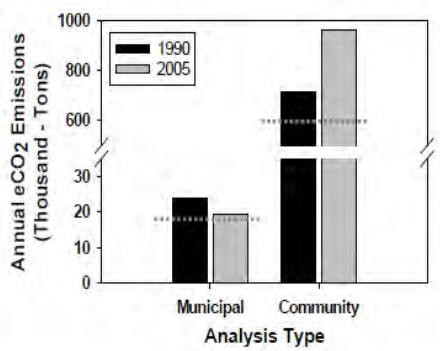
the General Plan to ensure that conflicting policies are eliminated as part of the amendment, in the interest of maintaining internal consistency.

Creating a Climate Change Element- A new climate change element could be added as an amendment to an existing General Plan. This should again be accompanied by a comprehensive review of the General Plan to identify and revise or eliminate conflicting policies. The element could include an introduction about climate change, a GHG inventory if feasible, and new and existing policies organized into the following categories: land use, circulation, energy efficiency, alternative energy, municipal operations, waste reduction, conservation, and education. These three main components of a climate change element are discussed further below.

The Introduction*:* The introduction should provide descriptive background information on climate change and its impacts to inform the reader on the issue and the need for incorporating new General Plan policies to reduce GHG emissions. Information needed for the introduction can be found in the first chapter in this report, as well as in Appendix D. Additional information is available from the Air Resources Board (www.arb.ca.gov), the Energy Commission (www.energy.ca.gov) the Climate Action Team (www.climatechange.ca.gov), and the National Academies of Science, Division of Earth and Life Science (www.dels.nas.edu/dels/).

The GHG Inventory*:* As described for Climate Action Plans, above, a greenhouse gas inventory is an important tool for establishing a baseline of existing emissions within the jurisdiction. This will greatly aid the process of determining the type, scope and number of GHG reduction policies to be included, particularly in the context of meeting regional GHG targets; it will also facilitate tracking of policy implementation and effectiveness. GHG inventories for local jurisdictions typically consist of two distinct components: one for the city/county as a whole defined by its geographical borders, and the second for emissions resulting from the city/county's municipal operations.

Fig. 18: Example Display of Municipal & Community Emissions

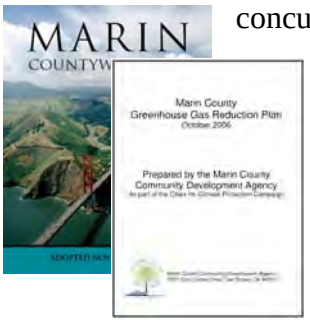


The municipal inventory would effectively be a subset of the community-scale inventory (the two are not mutually exclusive). Preparing an inventory is not required in order to incorporate General Plan policies that reduce GHG emissions, but it's highly advisable and is a critical component of any Climate Action Plan. The inventory may be included as an appendix to the General Plan. Figure 18 shows municipal and community emissions as calculated for the City of Chula Vista.

Objectives and Policies*:* As mentioned above, identifying existing General Plan objectives and policies that could or do reduce GHG emissions and categorizing them appropriately is a key step in determining what new policies may be needed to achieve established GHG reduction goals. The following eight category designations are recommended for this purpose: land use, circulation, energy efficiency, alternative energy, municipal operations, waste reduction, conservation, and education. These categories help associate the identified policies with how the reductions are achieved and indicate which General Plan element would contain related policies. Figure 19 shows how reductions in different categories add together to reach the overall target. The new objectives and policies developed for inclusion in this element would also be categorized in the same fashion, with the document structure similar to the other elements in the existing General Plan. Including a matrix or table of all the new and existing/revised policies in the element and the categories under which they fall is a helpful tool in developing implementation mechanisms.

Preparing a Climate Action Plan and Updating the General Plan

A jurisdiction may prepare a Climate Action Plan (CAP) prior to a General Plan update, concurrently with a General Plan update, or following a General Plan update. As described above, the Climate Action Plan would: provide background information on the causes of climate change and projections of its impacts on California and the jurisdiction; present estimates of the jurisdiction's baseline greenhouse gas emissions inventory and reduction target; describe recommended emission reduction actions in the key target sectors; and, identify next steps required over the near term to implement the plan.



Preparation of a CAP prior to updating the General Plan would provide much of the information needed to incorporate appropriate GHG reduction policies into the update. That may not be feasible, however, and is not essential to the preparation of an effective General Plan update with sufficient climate protection measures. However, developing a CAP subsequent to completing the General Plan update may necessitate further revision of the General Plan to provide a general policy basis for the CAP actions.

Coordination with Other Regional Plans

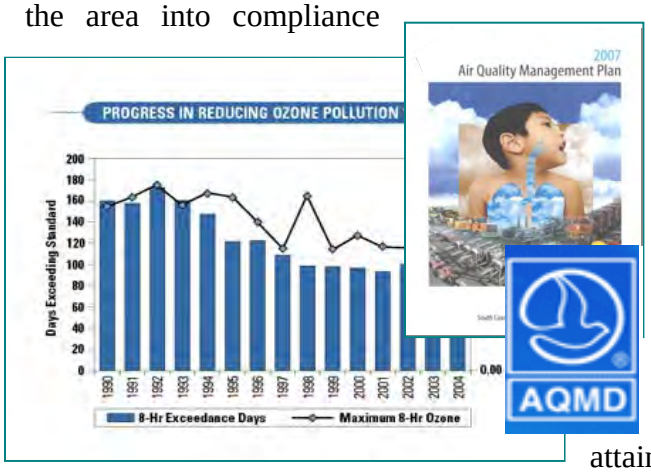
Coordination with regional blueprint plans, regional transportation plans and air district attainment plans, is critical to ensuring the measures within each plan support and do not conflict with the other plans, and that they are working together to reduce GHG emissions. Communication and coordination can improve effectiveness and reduce costs.

Association of Bay Area Governments
Bay Area Air Quality Management District
Bay Conservation and Development Commission
Metropolitan Transportation Commission

Coordination with Blueprint Plans: As discussed above, the AB 32 Draft Scoping Plan encourages local governments to incorporate regional "blueprint plans" into their General Plans. Blueprint plans are envisioned as regional guidance for land use decision-making that would be adopted by the applicable Regional Transportation Planning Agency or Metropolitan Planning Organization. Each regional blueprint would establish recommended land use patterns, transportation systems, and transportation investments to reduce GHG emissions, as well as other air pollutants and congestion within the defined region. The Proposed Scoping Plan does not identify specific mandates for General Plans, but recommends incentives for promoting consistency with one another, such as CEQA streamlining. Cities and counties should take an active part in drafting the blueprint plans through cooperation with the Regional Transportation Planning Agency or Metropolitan Planning Organization so that the plans reflect the cities' and counties' approaches to GHG emissions reductions.

Coordination with Air Quality Management Plans: California has 35 air pollution control districts (APCDs) and air quality management districts (AQMDs), each covering one or more counties. Air districts are governed by locally elected officials (or individuals appointed by locally elected officials) and have regulatory control over stationary sources of air pollutants such as industrial and manufacturing facilities. They are also responsible under CEQA for evaluating and recommending appropriate mitigation for air quality impacts of new development. Air districts also administer a variety of incentive programs to reduce emissions from diesel equipment, including engines, trucks, construction equipment, commercial vessels and other local emission sources.

Air quality attainment plans are prepared by an air pollution control district or air quality management district for a county or region designated as a nonattainment area. The plans identify the control measures and market mechanisms that will be implemented to bring the area into compliance with the national and /or California ambient air quality standards within a specified timeframe. There are often policies, regulations, and programs within an attainment plan that may affect or influence local government activities. Participation by jurisdictions in the public review process required prior to adoption of an attainment plan is important to ensure all the planning efforts work together in achieving mutual goals. The local attainment plan can also be an important resource for jurisdictions embarking on GHG planning efforts. Many of the GHG



reduction strategies also reduce other air pollutants, and may therefore already be addressed in the local attainment plan, which can then be a starting point from which to expand the GHG plan. Even if the attainment plan does not contain some of the measures where there is overlap, coordination is important to determine how the two plans will impact each other, and if there are efficiencies, synergies, or even disbenefits between them. For this reason, it is important to contact your local air district when embarking on your GHG Plan.

Coordination with Regional Transportation Plans: The Regional Transportation Plan (RTP) is a long-term blueprint of a region's transportation system. These plans are normally the product of recommendations and studies carried out and put forth by a Metropolitan Planning Organization (MPO) or Regional Transportation Planning Agency (RTPA). The Plan identifies and analyzes the mobility needs of the metropolitan region and creates a framework for prioritizing and funding transportation projects to meet those needs during the timeframe of the plan. RTPs are typically updated every four to five years and have a twenty to thirty year planning horizon.

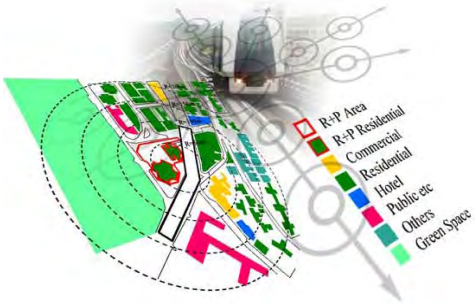
In developing the RTP, the MPO or RTPA must analyze population and growth trends and projections, regional land use and development patterns, existing transportation system efficiency for travel and goods movement, and the projected funding available to accomplish needed improvements. Thus, the MPO or RTPA must coordinate closely with local governments to ensure the RTP reflects the growth and development expectations of local General Plans. The adopted RTP must also be consistent with federal transportation planning requirements, and the projected emissions from transportation projects listed in the Plan must be incorporated into the local or regional air quality attainment plan.

As described in Chapter 2 and at the beginning of this chapter, SB 375 requires RTPs to also contain a Sustainable Communities Strategy and (if needed) an Alternative Planning Strategy designed to meet the regional GHG reduction targets established by ARB. Although the legislation does not require local governments to incorporate the SCS into its own local planning efforts, there are strong incentives to do so.

CEQA Streamlining

The previous discussion of SB 375 outlined specific CEQA streamlining it affords. Even greater streamlining is possible, however, when the local government has adopted a Climate Action Plan, used it as the basis for addressing climate change in its General Plan, and made sure that those efforts reflect, to the extent possible, regional reduction targets and planning for transportation sustainability. When done in a thoughtful and comprehensive way, this integrated planning effort will yield a robust GHG mitigation

strategy with a programmatic EIR that, applied consistently to individual projects, can significantly reduce the procedural and administrative burden of review under CEQA, while ensuring full environmental protection.



The degree to which CEQA requirements can be streamlined will be directly proportional to the specificity of the applicable plans, and the extent to which they are consistent with each other. For example, the exemptions and streamlining under SB 375 generally rely upon the quantitative demonstration that the SCS/APS meets the regional target, and the existence of approved mitigation measures for transportation projects. In order to demonstrate that the target is met, the transportation models will require more detailed information about demand, use patterns, and other specific factors than is typically used in RTPs today. Some of this detail will have to come from local land use patterns and growth commitments. If the coordination between the local and regional plans is poor, the data will either not be available or will be conflicting, which will render the demonstration unapprovable.

The opportunity for CEQA streamlining also calls for greater specificity in the General Plan. For example, by including a "Green List" of projects in the plan and conducting the environmental review of the projects upfront, the local government can provide downstream relief from further review. This saves resources while preserving environmental protection, and it also enhances the viability of desirable projects.

The application of CEQA to a ubiquitous pollutant with such serious global impacts has raised a number of difficult policy questions, not the least of which concerns the appropriate basis for establishing a threshold of significance. Without engaging in a discussion of the various arguments here, it should be pointed out that the debate can be substantially minimized by undertaking a more thorough and coordinated planning effort upfront and limiting the involvement with CEQA for specific projects.

Unintended Consequences and Assuring Environmental Justice

Many of the measures that will be implemented to reduce GHG emissions will have co-benefits reducing criteria and toxic air pollution, and others are specifically designed to enhance the livability of local communities. But sometimes there are conflicts instead of co-benefits, and sometimes changes to communities can adversely affect some groups within the community, especially those who have lower incomes or are people of color. This kind of unintended consequence should be avoided.

A first step in avoiding environmental justice impacts is to actively seek and incorporate participation from all sectors of the community. This should include outreach efforts in

non-traditional as well as traditional media, and may rely on local advocacy groups, and religious and civic organizations. Where languages other than English are used, efforts should be made to provide information and materials in the language(s) most used. The goal of these outreach efforts is true communication, which is two-way. When done successfully, the agency will have explained what it is proposing and what the expected impacts are, and the community members will not only understand those things, but will have the opportunity to have their suggestions and concerns heard and addressed.

In addition to the existing mechanisms for tracking progress towards the goals of a plan or group of plans, it is important to establish a process and a schedule to review the impacts of implementation and especially to look for unintended and potentially adverse outcomes. This review should also include communication with the community. In the unfortunate, and hopefully rare situation where unintended and potentially adverse outcomes are found, steps should be taken to eliminate or mitigate those outcomes right away.

Although addressing climate change is a very important goal, it is not the only goal, and in certain circumstances it is expressly not the goal that governs. Specifically, AB 32 clearly states that climate protection will not come at the expense of air quality and public health protection. In addition, California law guarantees equal environmental protection to all Californians regardless of income status or ethnic background.

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The General Plan is the gateway to transforming our communities into more efficient, low-carbon, sustainable, vital places for us, our families, and our neighbors to live, work, and play. It is within this framework that the web of interactions between policies can be examined and aligned to produce the world we want for our future. The remainder of this report is devoted to exploring the General Plan process and ways to maximize its effectiveness for reducing GHG emissions and lessening the impact of climate change. This chapter discusses legal requirements for General Plans in California and their relation to potential new goals, objectives, policies, and implementation mechanisms to reduce GHG emissions. The General Plan requirements are set out in Section 65300 et seq. of the California Government.

Introduction

Every city and county must adopt "a comprehensive, long term General Plan" (§65300). The General Plan must cover a local jurisdiction's entire planning area and address the broad range of issues associated with a city's or county's development. The General Plan includes diagrams that illustrate the distribution of land uses, location of hazards, and location of the traffic circulation system. A city or county General Plan is expected to reflect local conditions and circumstances, while meeting the minimum requirements set out in state law (§65300.7).

These requirements are discussed in detail in the *General Plan Guidelines* issued by the Governor's Office of Planning and Research, which offers advisory, not mandatory, suggestions for the content of General Plans. In a broad sense, a General Plan is made up of text describing goals, objectives, policies, standards, and/or implementation measures, as well as a set of maps and diagrams. Together, these constituent parts paint a picture of the community's future development. In framing the model policies set forth in Chapter 6 of this report, CAPCOA used the following framework of goals, objectives, policies, standards, and implementation measures:

- Goal - A goal is a general direction for the jurisdiction. It is an ideal future end related to health, safety, or general welfare. "The General Plan shall consist of a statement of development policies and shall include a diagram or diagrams and text setting forth objectives, principles, standards, and plan proposals." (§65302) A goal is a general expression of community values and, therefore, may be abstract in nature and is generally not quantified or time-dependent. *Example: The County shall reduce its greenhouse gas emissions consistent with state and federal planning to reduce the scale and intensity of climate change effects on the County, the state, and the planet.*

- Objective - An objective is a specified end. It should be achievable, measurable and time-specific. An objective may pertain to one particular aspect of a goal or it may be one of several successive steps toward goal achievement. Consequently, there may be more than one objective for each goal. *Example: The County shall reduce its greenhouse gas emissions by 30 percent relative to business as usual emissions projected for year 2020.*

- Policy - A policy is a specific statement that guides decision-making. It indicates a commitment of the local legislative body to a particular course of action. A policy is based on and helps implement a General Plan's objectives. *Example: The County shall require new residential and commercial buildings to be energy-efficient in order to reduce greenhouse gas emissions.*

- Standards - A standard is a rule or measure establishing a level of quality or quantity that must be complied with or satisfied. Standards define the abstract terms of objectives and policies with concrete specifications. *Example: All new residential buildings shall achieve a minimum of 50 points on the Greenpoints rating system and all new commercial buildings shall achieve a minimum standard of LEED certification.*

- Implementation Measures - An implementation measure is an action, procedure, program, or technique that carries out General Plan policy. The General Plan is a policy document and is implemented by other governmental regulations and actions. Many General Plans include at least one corresponding implementation measure for each policy. *Example: The County shall establish a Green Building Ordinance that includes minimum requirements for residential and commercial energy efficiency within 24 months of adoption of the General Plan.*

Consistency

The overriding legal requirement for a General Plan is that it be internally consistent. "In construing the provisions of this article, the Legislature intends that the General Plan and elements and parts thereof comprise an integrated, internally consistent and compatible statement of policies for the adopting agency." (§65300.5). This requirement will come into play as GHG reducing measures are introduced into a General Plan, because so many of the measures cut across elements. So, for example, a land use policy supporting pedestrian-friendly streetscapes in a neighborhood center must be aligned with the transportation measures affecting that same neighborhood center, to ensure that they are compatible. If the transportation measures called for the removal of a planted median strip and the addition of traffic lanes through the neighborhood center, the elements would not be internally consistent.
Consistency is evaluated in five ways:

- All elements are equal - No element can supersede other elements or be the "default" element for resolution of conflicts between General Plan policies.

- Consistency between elements – The requirements of one element may not conflict with the requirements nor hinder the furtherance of goals and objectives of another element.

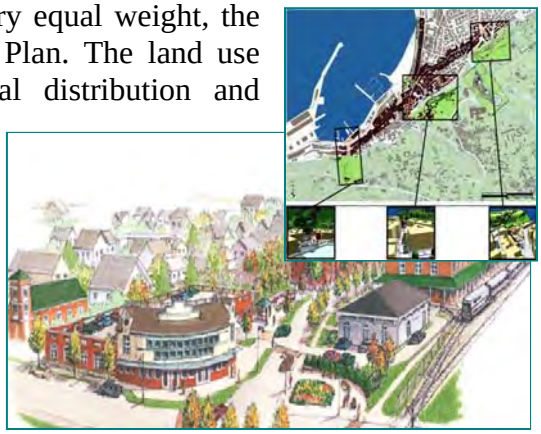
- Consistency within elements – Each element must be internally consistent between its various goals, objectives, and policies.

- Area Plan Consistency – If the General Plan includes Community or Area Plans, those must also be consistent with the overall General Plan.

- Text/Diagram consistency - Diagrams must be consistent with the General Plan's text and vice-versa.

GHG Reduction Opportunities in General Plan Mandatory Elements

Land Use Element



Although all elements of the General Plan carry equal weight, the land use element is the heart of the General Plan. The land use element must address the "proposed general distribution and general location and extent of the uses of the land for housing, business, industry, open space, including agriculture, natural resources, recreation, and enjoyment of scenic beauty, education, public buildings and grounds, solid and liquid waste disposal facilities, and other categories of public and private uses of land" (§65302[a]). The land use element shall include a statement of the standards of population density and building intensity recommended for the various districts and other territory covered by the plan. In addition, the land use element must identify and annually review those areas covered by the plan that are subject to flooding.

The land use element should, consistent with §65302(a), address each of the following issues to the extent that it is relevant:

- Distribution of housing, business, and industry;

- Distribution of open space, including agricultural land;

- Distribution of mineral resources and provisions for their continued availability;

- Distribution of recreation facilities and opportunities;
- Location of educational facilities;
- Location of public buildings and grounds;
- Location of future solid and liquid waste facilities;
- Identify areas subject to flooding;
- Identify existing Timberland Preserve Zone lands; and
- Other categories of public and private uses of land.

The key opportunities in the land use element related to GHG reductions include:

- Foster land use intensity near, along with connectivity to, retail and employment centers and services to reduce vehicle miles travelled and increase the efficiency of delivery of services through adoption and implementation of smart growth principles and policies;
- Improve the local jobs/housing balance to reduce vehicle miles travelled;
- Zone for appropriate mixed use development to encourage walking and bicycling for short trips, rather than vehicles;
- Link residential and commercial development to transit facilities;
- Reduce parking requirements to facilitate higher density development that fosters access by walking, biking and public transit;
- Identify potential sites for renewable energy facilities and transmission lines;
- Promote recycling to reduce waste and energy consumption; and
- Identify appropriate sites for waste recovery facilities to minimize escape of GHGs.

Conservation Element

Generally stated, the conservation element must address "the conservation, development, and utilization of natural resources including water and its hydraulic force, forests, soils, rivers and other waters, harbors, fisheries, wildlife, minerals, and other natural resources" (§65302[d]). This

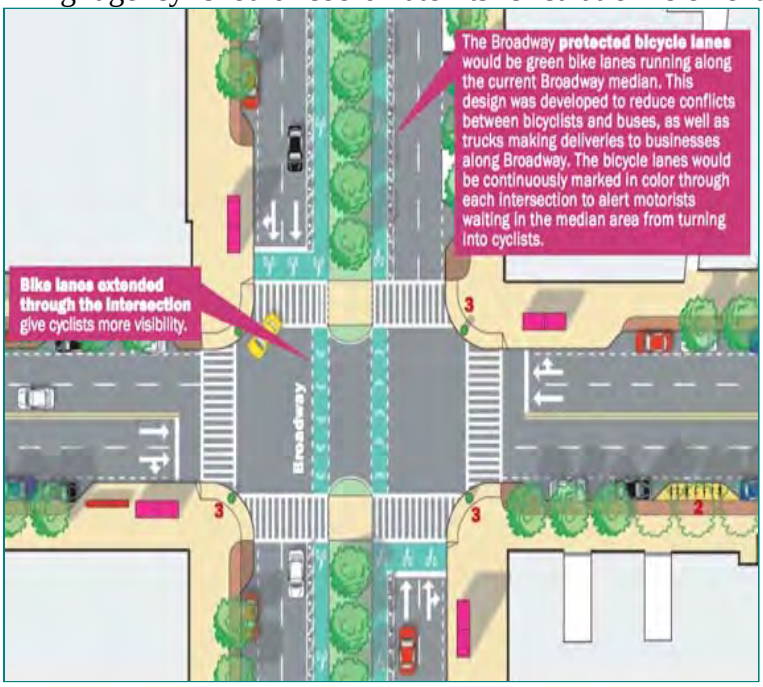
includes, but is not limited to, consideration of water supply to meet future needs, flood protection, the effects of development on water resources, erosion control, pollution prevention, and watershed protection.

The key opportunities in the conservation element related to GHG reductions include:

- Conserve natural lands for carbon sequestration;
- Identify lands suitable for wind power generation;
- Conserve water to promote energy efficiency;
- Promote recycling and waste recovery; and
- Promote urban forestry and reforestation as feasible.

Circulation Element

The circulation element is required "to identify the general location and extent of existing and proposed major thoroughfares, transportation routes, terminals, any military airports and ports, and other local public utilities and facilities, all correlated with the land use element of the plan" (§65302[b]). Typically, the circulation element describes the road system and its minimum development standards, as well as provisions for non-motorized transportation. The local planning agency should coordinate its circulation element provisions with applicable state and regional transportation plans (see §65103[f] and §65080, et seq.). Likewise, the state must coordinate its plans with those of local governments (§65080(a)). The federal government is under a similar obligation (Title 23 USC §134). If the circulation element is to be an effective basis for exactions, it must be based upon traffic studies that are sufficiently detailed to link land uses and related demand to future dedications.



The circulation element's policies can be a means of reducing vehicle miles traveled, a substantial indicator of GHG production from transportation. Key opportunities in the circulation element related to GHG reductions include:

- Identify and prioritize infrastructure improvements needed to support increased use of alternatives to private vehicle travel, including transit, bicycle, and pedestrian modes;
- Coordinate with adjacent municipalities, transit providers, and regional transportation planning agencies to develop mutual policies and funding mechanisms to increase the use of alternative transportation;
- Establish higher priorities for transit funding relative to street and road construction and maintenance;
- Incorporate "Complete Streets" policies that foster equal access by all users, including pedestrians and bicyclists;
- Promote linkages between development locations and transportation facilities;
- Preserve transportation corridors for renewable energy transmission and for new transit lines;
- Identify appropriate locations for intermodal transportation stations; and
- Identify opportunities, in cooperation with transit providers, to provide financing for transit operations and maintenance.

Open Space Element

The open space element is to identify open space for: (1) the preservation of natural resources; (2) the managed production of resources, including but not limited to, forest lands, rangeland, agricultural lands, areas required for recharge of groundwater basins, bays, estuaries, marshes, rivers and streams, and areas containing major mineral deposits; (3) outdoor recreation, including but not limited to, areas of outstanding scenic, historic and cultural value, areas particularly suited for park and recreation purposes, including access to lakeshores, beaches, and rivers and streams; and areas that link major recreation and open-space reservations; (4) for public health and safety; (5) open space in support of the mission of military installations, that comprises areas adjacent to military installations, military training routes, and underlying restricted airspace that can provide additional buffer zones to military activities and complement the resource values of the military lands; and (6) for

the protection of places, features, and objects of cultural value to Native American tribes (§65560).

The key opportunities in the open space element related to GHG reductions include:

- Identify existing and potential future urban growth boundaries to limit sprawling development patterns and foster a more compact urban form;
- Conserve natural lands for carbon sequestration; and
- Promote trail systems to facilitate bicycle and pedestrian trips in lieu of vehicle travel.

Housing Element

A General Plan is required to include a housing element "that facilitate[s] the improvement and development of housing to make adequate provision for the housing needs of all economic segments of the community" (§65580[d]). The housing element must provide opportunities for the private and public sectors to develop sufficient housing meet the jurisdiction's allocated share of the region's housing needs. Unlike the other elements of the General Plan, the housing element requirements are quite detailed and must be followed carefully. In addition, the housing element is subject to review by the state's Housing and Community Development Department for consistency with state law. The housing element must be updated every five years.

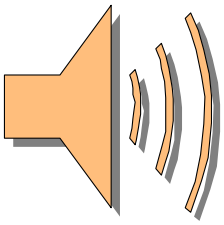
The key opportunities and constraints in the housing element related to GHG reductions include:

- Identify sites for higher density housing closer to employment centers, retail and services, and transit facilities;
- Identify sites for affordable housing for workers close to employment centers;
- Establish or support programs to assist in the energy-efficient retrofitting of older affordable housing units; and
- Balance additional upfront costs for energy efficiency and affordable housing economic considerations by providing or supporting programs to finance energy-efficient housing.

Noise Element

The noise element must identify and appraise noise problems in the community for the purpose of avoiding conflicts with noise-sensitive land uses (§65302[f]).

The noise element does not contain any measures that directly reduce GHG emissions. However, some of the potential GHG reduction strategies in other elements such as increased residential density, mixed use, expanded transit services, and wind energy could adversely affect the noise environment, which would be an issue for the noise element to address. The noise element's development standards may need to be strengthened to ensure that higher densities and mixed uses avoid excessive noise exposure for residents. At the same time, some GHG reduction strategies, for example, those that increase energy efficiency by adding insulation, may have a positive impact on the noise environment.



Safety Element

The safety element is to provide for the protection of the community from any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche (wave), and dam failure; slope instability leading to mudslides and landslides; subsidence, liquefaction, and other seismic hazards, and other geologic hazards known to the legislative body; flooding; and wildland and urban fires (§65302[g]).

With inevitable climate change impacts already occurring and predicted to occur in the future, adaptation to changes in safety hazards, such as potential increase in wildland fire potential or coastal or delta flooding resulting from sea level rise, would be topics of discussion in future safety elements. Adaptation planning for climate change impacts is an important and growing issue area that should be incorporated into local and regional planning processes. As this paper only focuses on GHG reductions, issues related to adaptation are not discussed further.

Air Quality Element (Mandatory Only in the San Joaquin Valley)

Many cities and counties throughout the State have adopted air quality elements. They establish policies for reducing emissions from stationary, mobile, and area sources of air pollution. In most cases, the local air district either provides model elements, or assists the city or county in development of the element. The cities and counties within the jurisdiction of the San Joaquin Valley Air Pollution Control District are required to adopt an air quality element. Under statute, the element is to integrate land use plans, transportation plans, and air quality plans, as well as provide for multimodal transportation options that will reduce vehicle trips (§65302.1). Cities and counties

should contact their local air district when developing an air quality element.

The key opportunities and constraints in an air quality element related to GHG reductions include:

- Integrate land use plans and transportation plans;
- Provide multimodal transportation options;
- Co-benefits of criteria pollutant reduction strategies that also reduce GHG emissions and vice versa; and
- Disbenefits of potential GHG emissions reductions strategies on criteria and other pollutants.

GHG Reduction Opportunities in Non-Mandatory Elements

State planning law authorizes cities and counties to adopt additional elements that "address any other subjects which, in the judgment of the legislative body, relate to the physical development of the county or city" (§65303). There are no statutory requirements for the subjects or content of any of these optional elements. Following are some of the common optional elements. Keep in mind that each city and county has its own definition of what the element should contain.

Energy

A number of cities and counties have adopted energy elements as part of their General Plans. There are no energy element guidelines or standard set of required contents. In some jurisdictions, these elements establish policies for energy extraction. In others, they are concerned with the conservation of energy.

The key opportunities in an energy element related to GHG reductions include:

- Energy-efficiency requirements for residential, commercial, and industrial construction under local jurisdiction that exceed current standards;
- Facilitate residential and commercial renewable energy facilities (solar array installations, individual wind energy generators, etc.);
- Promote cogeneration facilities for combined heating and electricity;
- Facilitate renewable energy facilities and transmission line siting;
- Establish energy-efficiency standards for public facilities;

- Establish policies to reduce municipal and community petroleum consumption through changes in the vehicle fleet; enhancement and promotion of public transit, carpooling and other transportation modes to reduce employee and student commute trips;

- Establish policies to reduce GHG production by city and county operations, such as improved energy efficiency of public buildings, recycling at public buildings.

Economic Development

Economic development elements generally establish policies intended to encourage economic development within the community. These may include establishing incentives for development, identifying areas of greatest development potential, and creating the basis for other economic development activities to be undertaken by the jurisdiction.

The key opportunities in an economic element related to GHG reductions include:

- Incentives for investment in and deployment of renewable energy technologies;

- Incentives for development of local green technology businesses and locally produced green products;

- Incentives for investment in residential and commercial energy efficiency improvements;

- Incentives for employers to provide workforce housing, thereby reducing the length of trips to work;

- Policies to enhance sales tax revenues that promote incorporation of larger retail uses within downtown areas and mixed use developments to facilitate access by alternative transportation, in favor of larger retail or mixed use developments on the urban fringe;

- Establish financing districts (in charter cities) to encourage installation of solar panels and other energy-efficient improvements (e.g., City of Berkeley Solar Financing District, 11/07);

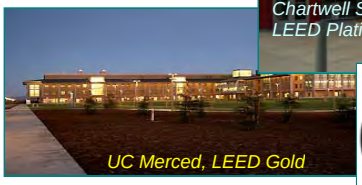
- Encourage implementation of AB 811 (Levine, see Chapter 159, Statutes of 2008), Renewable Energy Resource Credit (7/08), for low interest loans for energy improvements; and

- Use AB 811 to finance the installation of distributed generation renewable energy sources or energy efficiency improvements to lots or parcels which are developed and where the costs and time delays involved in creating an assessment district pursuant to other provisions of law would be prohibitively large relative to the cost of the public improvements to be financed.

Capital Improvements/Public Facilities

Capital improvements are often discussed in the circulation element of the General Plan. However, some cities and counties have adopted separate capital improvements or public facilities elements that discuss expected demand resulting from growth under the General Plan and identify necessary facilities to serve that growth. In some cases, the element will estimate costs and recommend implementation methods for raising the needed funding.

Chartwell School, Seaside, LEED Platinum

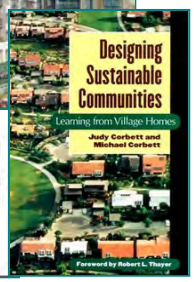

UC Merced, LEED Gold

The key opportunities in a capital improvements/public facilities element related to GHG reductions include:

- Establish energy-efficiency standards for public facilities;
- Promote solar installation opportunities for public facilities;
- Other building design energy and water efficiency standards for public facilities;
- Establish purchasing and procurement policies that support the use of green products and services; and
- Identify needs and funding sources for alternative transportation modes such as bicycle facilities and improved transit infrastructure.

Community Design

Community design elements typically provide a set of policies that promote better urban design. These often include provisions for aesthetic treatments, architectural design guidelines, and preferred street design.



The key opportunities in a community design element related to GHG reductions include:

- Incorporate urban design principles that promote higher residential densities in attractive forms with easily accessible parks and recreation opportunities nearby;

- Use urban design standards to facilitate clustered, higher-density, mixed use communities with greater potential for transit ridership, alternatives to vehicle travel, and shorter trips;

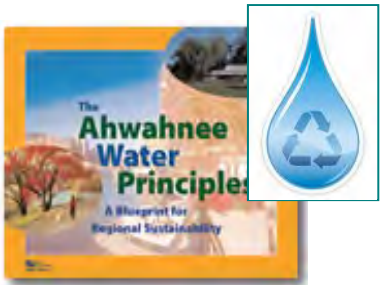
- Establish policies and design principles to incorporate inviting public spaces in high density, mixed use communities;

- Incorporate "Complete Streets" policies that foster equal access by all users, including pedestrians and bicyclists; and

- Promote water-efficient and energy-efficient housing and commercial areas.

Water

A water element typically identifies projected water demand based on the General Plan growth. It describes water supplies within the city or county (most water elements have been adopted by counties) and policies for matching future demand.



Available from: Local Government Commission

The key opportunities in a water element related to GHG reductions include:

- Incorporate water conservation measures for municipal operations and throughout the community to reduce GHG emissions from pumping and water delivery; and

- Adopt policies and standards to facilitate water recycling for use on landscaping, agricultural operations, and other applications where potable water is not required, to reduce pumping-related GHG emissions.

- Because energy used in moving water through the system is a major component of the GHG inventory, include measures that reduce peak demand for water, and therefore allow for smaller pumps that use less energy overall.

Agriculture

Available from: UC Davis Small Farm Center

Agricultural elements typically identify the highest quality farmland within the city or county (most agricultural elements have been adopted by counties) and establish policies that protect that land from premature conversion to other uses. The goals of an agricultural element are usually aimed at preserving the long-term viability of the agricultural economy of the city or county.

The key opportunities in an agricultural element related to GHG reductions include:

- Establishment of minimum parcel sizes for agricultural lands outside of Agricultural Preserves and restrictions on non-agriculture related development and uses on agricultural parcels to enhance the viability of local agriculture and prevent additional sprawl development that increases dependence on and emissions from private vehicles;

- Development of policies and incentives (e.g., carbon credit programs) to promote voluntary preservation of farmland for carbon sink purposes;

- Adoption of policies and programs that facilitate local farmers markets and farmer co-ops that allow residents to purchase local farm goods and reduce emissions from transportation of agricultural products; and

- Support for agricultural industries that reduce the need to move agricultural products long distances for processing or packaging.

- To the extent the agricultural element addresses water use, it should be noted that efficiencies here, or use of alternatives, can provide substantial GHG reductions.

Element Interrelationships

This section discusses the interrelationships between the mandated General Plan elements by identifying the cross-cutting issues for GHG emissions and opportunities for reductions, categorized by each required element. As previously described, a General Plan must be internally consistent across all adopted elements; thus, cross-cutting issues must be evaluated closely to ensure the goals, objectives, policies and implementation measures in one element do not conflict with, or hinder the implementation of, the requirements of other elements. Cross-cutting issues are first identified in a matrix format; those issues are then matched with the critical relationships that must be established across the elements in a General Plan to identify appropriate linkages and enhance internal consistency. Some examples of consistency considerations include the following:

- Density and Transit-Oriented Development – If increased density and transit-oriented development are strategies used to reduce vehicle miles travelled (and their associated GHG emissions), then the General Plan must provide the land use designations to allow such density to occur, identify the locations where those strategies are to be applied, and identify the land and other infrastructure necessary to facilitate transit connections. This requires consistency between the land use, circulation, housing, and possibly other elements of the General Plan. Further, site constraints such as toxics contamination, noise, or air quality emissions hot spots need to be considered before designating sites for high density and transit-oriented development in order to maintain consistency with the noise and safety elements.

- Specific Plans, Community Plans, and Area Plans: These types of land use plans are used to implement the General Plan. Where the General Plan provides for the preparation of any of these more specific land use plans to implement its strategies, those plans must be consistent with the policies of the General Plan. In particular, development intensity, population density, and location within the community, and roads and transportation facilities will be important facets of plan consistency.

- Energy-Efficiency Requirements – If new policies are added to increase the energy-efficiency requirements beyond that established in current Title 24 standards, these requirements could raise the cost of housing, which could affect the jurisdiction's ability to meet its mandatory requirements for the provision of affordable housing under the housing element. Those policies must not impede the jurisdiction's ability to meet its assigned share of the regional housing need. This requires coordination between the land use, housing, and energy (if one exists) elements.

- Renewable Energy – If new policies require further reliance on renewable energy for municipal and community electricity, then the General Plan must also address the availability of land for new facilities and transmission lines and their compatibility with existing and future adjacent uses. This requires coordination between the land use, circulation, and energy (if one exists) elements and possibly the open space and agriculture elements for transmission lines.

Table 1 (on the next page) summarizes the key element interrelationships relevant to broad GHG reduction strategies. This is also not a comprehensive list of GHG reduction approaches, but is intended to highlight the key linkages between General Plan elements for the strategies with greatest potential for GHG reductions that are under the control or influence of local land use authorities.

Table 1. Element Interrelationships for Greenhouse Gas Emission Reduction Strategies

Reduction Strategy	Key Element Interrelationships
Promotion of jobs/housing balance	Local governments can promote economic development to provide employment for the future workforce of the county and housing appropriate to that workforce to reduce out-of-area and out-of County commute miles and associated vehicle emissions. Mandatory Elements: LAND USE, HOUSING Optional Elements: ECONOMIC DEVELOPMENT
Increased housing density/mixed use/TOD/infill development	Local governments can designate areas of increased density in proximity to employment centers, services, transit linkages, and alternatives to single-occupancy vehicle travel. Mandatory Elements: LAND USE, CIRCULATION, HOUSING, OPEN SPACE Optional Elements: COMMUNITY DESIGN, ECONOMIC DEVELOPMENT
Increased transit	Local government can facilitate increased transit use through efficient links between employment centers, services, and clustered residential areas and to different modes of travel in cooperation with adjacent cities/counties, transportation providers, and regional transportation agencies. Local governments must also address safety and noise issues for new facilities. Mandatory Elements: CIRCULATION, LAND USE, NOISE, SAFETY. AIR QUALITY Optional Elements: AIR QUALITY
Alternative vehicles and alternatives to vehicle travel other than transit	Local government can facilitate bicycle and pedestrian linkages between residential areas, schools, services, centers of employment and recreation. Local government can also utilize alternatively-fueled vehicles for municipal operations and require recharging stations for electric vehicles at new private development Mandatory Elements: CIRCULATION, LAND USE, OPEN SPACE Optional Element: PUBLIC FACILITIES, AIR QUALITY
Energy-Efficiency (public)	Local governments can undertake cost-effective energy-efficient investments, while saving energy costs over the long run. Mandatory Element: LAND USE Optional Elements: ENERGY, PUBLIC FACILITIES, COMMUNITY DESIGN
Energy-Efficiency (private)	Local governments can promote or require energy-efficiency in new residential, commercial, and industrial development that will reduce GHG emissions related to electricity and natural gas consumption. This can include support for programs to retrofit existing residences and businesses. Mandatory Elements: HOUSING, LAND USE Optional Elements: ENERGY, COMMUNITY DESIGN

Reduction Strategy	Key Element Interrelationships
Renewable Energy (utility)	Local governments can identify sites for new renewable energy facilities and transmission lines. Mandatory Elements: LAND USE, CIRCULATION, CONSERVATION Optional Element: ENERGY, AGRICULTURE
Renewable Energy (residential/commercial)	Local governments must balance between the GHG reductions from residential/commercial solar and wind installations and concerns about safety, noise, and aesthetics. Policies should encourage these uses while establishing safety, noise, and aesthetics standards, consistent with state law. Mandatory Elements: LAND USE, NOISE, SAFETY Optional Element: ENERGY
Waste Reduction, Recycling, Reuse, and Recovery	Local governments can promote waste reduction, increased recycling, waste diversion, waste to energy and waste recovery through direct action. Mandatory Elements: LAND USE, CONSERVATION, SAFETY Optional Elements: ENERGY, PUBLIC FACILITIES, AIR QUALITY
Water Conservation and Recycling	Local governments can promote water conservation and recycling through landscaping and irrigation requirements and limitations, fixture and appliance requirements, and expanded use of reclaimed water. Plan policies would set the stage for water conservation and recycling ordinances. Mandatory Elements: LAND USE, CONSERVATION, SAFETY Optional Elements: ENERGY, PUBLIC FACILITIES, AIR QUALITY

Introduction

This chapter provides a presentation of an overarching climate change goal (to reduce municipal greenhouse gas emissions in a manner that is consistent with AB 32) and related objectives, policies, and implementation measures for incorporation into a General Plan - whether as part of an Air Quality element, as a separate Climate Change element, or interspersed throughout other existing elements as appropriate within a General Plan. The model policies provided in this section are grouped by General Plan element, and are provided in a format that should be readily included in a city or county's General Plan. The city or county has full discretion on where to place the policies, whether to change their format or content, and, indeed, whether to incorporate them at all. This report and policies in it are not intended in any way to dictate what a city or county chooses to include in its plan; that choice remains the purview of the locally elected officials who approve the city or county's General Plan.

However, if and when a city or county chooses to incorporate GHG reduction strategies into its General Plan, or into another guiding document, such as a Climate Action Plan, the following policies represent the best practices and current knowledge in land use planning. The climate change policies presented here were compiled through an extensive review of General Plans and Climate Action Plans from cities and counties throughout the State that are already moving forward to address climate change and GHG emissions. CAPCOA, with the help of its contractors, surveyed current practices in the field and aggregated them into model policies to ease the burden on staff at already strapped city and county land use agencies. Those staff remain the experts on their local land use circumstances and needs, however, and their knowledge and judgment, with the oversight of their policy boards, will shape when and how GHG reduction strategies are applied within their jurisdictions. This is not an exhaustive list -- local governments are encouraged to address climate change and GHG emissions through additional or reworked policies and implementation measures according to their unique needs.

The Model Policies

The menu of objectives, policies, and implementation measures is grouped around nine General Plan elements, including one new element, "Greenhouse Gas Reduction Planning." A city or county can place the policies it selects into the most relevant existing General Plan element, if the city or county is integrating GHG reduction strategies throughout its General Plan. On the other hand, the city or county may choose to group all GHG reduction policies under one element, in which case the Greenhouse Gas Reduction Planning element could be broadened to accommodate that. The nine greenhouse gas reduction categories for which model policies are provided are as follows:

1) Greenhouse Gas Reduction Planning (overall);
2) Land Use and Urban Design;
3) Transportation;

4) Energy Efficiency;
5) Alternative Energy;
6) Municipal Operations;
7) Waste Reduction and Diversion;
8) Conservation and Open Space; and
9) Education.

These categories do not correspond exactly to standard California General Plan elements. Some of the policies in this chapter correspond to multiple standard elements, and some do not correspond to any of the required California General Plan elements. These policies could be included in a separate Climate Change element. Please see the table at the end of this chapter for suggestions on which standard elements some of the policies may correspond to. A broad policy goal is identified for GHG reductions in each of these nine categories; more specific objectives are identified within each category; and the model policies are grouped by objective, and are numbered accordingly.

Focus of Policies for Different Communities

There are over 500 cities and counties in California. These jurisdictions range in size from the City of Los Angeles, with over 4 million residents, to the City of Dorris, with less than 900 residents. The eastern portion of the state north of San Bernardino County, and the northern tier of counties from Modoc to Mendocino are generally rural, with only small cities. Although climate change is a global concern and activities throughout the state are contributors, the capability to incorporate and implement climate-related General Plan policies and the applicability of those policies varies among cities and counties.

Policies suitable in urban and suburban areas in the Bay Area, San Joaquin Valley, SCAG region, and San Diego may be infeasible in rural areas that have different land use and resource bases . For that reason, the policies discussed above cannot be considered “one size fits all” solutions. Therefore, providing suggestions about the suitability of policies by general region of the state makes sense.

Air Quality Co-benefits from Greenhouse Gas Reduction Measures

When considering the implementation of a climate change measure, it is vital to consider and discuss the environmental co-benefits associated with GHG reduction measures. If one does not clearly show the co-benefits, then a third party could assume that the only function of a GHG reduction measure is to reduce GHG emissions.

It is well known within the environmental planning community that almost all efforts to reduce GHG emissions result in significant reductions in conventional air pollutant emissions. For instance, most efforts to reduce automobile use through smart growth design principles or improvements in public transit should result in reductions in both

GHG emissions and conventional pollutants associated with smog (such as NOx, PM, VOCs, and ozone). Additionally, efforts to conserve electricity will reduce both GHG emissions and conventional pollutant emissions from power plants.

There are limited scenarios where GHG reductions may cause local air quality impacts. For example, efforts to increase certain types of distributed power generation through the non-optimal combustion of landfill gas may produce localized NOx emissions that contribute to regional smog. Likewise, increasing densities near transit hubs and transportation corridors could increase exposure to unhealthy diesel emissions in certain areas. Fortunately, the potential for adverse air quality impacts from GHG reduction programs and plans is small; in the overwhelming majority of cases, measures implemented to reduce GHG emissions will also contribute to improved air quality.

Since a majority of Californians live in areas where air quality does not meet state and federal health standards for at least one pollutant, GHG reduction measures make sense from a direct and *local* public benefit perspective since they would likely contribute to improved local air quality. Clearly identifying the co-benefits of implementing such measures will potentially engender the support of a broader range of the community.

The communities surrounding the major California ports are a good example. Given the public health concern regarding diesel particulate matter emissions from ships and heavy duty vehicle use near ports, it is highly likely that local residents would prefer and support GHG programs that reduce exposure to pre-existing and well-known local air quality problems to a greater extent than GHG reduction programs that do not have local air quality improvement benefits. Addressing both GHG emissions and local health concerns simultaneously should be encouraged and may determine the selection of optimal multi-target reduction measures.

In general, public support and acceptance of GHG reduction efforts will be enhanced by the clear presentation of the co-benefits associated with these actions. This presents a significant opportunity to local decisionmakers to help improve public health and welfare in their local communities while simultaneously addressing the critical issue of climate change.

Worksheet for Evaluating Policies

Table 2 provides a worksheet for evaluating the expected impact of these policies, as well as factors that affect their implementation. The impacts will vary depending on a number of factors specific to each city and county. As stated previously, the effectiveness of many of these policies depends on how they are applied. For example, a number of the model land use policies are designed to support high-density development near the city center. Done properly, this strategy will result in a workforce that lives near the jobs it fills, and that relies on transit, biking, and walking to commute to work and school, and to reach a broad range of nearby services. If, for example, the housing is not in the proper price range for the workers who fill the local jobs, or if those jobs cannot be easily and safely reached using transit or other modes of transportation, the effect of the strategy

will be much less, and may even be negative. In the worst case, the housing could be purchased by people who work in remote areas and commute to their workplaces in single-occupancy vehicles, and this new housing could displace other housing that was in better balance with the local jobs, causing those workers to commute into the urban core. In the worksheet, each policy is referenced by number and name. For more detail on the policy, please refer to the text of the corresponding model policy, following in this chapter. The worksheet addresses the following factors:

- Implementation Examples: To the extent that CAPCOA has information, this information is already entered in the worksheet, to show the reader/practitioner examples of places this policy has been adopted or implemented in practice.

- Appropriate General Plan Element: This information is also already entered into the worksheet, to suggest (but not dictate) the most appropriate element or elements where the referenced model policy could be incorporated.

- Relative Effectiveness Reducing GHGs: We suggest ranking measures based on your estimate of their relative effectiveness, considering the local environment and constraints. This does not have to be quantitative; a rating of 1 to 3, or 1 to 5, could be used, or Low-Medium-High, for example. For more information on estimating effectiveness, consult the CAPCOA document on CEQA and Climate Change, the California Climate Action Registry, ICLEI[1], or the ARB Local Government Toolkit.

- Relative Difficulty to Implement: This is intended to be a measure of how prepared a jurisdiction is to implement a measure (do you have the necessary authority, knowledge, infrastructure, and resources, for example) as well as the expected political acceptability and the acceptance by the community.

- Relative Time for Reductions to Occur: This is not intended to be a precise measure, rather a qualitative one. We suggest "near term," "mid term," and "long term" for example, or another system for sorting and ranking measures based on when the return is expected to occur.

- Relative Cost: Measures could be rated qualitatively, for example as low, medium, or high costs, or between $ and $$$$$, with more dollar signs indicating a higher relative cost. Alternatively, a rough cost range could be used.

As cities and counties review these model policies and select the ones that are most appropriate for their jurisdictions, they should make clear and careful decisions about criteria that will properly target the policies to best achieve their intended result.

The model policies are provided in a form that begins, "The City/County will…" To reiterate, this is not meant to dictate what any city or county will do; rather, if a city or

[1] ICLEI is Local Governments for Sustainability

county wishes to incorporate a model policy, the policy has been written to allow the city or county to simply insert its name into the policy in place of "The City/County." As already stated, if other language or another format is preferred, the city or county has full discretion to make any such changes.

As previously noted, the California Air Resources Board has developed an online toolkit of measures for local governments to reduce global warming pollution, available at www.coolcalifornia.org. This toolkit contains emissions inventory utilities, case studies of local governments who have effectively reduced their global warming pollution, financial assistance available for conservation efforts, and other valuable information.

Greenhouse Gas Reduction Planning Policies

Goal: Reduce GHG emissions from all activities within the City/County boundaries to support the State's efforts under AB-32 and to mitigate the impact of climate change on the City/County, State, and world.

Objective GHG-1: By 2020, the City/County will reduce greenhouse gas emissions from within its boundaries to a level 30% less than the level that would otherwise occur if all activities continued under a "business as usual" scenario.

GHG-1.1 Emission Inventories: The City/County will establish GHG emissions inventories including emissions from all sectors within the City/County, using methods approved by, or consistent with guidance from, the ARB; the City/County will update inventories every 3 years to incorporate improved methods, better data, and more accurate tools and methods, and to assess progress.

1.1.1 The City/County will establish a baseline inventory of GHG emissions including municipal emissions, and emissions from all business sectors and the community.

1.1.2 The City/county will define a "business as usual" scenario of municipal, economic, and community activities, and prepare a projected inventory for 2020 based on that scenario.

GHG-1.2 Climate Action Plans: The City/County will establish plans to reduce or encourage reductions in GHG emissions from all sectors within the City/County.

1.2.1 The City/County will establish a Municipal Climate Action Plan which will include measures to reduce GHG emissions from municipal activities by at least 30% by 2020 compared to the "business as usual" municipal emissions (including any reductions required by ARB under AB 32).

1.2.2 The City/County will, in collaboration with the business community, establish a Business Climate Action Plan, which will include measures to reduce GHG emissions from business activities, and which will seek to reduce emissions by at least 30% by 2020 compared to "business as usual" business emissions.

1.2.3 The City/County will, in collaboration with the stakeholders from the community at large, establish a Community Climate Action Plan, which will include measures reduce GHG emissions from community activities, and which will seek to reduce emissions by

at least 30% by 2020 compared to "business as usual" community emissions.

1.2.4 Or: The City / County will, in collaboration with the stakeholders from the community at large, establish a CCAP, which will include measures to reduce GHG from community, municipal and business activities by at least 30% by 2020, compared to "business as usual".

GHG-1.1*A* **Emission Inventories:** *(Alternative form)* The City/County will establish GHG emissions inventories including emissions from all sectors within the City/County, using methods approved by, or consistent with guidance from, the ARB; the City/County will update inventories every 4 years to incorporate improved methods, better data, and more accurate tools and methods, and to assess progress.

1.1.1 The City/County will establish a baseline inventory of GHG emissions including municipal emissions, and emissions from all business sectors and the community.

GHG-1.2*A* **Climate Action Plans:** *(Alternative form)* The City/County will establish plans to reduce or encourage reductions in GHG emissions from all sectors within the City/County.

1.2.1 The City/County will establish a Municipal Climate Action Plan which will include measures to reduce GHG emissions from municipal activities by at least 15% by 2020 compared to the baseline municipal emissions inventory (including any reductions required by ARB under AB 32).

1.2.2 The City/County will, in collaboration with the business community, establish a Business Climate Action Plan, which will include measures to incentivize and support reductions in GHG emissions from business activities, and which will seek to reduce emissions by at least 15% by 2020 compared to the baseline business emissions inventory (including any reductions required by ARB under AB-32).

1.2.3 The City/County will, in collaboration with the stakeholders from the community at large, establish a Community Climate Action Plan, which will include measures to incentivize and support reductions in GHG emissions from community activities, and which will seek to reduce emissions by at least 15% by 2020 compared to the baseline community emissions inventory (including any reductions any reductions required by ARB under AB-32).

Objective GHG-2 The City/County will ensure that its local Climate Action, Land Use, Housing, and Transportation Plans are aligned with, support, and enhance any regional plans that have been developed consistent with state guidance to achieve reductions in GHG emissions.

GHG-2.1 Sustainable Communities Strategy/Regional Blueprint Planning: The City/County will participate in the Sustainable Communities Strategy/Regional Blueprint Planning effort and will ensure that local plans are consistent with the Regional Plan.

Land Use and Urban Design Policies

Goal: Promote land use strategies that decrease reliance on automobile use, increase the use of alternative modes of transportation, maximize efficiency of urban services provision and reduce emissions of GHGs.

Objective LU-1: The City/County will adopt and implement a development pattern that utilizes existing infrastructure; reduces the need for new roads, utilities and other public works in new growth areas; and enhances non-automobile transportation.

LU-1.1 Urban Growth Boundary: The City will establish an urban growth boundary (UBG) with related ordinances or programs to limit suburban sprawl; the City/County will restrict urban development beyond the UGB and streamline entitlement processes within the UGB for consistent projects.

1.1.1 Urban development should occur only where urban public facilities and services exist or can be reasonably made available.

1.1.2 The improvement and expansion of one urban public facility or service should not stimulate development that significantly precedes the City's, or other affected jurisdiction's, ability to provide all other necessary urban public facilities and services at adequate levels.

LU-1.2 Reserve Limits: The City/County will redirect new growth into existing city/urban reserve areas.

LU-1.3 Infill: The City/County will encourage high-density, mixed-use, infill development and creative reuse of brownfield, under-utilized and/or defunct properties within the urban core.

LU-1.4 Urban Service Lines: The City/County will maintain a one dwelling unit per 10 acre minimum lot size or lower density in areas outside designated urban service lines.

1.4.1 Adopt an urban-rural transition zone along the urban service line to ensure that land uses within the City / County are compatible with adjacent open space and agricultural uses.

LU-1.5 Density: The City/County will increase densities in urban core areas to support public transit.

1.5.1 Remove barriers to the development of accessory dwelling units in existing residential neighborhoods inside urban service lines.

LU-1.6 Road Width: The City/County will reduce required road width standards wherever feasible to calm traffic and encourage alternative modes of transportation.

LU-1.7 Parking Spaces: The City/County will reduce parking space requirements, unbundle parking from rents and charge for parking in new developments.

LU-1.8 Bicycle Facilities: The City/County will add bicycle facilities to city streets and public spaces.

LU-1.9 Levels of Service: The City/County will discourage the extension of urban levels of service for new development beyond existing urban service lines, and, if necessary, use zoning to assure that development occurs only if public services are adequate.

Objective LU-2: Promote infill, mixed-use, and higher density development, and provide incentives to support the creation of affordable housing in mixed use zones.

LU-2.1 Mixed-Use Development: The City/County will plan for and create incentives for mixed-use development.

2.1.1 The City/County will identify sites suitable for mixed-use development within an existing urban service line and will establish appropriate site-specific standards to accommodate the mixed uses. Site-specific standards could include:

2.1.1.1 Increasing allowable building height or allowing height limit bonuses;

2.1.1.2 Allowing flexibility in applying development standards (such as FAR[2] and lot coverage) based on the location, type, and size of the units, and the design of the development;

2.1.1.3 Allowing the residential component to be additive rather than within the established FAR for that zone, and eliminating maximum density requirements for residential uses in mixed use zones;

2.1.1.4 Allowing reduced and shared parking based on the use mix, and establishing parking maximums where sites are located within 0.25 miles of a public transit stop;

2.1.1.5 Allowing for tandem parking, shared parking and off-site parking leases;

[2] FAR is Floor Area Ratio

2.1.1.6 Requiring all property owners in mixed-use areas to unbundle parking from commercial and residential leases;

2.1.1.7 Creating parking benefit districts, which invest meter revenues in pedestrian infrastructure and other public amenities;

2.1.1.8 Establishing performance pricing of street parking, so that it is expensive enough to promote frequent turnover and keep 15 percent of spaces empty at all times.

2.1.2 The City/County will seek funding to prepare specific plans and related environmental documents to facilitate mixed-use development at selected sites, and to allow these areas to serve as receiver sites for transfer of development rights away from environmentally sensitive lands and rural areas outside established urban growth boundaries.

2.1.3 The City/County will enable prototype mixed-use structures for use in neighborhood center zones that can be adapted to new uses over time with minimal internal remodeling.

2.1.4 The City/County will identify and facilitate the inclusion of complementary land uses not already present in local zoning districts, such as supermarkets, parks and recreational fields, schools in neighborhoods, and residential uses in business districts, to reduce the vehicle miles traveled and promote bicycling and walking to these uses.

EMPHASIS OF DEVELOPMENT

USE	COMMERCIAL	OFFICE	RESIDENTIAL
Retail	50-70%	10-30%	10-30%
Office	0-20%	50-70%	0-30%
Residential	20-40%	0-30%	50-80%
Public	10-30%	10-30%	10-30%

2.1.5 The City/County will work with employers developing larger projects to ensure local housing opportunities for their employees, and engage employers to find ways to provide housing assistance as part of their employee benefits packages; major projects in mixed-use areas should include work-force housing where feasible.

2.1.6 The City/County will revise zoning ordinance(s) to allow local-serving businesses, such as childcare centers, restaurants, banks, family medical offices, drug stores, and other similar services near employment centers to minimize midday vehicle use.

2.1.7 The City / County will develop form-based community design standards to be applied to development projects and land use plans, using a comprehensive community outreach, for areas designated mixed-use

2.1.8 Mix affordable housing units with market rate units as opposed to building segregated affordable housing developments.

Objective LU-3: Promote greater linkage between land uses and transit, as well as other modes of transportation.

LU-3.1 Transit-Supportive Density: The City/County will implement a Housing Overlay Zone for transit centers and corridors. This shall include average minimum residential densities of 25 units per acre within one quarter mile of transit centers; average minimum densities of 15 units per acre within one quarter mile of transit corridors; and minimum FAR of 0.5:1 for non-residential uses within a quarter mile of transit centers or corridors.

LU-3.2 Transit-Oriented Development: The City/County will identify transit centers appropriate for mixed-use development, and will promote transit-oriented, mixed use development within these targeted areas, including:

3.2.1 Amending the Development Code to encourage mixed-use development within one-half mile of intermodal hubs and future rail stations; to offer flexible standards for affordable housing; and to establish minimum residential densities and non-residential FAR;

3.2.2 Rezoning commercial properties to residential and/or mixed-use where appropriate;

3.2.3 Providing expanded zoning for multi-family housing;

3.2.4 Providing maximum parking standards and flexible building height limitations;

3.2.5 Providing density bonus programs;

3.2.6 Establishing guidelines for private and public spaces;

3.2.7 Providing incentives for redevelopment of underutilized areas, such as surface parking lots;

3.2.8 Establishing a minimum pedestrian and bicycle connectivity standard;

3.2.9 Creating parking benefit districts, which invest meter revenues in pedestrian infrastructure and other public amenities;

3.2.10 Establishing performance pricing of street parking, so that it is expensive enough to promote frequent turnover and keep 15 percent of spaces empty at all times;

3.2.11 Discouraging auto-oriented development.

LU-3.3 **Transit-oriented Brownfield Development:** The City/County will promote the development of brownfield sites and other underused or defunct properties near existing public transportation.

LU-3.4 **Public Transit Development Focus:** The City/County will ensure new development is designed to make public transit a viable choice for residents, including:

3.4.1 Locating medium-high density development near activity centers that can be served efficiently by public transit and alternative transportation modes;

3.4.2 Locating medium-high density development near streets served by public transit whenever feasible;

3.4.3 Linking neighborhoods to bus stops by continuous sidewalks or pedestrian paths.

LU-3.5 **City-centered Corridors:** The City/County will establish city-centered corridors, directing development to existing transportation corridors.

LU-3.6 **Transit-oriented Development Design Standards:** The City / County will develop form-based community design standards to be applied to development projects and land use plans, using a comprehensive community outreach program, for areas designated mixed-use *(suggestion: check language with FBCI[3])*

LU-3.7 **Affordable Housing:** Affordable housing will be located in transit-oriented development whenever feasible.

Objective LU-4: Promote development and preservation of neighborhood characteristics that encourage walking and bicycle riding in lieu of automobile-based travel.

LU-4.1 **Pedestrian-oriented Character:** The City/County will create and preserve distinct, identifiable neighborhoods whose characteristics support pedestrian travel, especially within, but not limited to, mixed-use and transit-oriented development areas, including:

[3] FBCI is the Form-Based Codes Institute

4.1.1 Designing or maintaining neighborhoods where the neighborhood center can be reached in approximately five minutes of walking;

4.1.2 Increasing housing densities from the perimeter to the center of the neighborhood;

4.1.3 Directing retail, commercial, and office space to the center of the neighborhood;

4.1.4 Encouraging pedestrian-only streets and/or plazas within developments, and destinations that may be reached conveniently by public transportation, walking, or bicycling;

4.1.5 Allowing flexible parking strategies in neighborhood activity centers to foster a pedestrian-oriented streetscape;

4.1.6 Providing continuous sidewalks with shade trees and landscape strips to separate pedestrians from traffic;

4.1.7 Encouraging neighborhood parks and recreational centers near concentrations of residential areas (preferably within one quarter mile) and include pedestrian walkways and bicycle paths that encourage non-motorized travel.

LU-4.2 Pedestrian Access: The City/County will ensure pedestrian access to activities and services, especially within, but not limited to, mixed-use and transit-oriented development areas, including:

4.2.1 Ensuring new development that provides pedestrian connections in as many locations as possible to adjacent development, arterial streets, thoroughfares;

4.2.2 Ensuring a balanced mix of housing, workplaces, shopping, recreational opportunities, and institutional uses, including mixed-use structures;

4.2.3 Locating schools in neighborhoods, within safe and easy walking distances of residences served;

4.2.4 For new development, primary entrances shall be pedestrian entrances, with automobile entrances and parking located to the rear;

4.2.5 Support development where automobile access to buildings does not impede pedestrian access, by consolidating driveways between buildings or developing alley access;

4.2.6 Street parking provided shall be utilized as a buffer between sidewalk pedestrian traffic and the automobile portion of the roadway;

4.2.7 Establish pedestrian and bicycle connectivity standards for new development, with block sizes between 1 and 2 acres;

4.2.8 For existing areas that do not meet established connectivity standards, prioritize the physical development of pedestrian connectors;

4.2.9 Prioritizing grade-separated bicycle / pedestrian crossings where appropriate to enhance connectivity or overcome barriers such as freeways, railways and waterways.

Objective LU-5: Review fee structures and other opportunities to provide financial and administrative incentives to support desired land uses, development patterns, and alternative modes of transportation.

LU-5.1 Developer Fees: The City/County will promote desired land uses by scaling developer fees based on desired criteria, for example:

5.1.1 Increasing or reducing fees proportionally with distance from the city center or preferred transit sites;

5.1.2 Increasing or reducing fees based on the degree to which mixed uses are incorporated into the project;

5.1.3 Reducing fees for creative re-use of brownfield sites;

5.1.4 Increasing fees for the use of greenfield sites.

LU-5.2 Administrative Fees and Streamlining: The City/County will provide fast-track permitting and reductions in processing fees for desired projects. The City/County will research and implement a program of incentives for development projects that are fully consistent with the Sustainable Communities Strategy / Regional Plan.

LU-5.3 Incentives and Loans: The City/County will provide incentive funding and/or infrastructure loans to support desired projects.

LU-5.4 Infrastructure Preference: The City/County will give preference for infrastructure improvements that support or enhance desired land uses and projects.

Objective LU-6: The City/County will mitigate climate change by decreasing heat gain from pavement and other hard surfaces associated with infrastructure.

LU-6.1 Hardscape Heat Gain: The City/County will reduce heat gain from pavement and other hardscaping, including:

6.1.1 Reduce street rights-of-way and pavement widths to pre-World War II widths (typically 22 to 34 feet for local streets, and 30 to 35 feet for collector streets, curb to curb), unless landscape medians or parkway strips are allowed in the center of roadways;

6.1.2 Reinstate the use of parkway strips to allow shading of streets by trees;

6.1.3 Include shade trees on south- and west-facing sides of structures;

6.1.4 Include low-water landscaping in place of hardscaping around transportation infrastructure and in parking areas;

6.1.5 Install cool roofs, green roofs, and use cool paving for pathways, parking, and other roadway surfaces;

6.1.6 Establish standards that provide for pervious pavement options;

6.1.7 Remove obstacles to xeriscaping, edible landscaping and low-water landscaping.

Transportation Policies

Goal: Reduce GHG emissions by reducing vehicle miles traveled and by increasing or encouraging the use of alternative fuels and transportation technologies.

Objective TR-1: The City/County will reduce VMT-related emissions by encouraging the use of public transit through adoption of new development standards that will require improvements to the transit system and infrastructure, increase safety and accessibility, and provide other incentives.

TR-1.1 Transportation Planning: The City/County will ensure that new developments incorporate both local and regional transit measures into the project design that promote the use of alternative modes of transportation.

TR-1.1.1 Project Selection: The City / County shall give priority to transportation projects that will contribute to a reduction in vehicle miles traveled per capita, while maintaining economic vitality and sustainability.

TR-1.1.2 Equal Pedestrian Access: The City / County shall include sidewalks, separated sidewalks whenever possible, on both sides of all new street improvement projects, except where there are severe topographic or natural resource constraints.

TR-1.1.3 Public Involvement: Carry out a comprehensive public involvement and input process that provides information about transportation issues, projects, and processes to community members and other stakeholders, especially to those traditionally underserved by transportation services.

TR-1.2 System Interconnectivity: The City/County will create an interconnected transportation system that allows a shift in travel from private passenger vehicles to alternative modes, including public transit, ride sharing, car-sharing, bicycling and walking.

1.2.1 Ensure transportation centers are multi-modal to allow transportation modes to intersect;

1.2.2 Provide adequate and affordable public transportation choices, including expanded bus routes and service, as well as other transit choices such as shuttles, light rail, and rail;

1.2.3 To the extent feasible, extend service and hours of operation to underserved arterials and population centers or destinations such as colleges;

1.2.3A Focus transit resources on high-volume corridors and high-boarding destinations such as colleges, employment centers and regional destinations;

1.2.4 Coordinate schedules and routes across service lines with neighboring transit authorities;

1.2.5 Support programs to provide "station cars" for short trips to and from transit nodes (e.g., neighborhood electric vehicles);

1.2.6 Study the feasibility of providing free transit to areas with residential densities of 15 dwelling units per acre or more, including options such as removing service from less dense, underutilized areas to do so;

1.2.7 Employ transit-preferential measures, such as signal priority and bypass lanes. Where compatible with adjacent land use designations, right-of-way acquisition or parking removal may occur to accommodate transit-preferential measures or improve access to transit. The use of access management should be considered where needed to reduce conflicts between transit vehicles and other vehicles;

1.2.8 Provide safe and convenient access for pedestrians and bicyclists to, across, and along major transit priority streets;

1.2.9 Use park-and-ride facilities to access transit stations only at ends of regional transitways or where adequate feeder bus service is not feasible.

TR-1.3 Transit System Infrastructure: The City/County will upgrade and maintain transit system infrastructure to enhance public use, including:

1.3.1 Ensure transit stops and bus lanes are safe, convenient, clean and efficient;

1.3.2 Ensure transit stops have clearly marked street-level designation, and are accessible;

1.3.3 Ensure transit stops are safe, sheltered, benches are clean, and lighting is adequate;

1.3.4 Place transit stations along transit corridors within mixed-use or transit-oriented development areas at intervals of three to four blocks, or no less than one-half mile.

TR-1.4 Customer Service: The City/County will enhance customer service and system ease-of-use, including:

1.4.1 Develop a Regional Pass system to reduce the number of different passes and tickets required of system users;

1.4.2 Implement "Smart Bus" technology, using GPS and electronic displays at transit stops to provide customers with "real-time" arrival and departure time information (and to allow the system operator to respond more quickly and effectively to disruptions in service);

1.4.3 Investigate the feasibility of an on-line trip planning program.

TR-1.5 Transit Funding: The City/County will prioritize transportation funding to support a shift from private passenger vehicles to transit and other modes of transportation, including:

1.5.1 Give funding preference to improvements in public transit over other new infrastructure for private automobile traffic;

1.5.2 Before funding transportation improvements that increase roadway capacity and VMT, evaluate the feasibility and effectiveness of funding projects that support alternative modes of transportation and reduce VMT, including transit, and bicycle and pedestrian access.

TR-1.6 Transit and Multimodal Impact Fees: The City/County will assess transit and multimodal impact fees on new developments to fund public transportation infrastructure, bicycle infrastructure, pedestrian infrastructure and other multimodal accommodations.

Objective TR-2: The City/County will implement traffic and roadway management strategies to improve mobility and efficiency, and reduce associated emissions.

TR-2.1 System Monitoring: The City/County will monitor traffic and congestion to determine when and where the city needs new transportation facilities in order to increase access and efficiency.

TR-2.2 Arterial Traffic Management: The City/County will modify arterial roadways to allow more efficient bus operation, including bus lanes and signal priority/ preemption where necessary.

TR-2.3 Signal Synchronization: The City/County will expand signal timing programs where emissions reduction benefits can be demonstrated, including maintenance of the synchronization system, and will coordinate with adjoining jurisdictions as needed to optimize transit operation while maintaining a free flow of traffic.

TR-2.4 HOV Lanes: The City/County will encourage the construction of high-occupancy vehicle (HOV) lanes or similar mechanisms whenever necessary to relieve congestion and reduce emissions.

TR-2.5 Delivery Schedules: The City/County will establish ordinances or land use permit conditions limiting the hours when deliveries can be made to off-peak hours in high traffic areas.

Objective TR-3: The City/County will reduce VMT related-emissions by implementing and supporting trip reduction programs.

TR-3.1 Ride-Share Programs: The City/County will promote ride sharing programs, including:

3.1.1 Designate a certain percentage of parking spaces for ride-sharing vehicles;

3.1.2 Designate adequate passenger loading, unloading, and waiting areas for ride-sharing vehicles;

3.1.3 Provide a web site or message board for coordinating shared rides;

3.1.4 Encourage private, for-profit community car-sharing, including parking spaces for car share vehicles at convenient locations accessible by public transit;

3.1.5 Hire or designate a rideshare coordinator to develop and implement ridesharing programs.

TR-3.2 Employer-based Trip Reduction: The City/County will support voluntary, employer-based trip reduction programs, including:

3.2.1 Provide assistance to regional and local ridesharing organizations;

3.2.2 Advocate for legislation to maintain and expand incentives for employer ridesharing programs;

3.2.3 Require the development of Transportation Management Associations for large employers and commercial/ industrial complexes;

3.2.4 Provide public recognition of effective programs through awards, top ten lists, and other mechanisms.

TR-3.3 Ride Home Programs: The City/County will implement a city/county wide "guaranteed ride home" program for those who commute by public

transit, ride-sharing, or other modes of transportation, and encourage employers to subscribe to or support the program.

TR-3.4 Local Area Shuttles: The City/County will encourage and utilize shuttles to serve neighborhoods, employment centers and major destinations.

3.4.1 The City/County will create a free or low-cost local area shuttle system that includes a fixed route to popular tourist destinations or shopping and business centers;

3.4.2 The City/County will work with existing shuttle service providers to coordinate their services.

TR-3.5 Low- and No-Travel Employment Opportunities: The City/County will facilitate employment opportunities that minimize the need for private vehicle trips, including:

3.5.1 Amend zoning ordinances and the Development Code to include live/work sites and satellite work centers in appropriate locations;

3.5.2 Encourage telecommuting options with new and existing employers, through project review and incentives, as appropriate.

TR-3.6 Congestion Pricing: Advocate for a regional, market-based system to price or charge for auto trips during peak hours

Objective TR-4: The City/County will support bicycle use as a mode of transportation by enhancing infrastructure to accommodate bicycles and riders, and providing incentives.

TR-4.1 Development Standards for Bicycles: The City/County will establish standards for new development and redevelopment projects to support bicycle use, including:

4.1.1 Amending the Development Code to include standards for safe pedestrian and bicyclist accommodations, including:

4.1.1.1 "Complete Streets" policies that foster equal access by all users in the roadway design;

4.1.1.2 Bicycle and pedestrian access internally and in connection to other areas through easements;

4.1.1.3 Safe access to public transportation and other non-motorized uses through construction of dedicated paths;

4.1.1.4 Safe road crossings at major intersections, especially for school children and seniors;

4.1.1.5 Adequate, convenient and secure bike parking at public and private facilities and destinations in all urban areas;

4.1.1.6 Street standards will include provisions for bicycle parking within the public right of way;

4.1.2 Require new development and redevelopment projects to include bicycle facilities, as appropriate with the new land use, including:

4.1.2.1 Construction of weatherproof bicycle facilities where feasible, and at a minimum, bicycle racks or covered, secure parking near the building entrances;

4.1.2.2 Provision and maintenance of changing rooms, lockers, and showers at large employers or employment centers.

4.1.3 Prohibit projects that impede bicycle and pedestrian access, such as large parking areas that cannot be safely crossed by non-motorized vehicles, and developments that block through access on existing or potential bicycle and pedestrian routes;

4.1.4 Encourage the development of bicycle stations at intermodal hubs, with attended or "valet" bicycle parking, and other amenities such as bicycle rental and repair, and changing areas with lockers and showers;

4.1.5 Conduct a connectivity analysis of the existing bikeway network to identify gaps, and prioritize bikeway development where gaps exist.

TR-4.2 Bicycle and Pedestrian Trails: The City/County will establish a network of multi-use trails to facilitate safe and direct off-street bicycle and pedestrian travel, and will provide bike racks along these trails at secure, lighted locations.

TR-4.3 Bicycle Safety Program: The City/County will develop and implement a bicycle safety educational program to teach drivers and riders the laws, riding protocols, routes, safety tips, and emergency maneuvers.

TR-4.4 Bicycle and Pedestrian Project Funding: The City/County will pursue and provide enhanced funding for bicycle and pedestrian facilities and access projects, including, as appropriate:

4.4.1 Apply for regional, State, and federal grants for bicycle and pedestrian infrastructure projects;

4.4.2 Establish development exactions and impact fees to fund bicycle and pedestrian facilities;

4.4.3 Use existing revenues, such as state gas tax subventions, sales tax funds, and general fund monies for projects to enhance bicycle use and walking for transportation.

TR-4.5 Bicycle Parking: Adopt bicycle parking standards that ensure bicycle parking sufficient to accommodate 5 to 10% of projected use at all public and commercial facilities, and at a rate of at least one per residential unit in multiple-family developments *(suggestion: check language with League of American Bicyclists).*

Objective TR-5: The City/County will establish parking policies and requirements that capture the true cost of private vehicle use and support alternative modes of transportation.

TR-5.1 Parking Policy: The City/County will adopt a comprehensive parking policy to discourage private vehicle use and encourage the use of alternative transportation, including:

5.1.1 Reduce the available parking spaces for private vehicles while increasing parking spaces for shared vehicles, bicycles, and other alternative modes of transportation;

5.1.2 Eliminate or reduce minimum parking requirements for new buildings;

5.1.3 "Unbundle" parking (require that parking is paid for separately and is not included in the base rent for residential and commercial space);

5.1.4 Use parking pricing to discourage private vehicle use, especially at peak times;

5.1.5 Create parking benefit districts, which invest meter revenues in pedestrian infrastructure and other public amenities;

5.1.6 Establish performance pricing of street parking, so that it is expensive enough to promote frequent turnover and keep 15 percent of spaces empty at all times;

5.1.7 Encourage shared parking programs in mixed-use and transit-oriented development areas.

TR-5.2 Event Parking Policies: The City/County will establish policies and programs to reduce onsite parking demand and promote ride-sharing and public transit at large events, including:

5.2.1 Promote the use of peripheral parking by increasing on-site parking rates and offering reduced rates for peripheral parking;

5.2.2 Encourage special event center operators to advertise and offer discounted transit passes with event tickets;

5.2.3 Encourage special event center operators to advertise and offer discount parking incentives to carpooling patrons, with four or more persons per vehicle for on-site parking;

5.2.4 Promote the use of bicycles by providing space for the operation of valet bicycle parking service.

TR-5.3 Parking "Cash-out" Program: The City/County will require new office developments with more than 50 employees to offer a Parking "Cash-out" Program to discourage private vehicle use.

TR-5.4 Electric/Alternative Fuel Vehicle Parking: The City/County will require new commercial and retail developments to provide prioritized parking for electric vehicles and vehicles using alternative fuels.

Objective TR-6: The City/County will support and promote the use of low- and zero-emission vehicles, and alternative fuels, and other measures to directly reduce emissions from motor vehicles.

TR-6.1 Low and Zero Emission Vehicles: The City/County will support and promote the use of low- and zero-emission vehicles, including:

6.1.1 Develop the necessary infrastructure to encourage the use of zero-emission vehicles and clean alternative fuels, such as development of electric vehicle charging facilities and conveniently located alternative fueling stations;

6.1.2 Encourage new construction to include vehicle access to properly wired outdoor receptacles to accommodate ZEV and/or plug in electric hybrids (PHEV);

6.1.3 Encourage transportation fleet standards to achieve the lowest emissions possible, using a mix of alternate fuels, PZEV or better fleet mixes;

6.1.4 Establish incentives, as appropriate, to taxicab owners to use alternative fuel or gas-electric hybrid vehicles.

TR-6.2 Vehicle Idling: The City/County will enforce State idling laws for commercial vehicles, including delivery and construction vehicles.

Energy Efficiency Policies

Goal: Reduce emissions from the generation of electricity by reducing electricity use through increased efficiency.

Objective EE-1 The City/County will establish green building requirements and standards for new development and redevelopment projects, and will work to provide incentives for green building practices and remove barriers that impede their use.

EE-1.1 **Green Building Ordinance:** The City/County will adopt a Green Building Ordinance that requires new development and redevelopment projects for both residential and commercial buildings to incorporate sufficient green building methods and techniques to qualify for the equivalent of a current LEED Certified rating, GreenPoints, or equivalent rating system.

EE-1.2 **Green Building Flexibility:** The City/County will allow increased height limits and/or flexibility in other standards for projects that incorporate energy efficient green building practices.

EE-1.3 **Green Building Barriers:** The City/County will identify and remove regulatory or procedural barriers to implementing green building practices within its jurisdiction, such as updating codes, guidelines, and zoning, and will ensure that all plan review and building inspection staff are trained in green building materials, practices, and techniques.

EE-1.4 **Green Building Incentives:** The City/County will support the use of green building practices by:

1.4.1 Providing information, marketing, training, and technical assistance about green building practices;

1.4.2 Establishing guidelines for green building practices in residential and commercial development;

1.4.3 Providing financial incentives, including reduction in development fees, administrative fees, and expedited permit processing for projects that use green building practices.

Objective EE-2 The City/County will establish policies and standards to increase energy efficiency at new developments.

EE-2.1 **Improved Building Standards:** The City/County will adopt energy efficiency performance standards for buildings that achieve a greater reduction in energy and water use than otherwise required by state law, including:

2.1.1 Standards for the installation of "cool roofs";

2.1.2 Performance standards for heat transfer across the building envelope that result in increased insulation and the use of low-emissive windows;

2.1.3 Requirements to install high-efficiency plumbing fixtures and tankless water heaters;

2.1.4 Performance standards that specify high-efficiency space heating and cooling systems;

2.1.5 Requirements for improved overall efficiency of lighting systems;

2.1.6 Requirements for the use of Energy Star® appliances and fixtures in discretionary new development;

2.1.7 New lots shall be arranged and oriented to maximize effective use of passive solar energy.

EE-2.2 Affordable Housing Energy Efficiency: Affordable housing development shall incorporate energy efficient design and features to the maximum extent feasible.

2.2.1 The City/County will target local funds, including redevelopment and community development block grant resources, to assist affordable housing developers in meeting the energy efficiency requirements.

EE-2.3 Outdoor Lighting: The City/County will establish outdoor lighting standards in the Zoning Ordinance, including:

2.3.1 Requirements that all outdoor lighting fixtures be energy efficient, such as:

2.3.1.1 Full cut-off light fixtures at parking lots and on buildings;

2.3.1.2 Photocells or astronomical time switches on all permanently installed exterior lighting;

2.3.1.3 Directional and shielded LED lights for exterior lighting *(for example, see: www.nightwise.org)*, and install exterior and security lights with motion detectors.

2.3.2 Requirements that light levels in all new development, parking lots, and street lighting not exceed state standards;

2.3.3 Requirements that lighting at the urban-rural boundary be designed to provide one-half the light standard for urban areas;

2.3.4 Prohibition against continuous all-night outdoor lighting in sports stadiums, construction sites, and rural areas unless required for security reasons.

EE-2.4 Residential Wood Burning: The City/County will establish or enhance local ordinances that prohibit solid fuel wood-burning devices in mixed-use high-density development and restrict the installation of wood-burning appliances in new or redeveloped single family residential properties to those that burn pellets, natural gas, or propane, or at a minimum, EPA certified wood-burning units.

Objective EE-3: The City/County will establish policies and standards to reduce exterior heat gain and heat island effects.

EE-3.1 Exterior Heat Gain: The City/County will establish standards for new development and for large redevelopment or rehabilitation (for example, additions of more than 25,000 square feet commercial or 100,000 square feet industrial), to reduce exterior heat gain for 50% of non-roof impervious site landscape (roads, sidewalks, courtyards, parking lots, and driveways), including:

3.1.1 Achieving 50% paved surface shading with vegetation within 5 years, in consultation with city/county arborist;

3.1.2 Use of paving materials with a Solar Reflective Index (SRI) of at least 29, or open grid paving systems;

3.1.3 Covered parking (underground, beneath decking or roofs, or beneath a building), where any roof-covered parking uses roofing material with SRI of at least 29.

EE-3.2 Heat Island Mitigation: The City/County will adopt a Heat Island Mitigation Plan that requires cool roofs, cool pavements, and strategically placed shade trees, and will actively inspect and enforce state requirements for cool roofs on non-residential re-roofing projects.

Objective EE-4: The City/County will pursue policies and programs to improve energy efficiency of existing buildings.

EE-4.1 Energy Audits: The City/County will require the performance of energy audits for residential and commercial buildings prior to completion of sale, and that audit results and information about opportunities for energy efficiency improvements be presented to the buyer.

EE-4.2 Energy Efficiency Funding: The City/County will pursue incentives, grants, and creative financing for projects that improve energy efficiency, including, for example, the option for property owners to pay for such improvements through long-term assessments on their property tax bills.

EE-4.3 Community Energy Program: The City/County will implement an outreach and incentive program to promote energy efficiency and conservation in the community, including:

4.3.1 Launch an "energy efficiency challenge" campaign for community residents;

4.3.2 Implement a low-income weatherization assistance program;

4.3.3 Implement conservation campaigns specifically targeted to residents, and separately to businesses;

4.3.4 Promote the purchase of Energy Star® appliances, including, where feasible, incentive grants and vouchers;

4.3.5 Promote participation in the local "Green Business" program;

4.3.6 Distribute free CFL bulbs or other efficiency fixtures to community members;

4.3.7 Offer exchange programs for high-energy-use items, such as halogen torchiere lamps;

4.3.8 Adopt an ordinance requiring energy upgrades at time of property sale.

Alternative Energy Policies

Goal: The City/County will seek to reduce emissions associated with electrical generation by promoting and supporting the generation and use of alternative energy.

Objective AE-1: The City/County will establish policies and programs that facilitate the siting of new renewable energy generation.

AE-1.1 Site Designation: The City/County will identify possible sites for production of renewable energy (such as solar, wind, small hydro, and biogas), as compatible with surrounding uses, and will protect and promote that use, including:

1.1.1 Designate suitable sites to prioritize their development for renewable energy generation;

1.1.2 Evaluate potential land use, environmental, economic, and other constraints on that use, and mitigate such constraints, as feasible;

1.1.3 Adopt measures to protect the renewable energy use of the sites and their resources, such as utility easements, rights-of-way, and land set-asides.

AE-1.2 Removing Barriers: The City/County will identify and remove or otherwise address barriers to renewable energy production, including:

1.2.1 Review and revise building and development codes, design guidelines, and zoning ordinances to remove such barriers;

1.2.2 Work with related agencies, such as fire, water, health and others that may have policies or requirements that adversely impact the development or use of renewable energy technologies;

1.2.3 Develop protocols for safe storage of renewable and alternative energy products with the potential to leak, ignite or explode, such as biodiesel, hydrogen, and/or compressed air.

AE-1.3 Zoning Flexibility: The City/County will allow renewable energy projects in areas zoned for open space, where consistent with the Open Space element, and other uses and values.

Objective AE-2 The City/County will promote and require renewable energy generation, and co-generation projects where feasible and appropriate.

AE-2.1 On-site Renewable Energy Generation: The City/County will require that new office/retail/commercial or industrial development, or major rehabilitation (e.g., additions of 25,000 square feet commercial, or 100,000 square feet industrial) incorporate renewable energy generation either on- or off-site to provide 15% or more of the project's energy needs.

AE-2.2 Co-generation Projects: The City/County will promote and encourage co-generation projects for commercial and industrial facilities, provided they meet all applicable air quality standards and provide a net reduction in GHG emissions associated with energy production.

AE-2.3 Green Utilities: The City/County will promote and support green utilities, and will evaluate the creation of a locally or regionally owned green utility, perhaps in coordination with other regional strategies.

Objective AE-3: The City/County will promote, support, and require, as appropriate, the development of solar energy.

AE-3.1 Solar-ready Buildings: The City/County will require that, where feasible, all new buildings be constructed to allow for easy, cost-effective installation of solar energy systems in the future, using such "solar-ready" features as:

3.1.1 Designing the building to include optimal roof orientation (between 20 to 55 degrees from the horizontal), with sufficient south-sloped roof surface;

3.1.2 Clear access without obstructions (chimneys, heating and plumbing vents, etc.) on the south sloped roof;

3.1.3 Designing the roof framing to support the addition of solar panels;

3.1.4 Installation of electrical conduit to accept solar electric system wiring;

3.1.5 Installation of plumbing to support a solar hot water system and provision of space for a solar hot water storage tank.

AE-3.2 Solar Homes Partnership: The City/County will require that residential projects of 6 units or more participate in the California Energy Commission's New Solar Homes Partnership, which provides rebates to developers who offer solar power in at least 50% of new units, or a program with similar provisions.

AE-3.3 Passive Solar Design: The City/County will require that any building constructed in whole or in part with City/County funds incorporate passive solar design features, such as daylighting and passive solar heating, where feasible.

AE-3.4 Protection of Solar Elements: The City/County will protect active and passive solar design elements and systems from shading by neighboring structures and trees, as consistent with existing tree shading requirements.

Objective AE-4: The City/County will pursue and provide economic incentives and creative financing for renewable energy projects, as well as other support for community members or developers seeking funding for such projects.

AE-4.1 Renewable Energy Incentives: The City/County will provide, where possible, grants, rebates, and incentives for renewable energy projects, including reduced fees and expedited permit processing.

AE-4.2 Creative Financing: The City/County will provide, where feasible, creative financing for renewable energy projects, including subsidized or other low-interest loans, and the option to pay for system installation through long-term assessments on individual property tax bills.

AE-4.3 Partnerships: The City/County will pursue partnerships with other governmental entities and with private companies and utilities to establish incentive programs for renewable energy.

AE-4.4 Information and Support: The City/County will establish and maintain a clearinghouse of information on available funding alternatives for renewable energy projects, rates of return, and other information to support developers and community members interested in pursuing renewable energy projects.

Objective AE-5: The City/County will implement measures to support the purchase and use of renewable and alternative energy.

AE-5.1 Green Electricity Purchasing: The City/County will establish targets for the purchase of renewable energy, in excess of the state Renewable Portfolio Standards, using such mechanisms as green tags or renewable energy certificates.

AE-5.2 Community Choice Aggregation: The City/County will evaluate the feasibility and effectiveness of using Community Choice Aggregation as a model for providing renewable energy to meet the community's electricity needs, including potential partnerships with other jurisdictions.

Municipal Operations Policies

Goal: Reduce GHG emissions from municipal facilities and operations, and by purchasing goods and services that embody or create fewer GHG emissions.

Objective MO-1: The City/County will enhance the energy efficiency of its facilities.

MO-1.1 Energy Efficiency Plan: The City/County will prepare and implement a comprehensive plan to improve energy efficiency of municipal facilities, including:

1.1.1 Conduct energy audits for all municipal facilities;

1.1.2 Retrofit facilities for energy efficiency where feasible and when remodeling or replacing components, including increased insulation, installing green or reflective roofs and low-emissive window glass;

1.1.3 Implement an energy tracking and management system;

1.1.4 Install energy-efficient exit signs, street signs, and traffic lighting;

1.1.5 Install energy-efficient lighting retrofits and occupancy sensors, and institute a "lights out at night" policy;

1.1.6 Retrofit heating and cooling systems to optimize efficiency (e.g., replace chillers, boilers, fans, pumps, belts, etc.);

1.1.7 Install Energy Star® appliances and energy-efficient vending machines;

1.1.8 Improve efficiency of water pumping and use at municipal facilities, including a schedule to replace or retrofit system components with high-efficiency units (i.e., ultra-low-flow toilets, fixtures, etc.);

1.1.9 Provide chilled, filtered water at water fountains and taps in lieu of bottled water;

1.1.10 Install a central irrigation control system and time its operation for off-peak use;

1.1.11 Adopt an accelerated replacement schedule for energy inefficient systems and components.

MO-1.2 Efficiency Requirement for New Facilities: The City/County will require that any newly constructed, purchased, or leased municipal space meet minimum standards as appropriate, such as:

1.2.1 Requirements for new commercial buildings to meet LEED criteria established by the U.S. Green Building Council;

1.2.2 Requirements for new residential buildings to meet criteria of the Energy Star® New Homes Program established by U.S. EPA;

1.2.3 Incorporation of passive solar design features in new buildings, including daylighting and passive solar heating;

1.2.4 Retrofitting of existing buildings to meet standards under Title 24 of the California Building Energy Code, or to achieve a higher performance standard as established by the City/County;

1.2.5 Retrofitting of existing buildings to decrease heat gain from non-roof impervious surfaces with cool paving, landscaping, and other techniques.

MO-1.3 Training & Support: The City/County will ensure that staff receives appropriate training and support to implement objectives and policies to reduce GHG emissions, including:

1.3.1 Provide energy efficiency training to design, engineering, building operations, and maintenance staff;

1.3.2 Provide information on energy use and management, including data from the tracking and management system, to managers and others making decisions that influence energy use;

1.3.3 Provide energy design review services to departments undertaking new construction or renovation projects, to facilitate compliance with LEED standards.

Objective MO-2: The City/County will improve efficiency at municipal systems and reduce GHG emissions from vehicle and equipment engines.

MO-2.1 Wastewater System Efficiency: The City/County will maximize efficiency of wastewater treatment and pumping equipment.

MO-2.2 Drinking Water System Efficiency: The City/County will maximize efficiency at drinking water treatment, pumping, and distribution facilities, including development of off-peak demand schedules for heavy commercial and industrial users.

MO-2.3 Fleet Replacement: The City/County will establish a replacement policy and schedule to replace fleet vehicles and equipment with the most fuel-

efficient vehicles practical, including gasoline hybrid and alternative fuel or electric models.

MO-2.4 Small Tools and Equipment: Install outdoor electrical outlets on buildings to support the use of electric lawn and garden equipment, and other tools that would otherwise be run with small gas engines or portable generators.

Objective MO-3: The City/County will implement measures to reduce employee vehicle trips and to mitigate emissions impacts from municipal travel.

MO-3.1 Trip Reduction Program: The City/County will implement a program to reduce vehicle trips by employees, including:

3.1.1 Providing incentives and infrastructure for vanpooling and carpooling, such as pool vehicles, preferred parking, and a website or bulletin board to facilitate ride-sharing;

3.1.2 Providing subsidized passes for mass transit;

3.1.3 Offering compressed work hours, off-peak work hours, and telecommuting, where appropriate;

3.1.4 Offer a guaranteed ride home for employees who use alternative modes of transportation to commute.

MO-3.2 Bicycle Transportation Support: The City/County will promote and support the use of bicycles as transportation, including:

3.2.1 Providing bicycle stations with secure, covered parking, changing areas with storage lockers and showers, as well as a central facility where minor repairs can be made;

3.2.2 Providing bicycles, including electric bikes, for employees to use for short trips during business hours;

3.2.3 Implementing a police-on-bicycles program;

3.2.4 Providing a bicycle safety program, and information about safe routes to work.

MO-3.3 Municipal Parking Management: The City/County will implement a Parking Management Program to discourage private vehicle use, including:

3.3.1 Encouraging carpools and vanpools with preferential parking and a reduced parking fee;

3.3.2 Institute a parking cash-out program;

3.3.3 Renegotiate employee contracts, where possible, to eliminate parking subsidies;

3.3.4 Install on-street parking meters with fee structures designed to discourage private vehicle use;

3.3.5 Establish a parking fee for all single-occupant vehicles.

MO-3.4 Travel Mitigation: The City/County will mitigate business-related travel, especially air travel, through the annual purchase of verified carbon offsets.

MO-3.5 Transit Access to Municipal Facilities: Municipal employment and service facilities shall be located on major transit corridors, unless their use is plainly incompatible with other uses located along major transit corridors.

Objective MO-4: The City/County will enhance renewable energy generation, and implement programs for load management and demand response.

MO-4.1 Load Management and Demand Response: The City/County will design and implement peak load management and demand response programs for water pollution control, supply and treatment, and distribution, including interface with existing automated systems for building energy management and SCADA systems.

MO-4.2 Renewable Energy Installation: The City/County will install renewable energy systems at its facilities where feasible, including:

4.2.1 Solar collection systems on municipal roofs;

4.2.2 Solar water heating for municipal pools;

4.2.3 Waste-to-energy systems at waste handling operations.

Objective MO-5: The City/County will manage its stock of vegetation to reduce GHG emissions.

MO-5.1 Urban Tree Management: The City/County will conduct a comprehensive inventory and analysis of the urban forest, and coordinate tree maintenance responsibilities with all responsible departments, consistent with best management practices.

MO 5.2 Landscaping: The City/County will evaluate existing landscaping and options to convert reflective and impervious surfaces to landscaping, and will install or replace vegetation with drought-tolerant, low-maintenance

native species or edible landscaping that can also provide shade and reduce heat-island effects.

Objective MO-6: The City/County will use its purchasing power to promote reductions in GHG emissions by the suppliers of its goods and services.

MO-6.1 Purchasing Practices: The City/County will adopt purchasing practices and standards to support reductions in GHG emissions, including preferences for energy-efficient office equipment, and the use of recycled materials and manufacturers that have implemented green management practices.

MO-6.2 Contracting Practices: The City/County will establish bidding standards and contracting practices that encourage GHG emissions reductions, including preferences or points for the use of low or zero emission vehicles and equipment, recycled materials, and provider implementation of other green management practices.

Waste Reduction and Diversion Policies

Goal: Reduce GHG emissions waste through improved management of waste handling and reductions in waste generation.

Objective WRD-1: The City/County will improve emissions control at waste handling facilities.

WRD-1.1 Methane Recovery: The City/County will establish methane recovery at all wastewater and solid waste treatment facilities.

WRD-1.2 Waste to Energy: The City/County will implement waste-to-energy projects where characteristics meet criteria for effective energy generation.

WRD-1.3 Best Management Practices: The City/County will utilize best management practices at all waste handling facilities.

Objective WRD-2: The City/County will implement enhanced programs to divert solid waste from landfill operations.

WRD-2.1 Diversion Targets: The City/County will achieve a solid waste diversion of 75% of the waste stream by 2020.

WRD-2.2 Diversion Services: The City/County will expand jurisdiction-wide waste diversion services to include, for example, single stream curbside recycling, and curbside recycling of food and greenwaste.

WRD-2.3 Construction and Demolition Waste: The City/County will adopt a Construction and Demolition Waste Recovery Ordinance, requiring building projects to recycle or reuse a minimum percentage of unused or leftover building materials, including:

2.3.1 Require all new development and major rehabilitation projects (additions of 25,000 square feet commercial or 100,000 square feet industrial) to recycle or salvage XX% of non-hazardous construction and demolition debris (excluding excavated soil and land-clearing debris);

2.3.2 Require preparation of a construction waste management plan identifying materials to be diverted from disposal, and how material will be stored and handled;

2.3.3 Establish clear and consistent guidelines for calculation methods, recordkeeping, and reporting to document compliance with the plan;

2.3.4 Establish clear and consistent guidelines for how and when used construction materials can be used in new or remodel construction.

WRD-2.4 Reuse Center: The City/County will establish a reuse/recycling center where furniture, appliances, building materials, and other useful, non-hazardous items may be dropped off or purchased for a nominal fee.

WRD-2.5 Program Promotion: The City/County will promote and expand recycling programs, purchasing policies, and employee education to reduce the amount of waste produced.

Objective WRD-3: The City/County will enhance regional coordination on waste management.

WRD-3.1 Regional Coordination: The City/County will coordinate with other agencies in its region to develop and implement effective waste management strategies and waste-to-energy technologies.

Conservation and Open Space Policies

Goal: Conserve natural resources such as water and open space to minimize energy used and GHG emissions and to preserve and promote the ability of such resources to remove carbon from the atmosphere.

Objective COS-1: The City/County will adopt and implement a comprehensive strategy to increase water conservation and the use of recycled water.

COS-1.1 Water Consumption Reduction Target: The City/County will reduce per capita water consumption by X% by 2020.

COS-1.2 Water Conservation Plan: The City/County will establish a water conservation plan that may include such policies and actions as:

1.2.1 Tiered rate structures for water use;

1.2.2 Restrictions on time of use for landscape watering, and other demand management strategies;

1.2.3 Performance standards for irrigation equipment and water fixtures;

1.2.4 Requirements that increased demand from new construction be offset with reductions so that there is no net increase in water use.

COS-1.3 Recycled Water Use: The City/County will establish programs and policies to increase the use of recycled water, including:

1.3.1 Create an inventory of non-potable water uses within the jurisdiction that could be served with recycled water;

1.3.2 Produce and promote the use of recycled water for agricultural, industrial, and irrigation purposes, including grey water systems for residential irrigation;

1.3.3 Produce and promote the use of treated, recycled water for potable uses where GHG emissions from producing such water are lower than from other potable sources.

COS-1.4 Water Conservation Outreach: The City/County will implement a public education and outreach campaign to promote water conservation, and will highlight specific water-wasting activities to discourage, such as the watering of non-vegetated surfaces and using water to clean sidewalks and driveways.

Objective COS-2: The City/County will ensure that building standards and permit approval processes promote and support water conservation.

COS-2.1 Water-Efficient Design: The City/County will establish building design guidelines and criteria to promote water-efficient building design, including minimizing the amount of non-roof impervious surfaces around the building(s).

COS-2.2 Water-Efficient Infrastructure and Technology: The City/County will establish menus and check-lists for developers and contractors to ensure water-efficient infrastructure and technology are used in new construction, including low-flow toilets and shower heads, moisture-sensing irrigation, and other such advances.

COS-2.3 Gray Water System Standards: The City/County will establish criteria and standards to permit the safe and effective use of gray water (on-site water recycling), and will review and appropriately revise, without compromising health and safety, other building code requirements that might prevent the use of such systems.

Objective COS-3: The City/County will establish programs and policies to ensure landscaping and forests are installed and managed to optimize their climate benefits.

COS-3.1 Water-Efficient Landscapes: The City/County will install water-efficient landscapes and irrigation, including:

3.1.1 Planting drought-tolerant and native species, and covering exposed dirt with moisture-retaining mulch;

3.1.2 Installing water-efficient irrigation systems and devices, including advanced technology such as moisture-sensing irrigation controls;

3.1.3 Installing edible landscapes that provide local food.

COS-3.2 Shade Tree Planting: The City/County will promote the planting of shade trees and will establish shade tree guidelines and specifications, including:

3.2.1 Recommendations for tree planting based on the land use (residential, commercial, parking lots, etc.);

3.2.2 Recommendations for tree types based on species size, branching patterns, whether deciduous or evergreen, whether roots are invasive, etc.;

3.2.3 Recommendations for placement, including distance from structures, density of planting, and orientation relative to structures and the sun.

COS-3.3 Urban Forestry Management: The City/County will develop an Urban Forestry Program to consolidate policies and ordinances regarding tree planting, maintenance, and removal, including:

3.3.1 Establish a tree-planting target and schedule to support the goals of the California Climate Action Team to plant 5 million trees in urban areas by 2020;

3.3.2 Establish guidelines for tree planting, including criteria for selecting deciduous or evergreen trees low-VOC-producing trees, and emphasizing the use of drought-tolerant native trees and vegetation.

Objective COS-4: The City/County will establish policies and programs to develop and preserve conservation areas, including forested areas, agricultural lands, wildlife habitat and corridors, wetlands, watersheds, and groundwater recharge areas, that remove and sequester carbon from the atmosphere.

COS-4.1 Conservation Area Development: The City/County will establish programs and funding mechanisms to create protected conservation areas, including:

4.1.1 Imposing mitigation fees for development on lands that would otherwise be conservation areas, and use the funds generated to protect other areas from development;

4.1.2 Proposing for voter approval a small tax increment (e.g., a quarter cent sales tax, perhaps for a finite time period that could be renewed) to fund the purchase of development rights in conservation areas, or purchase of the land outright.

COS-4.2 Conservation Area Preservation: The City/County will establish policies to preserve existing conservation areas, and to discourage development in those areas.

Education and Outreach Policies

Goal: Increase public awareness of climate change and climate protection challenges, and support community reductions of GHG emissions through coordinated, creative public education and outreach, and recognition of achievements.

Objective EO-1: The City/County will establish a coordinated, creative public outreach campaign, including publicizing the importance of reducing GHG emissions and steps community members can take to reduce their individual impacts.

EO-1.1 **Outreach Methods:** The City/County will use a variety of media and methods to promote climate awareness and GHG reduction, including:

1.1.1 TV and radio spots with local celebrities and community leaders;

1.1.2 Advertising "Green Tips" in the local paper;

1.1.3 Collaborating with utilities, business associations, civic groups, and non-profits to place tips and articles in billing materials or newsletters;

1.1.4 Designing and maintaining an interactive Climate Protection website and collaborating with other organizations to link to the website.

EO-1.2 **Outreach Topics:** The City/County will coordinate with other agencies and outreach efforts to align messages on topics such as:

1.2.1 Energy efficiency and conservation, and green energy;

1.2.2 Trip reduction, public transit, carpooling, vanpooling, and alternative modes of transportation;

1.2.3 Green building and energy-efficient design;

1.2.4 Waste reduction, recycling, and composting;

1.2.5 Water conservation and water-efficient design and products;

1.2.6 The benefits of buying local, and information about locally grown, prepared, and manufactured goods and local services.

Objective EO-2: The City/County will work with local businesses and energy providers on specific, targeted outreach campaigns and incentive programs.

EO-2.1 **Energy Efficiency Campaigns:** The City/County will collaborate with local energy suppliers and distributors to establish energy conservation

programs, Energy Star® appliance change-out programs, rebates, vouchers, and other incentives to install energy-efficient technology and products and to cooperate on advertising.

EO-2.2 **Pedestrian and Bicycle Promotion:** The City/County will work with local community groups and downtown business associations to organize and publicize walking tours and bicycle events, and to encourage pedestrian and bicycle modes of transportation.

Objective EO-3: The City/County will organize events and workshops to promote GHG-reducing activities.

EO-3.1 **Waste Reduction:** The City/County will organize workshops on waste reduction activities for the home or business, such as backyard composting, or office paper recycling, and will schedule recycling dropoff events and neighborhood chipping/mulching days.

EO-3.2 **Water Conservation:** The City/County will organize workshops on water conservation activities, such as selecting and planting drought-tolerant, native plants in landscaping, and installing advanced irrigation systems.

EO-3.3 **Energy Efficiency:** The City/County will organize workshops on steps to increase energy efficiency in the home or business, such as weatherizing the home or building envelope, installing smart lighting systems, and how to conduct a self-audit for energy use and efficiency.

EO-3.4 **Climate Protection Summit/Fair:** The City/County will organize an annual Climate Protection Summit or Fair, to educate the public on current climate science, projected local impacts, and local efforts and opportunities to reduce GHG emissions, including exhibits of the latest technology and products for conservation and efficiency.

EO-3.5 **Schools Programs:** The City/County will develop and implement a program to present information to school children about climate change and ways to reduce GHG emissions, and will support school-based programs for GHG reduction, such as school based trip reduction and the importance of recycling.

Objective EO-4: The City/County will sponsor competitions and awards to encourage GHG reductions and recognize success.

EO-4.1 **Climate Champions Awards:** The City/County will establish a Climate Champions Awards program to acknowledge outstanding private and public efforts to reduce GHG emissions.

EO-4.2 **GHG Reduction / Climate Protection Competitions:** The City/County will sponsor competitions and contests with prizes for promoting climate protection and reducing GHG emissions, including such contests as:

4.2.1 Poster contests at schools, with winning entrants receiving scholarship grants and recognition at the Climate Protection Summit/Fair, and posters used in outreach campaigns or compiled in calendars;

4.2.2 Waste diversion contests between schools, businesses, civic organizations, and Scout troops or other groups, with prizes for the greatest percent waste diverted and recognition at the Climate Protection Summit/Fair, and similar contests for planting trees, reducing vehicle trips, or other desired behaviors;

4.2.3 Walkathons, relays, or other similar fundraising challenges, with funds raised to support community climate protection programs and activities.

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Table 2: Worksheet for Model Policies Evaluation

Greenhouse Gas Reduction Planning Policies							
Goal: Reduce GHG emissions from all activities within the City/County boundaries to support the State's efforts under AB32 and to mitigate the impact of climate change on the City/County, State, and world.							
Objective: GHG-1 By 2020, the City/County will reduce greenhouse gas emissions from within its boundaries to a level 30% less than the level that would otherwise occur if all activities continued under a "business as usual" scenario, or to a level 15% less than the levels in 2009.							
Model Policy #	Policy Name/ Subject Area	Implementation Examples (click on link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
GHG-1.1	Emissions Inventories	Cal Poly Pomona GHG inventory	Conservation				
GHG-1.1.1	Baseline Inventory	San Carlos	Conservation				
GHG-1.1.2	Business As Usual Scenario	San Carlos	Conservation				
GHG-1.2	Climate Action Plan (CAP)		Conservation				
GHG-1.2.1	Municipal CAP	San Carlos City of Los Angeles City of Santa Monica – Sustainable City Progress City of Calabasas Issue Paper on GHG Reduction Strategies City of Santa Monica Sustainable Strategies Green County San Bernardino City of Huntington Beach	Conservation				
GHG-1.2.2	Business CAP	The Walt Disney Corporation	Conservation				
GHG-1.2.3	Community CAP	San Carlos	Conservation				
GHG-1.1A	Emissions Inventory Alternative		Conservation				
GHG-1.1	Baseline Inventory – alt		Conservation				
GHG-1.2A	Climate Action Plan (CAP) Alternative		Conservation				
GHG-1.2.1A	Municipal CAP - alt		Conservation				
GHG-1.2.2A	Business CAP - alt		Conservation				
GHG-1.2.3A	Community CAP - alt		Conservation				
Objective: GHG-2 The City/County will ensure that its local Climate Action, Land Use, Housing, and Transportation Plans are aligned with, support, and enhance any regional plans that have been developed consistent with state guidance to achieve reductions in GHG emissions.							
GHG-2.1	Sustainable Communities/ Regional Blueprint	Institute for Local Government Strategies	Land Use/ Circulation				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Land Use and Urban Design Policies							
Goal: Promote land use strategies that decrease reliance on automobile use, increase the use of alternative modes of transportation, and reduce emissions of GHGs.							
Objective: LU-1 The City/County will adopt and implement a development pattern that enhances non-automobile transportation.							
Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
LU-1.1	Urban Growth Boundary	County of Santa Clara Urban Growth Boundary Portland Metropolitan Area Petaluma 2025 General Plan Land Use GOAL 1-G-3: Maintain a well-defined boundary at the edge of urban development. Page 1-15 Land Use GOAL 1-G-4: Urban Growth Boundary Maintain a parcel-specific Urban Growth Boundary. Page 1-17	Land Use / Open Space				
LU-1.1.1	Location of Urban Development		Land Use / Open Space				
LU-1.1.2	Timing of Urban Development		Land Use / Open Space				
LU-1.2	Reserve Limits	Agricultural Land Reserve	Land Use				
LU-1.3	Infill	Smart Infill Greenbelt Alliance State of California Interim Hearing: Best Practices Successful Infill Development Marin Countywide Plan Goal CD-6 Page 3-30, Community Development, Built Environment Element	Land Use				
LU-1.4	Urban Service Lines	Santa Cruz County Urban Services Line	Land Use				
LU-1.4.1	Urban-Rural Transition Zone		Land Use				
LU-1.5	Density	City of Pasadena 2004 General Plan	Land Use				
LU-1.5.1	Barriers to Accessory Units		Land Use				
LU-1.6	Road Width		Circulation				
LU-1.7	Parking Spaces	Victoria Transport Policy Institute Parking Management Los Angeles Department of Transportation Parking and Smart Growth Study MTC Parking Best Practices see page 29 through fin MTC Parking Toolbox see page 29-33 Parking Policy Transit Oriented Development: Lessons for Cities Transit Agencies & Developers	Land Use				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
LU-1.8	Bicycle Facilities	San Francisco Municipal Transportation Authority Bicycle Parking San Francisco Bicycle Coalition Bike Parking at Work Alameda Bicycle	Circulation				
LU-1.9	Levels of Service	San Francisco Department of Public Health 1 / 2 San Francisco County Transportation Authority 1 / 2	Land Use				
Objective: LU-2 Promote infill, mixed use, and higher density development, and provide incentives to support the creation of affordable housing in mixed use zones.							
LU-2.1	Mixed-Use Development	Marin Countywide Plan Goal CD-8, Policy CD 8.7 Page 3-39, Community Development, Built Environment Element Goal DES-2, DES-3, Community Development, Built Environment Element Page 3-84	Land Use				
LU-2.1.1	Site-Specific Standards		Land Use				
LU-2.1.1.1	Allowable Building Height		Land Use				
LU-2.1.1.2	Flexible Development Standards		Land Use				
LU-2.1.1.3	Additive Residential Component/ Eliminate Density		Land Use				
LU-2.1.1.4	Reduced and Shared Parking		Land Use				
LU-2.1.1.5	Tandem and Offsite Parking		Land Use				
LU-2.1.1.6	Unbundle Parking from Leases		Land Use				
LU-2.1.1.7	Parking Benefit Districts		Land Use				
LU-2.1.1.8	Performance Pricing of Parking		Land Use				
LU-2.1.2	Supportive Pre-planning		Land Use				
LU-2.1.3	Prototype Adaptive Use Buildings		Land Use				
LU-2.1.4	Facilitate Complementary Uses		Land Use				
LU-2.1.5	Employer-Assisted Housing		Housing				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
LU-2.1.6	Services Near Employment Centers		Land Use				
LU-2.1.7	Form-based Standards		Land Use				
LU-2.1.8	Non-segregated Affordable Housing		Land Use				
Objective LU-3 Promote greater linkage between land uses and transit, as well as other modes of transportation.							
LU-3.1	Housing Overlay Zone	Marin Countywide Plan Goal CD-2, Policy CD-2.3; Page 3-15, Community Development, Built Environment Element	Land Use				
LU-3.2	Transit-oriented Mixed-use	US Federal Highway Administration: Fruitvale Transit Village Project Marin Countywide Plan Goal DES-2 Page 3-60, Community Design, Built Environment Element Smart Communities Network Transit Strategies	Land Use				
LU-3.2.1	Amend Code to Promote Transit-oriented Mixed-use		Land Use				
LU-3.2.2	Rezone to Allow Mixed Use		Land Use				
LU-3.2.3	Expand Zoning for Multi-Family Housing		Land Use				
LU-3.2.4	Flexible Parking & Bldg. Height		Land Use				
LU-3.2.5	Density Bonus Programs	County of San Diego Density Bonus Program	Land Use				
LU-3.2.6	Guidelines for Private/Public Spaces		Land Use				
LU-3.2.7	Incentives for Redevelopment	City of Knoxville Downtown Incentives	Land Use				
LU-3.2.8	Pedestrian/ Bicycle Connectivity		Land Use				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
LU-3.2.9	Parking Benefit Districts		Land Use				
LU-3.2.10	Performance Pricing for Parking		Land Use				
LU-3.2.11	Discourage Auto-oriented Development		Land Use				
LU-3.3	Transit-oriented Brownfield Development	Marin Countywide Plan Goal CD-6, Page 3-31, Community Development, Built Environment Element Multi Housing News Case Study Windsor, Ontario Brownfield's Strategy	Land Use				
LU-3.4	Public Transit Development Focus	Marin Countywide Plan Goal DES-2 Page 3-60, Community Design, Built Environment Element Victoria Transport Policy Institute 21 TOD Projects in California - Caltrans MTC - 10 Transit Oriented Development Profiles	Land Use				
LU-3.4.1	Density Near Activity Centers	City of Sacramento Smart Growth Strategy	Land Use				
LU-3.4.2	Density Near Transit Routes		Land Use				
LU-3.4.3	Links to Transit Stops		Land Use				
LU-3.5	City-centered Corridors	Map of Marin County	Land Use				
LU-3.6	Transit-oriented Development Design Standards		Land Use				
LU-3.7	Affordable Housing		Land Use				
Objective: LU-4 Promote development and preservation of neighborhood characteristics that encourage walking and bicycle riding in lieu of automobile-based travel.							
LU-4.1	Pedestrian-oriented Character	City of Los Angeles	Land Use				
LU-4.1.1	Design Short Walk to Center		Land Use				
LU-4.1.2	Increase Density Towards Center		Land Use				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
LU-4.1.3	Direct Business Space to Center		Land Use				
LU-4.1.4	Pedestrian Only Streets/Plazas	Urban Design International Santa Monica's Third Street Promenade Abstract	Circulation				
LU-4.1.5	Flexible Parking for Streetscape		Circulation				
LU-4.1.6	Continuous Separated Sidewalks		Circulation				
LU-4.1.7	Bike/Walk Paths to Parks		Circulation				
LU-4.2	Pedestrian Access	City of Los Angeles Marin Countywide Plan Goal TR-2 Page 3-159, Transportation, Built Environment Element	Circulation				
LU-4.2.1	Connectivity of Development		Land Use				
LU-4.2.2	Balanced Mix of Development	Petaluma 2025 General Plan Goal 1-G-1, page 1-14; Maintain a balanced land use program that meets the long-term residential, employment, retail, institutional, education, recreation, and open space needs of the community.	Land Use				
LU-4.2.3	Locate Schools w/ Safe Routes	Transportation Authority of Marin Safe Routes to Schools Transform Safe Routes to School	Land Use				
LU-4.2.4	Entrances to New Development		Land Use				
LU-4.2.5	Location of Driveways		Land Use				
LU-4.2.6	Street Parking as Buffer		Land Use				
LU-4.2.7	Pedestrian/ Bicycle Connectivity		Land Use				
LU-4.2.8	Develop Pedestrian Connectors		Land Use				
LU-4.2.9	Grade-separated Crossings		Land Use				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
Objective LU-5 Review fee structures and other opportunities to provide financial and administrative incentives to support desired land uses, development patterns, and alternative modes of transportation.							
LU-5.1	Developer Fees	ABAG memo to JPC PolicyLink Infill bonuses and Incentives Brownfields Smart Growth Incentives & Loans for Businesses – New Jersey	Land Use				
LU-5.1.1	Proportional to Distance from Center		Land Use				
LU-5.1.2	Incentivize Mixed Use		Land Use				
LU-5.1.3	Reduce fees for Brownfield Redevelopment		Land Use				
LU-5.1.4	Fees for Greenfield Development		Land Use				
LU-5.2	Admin. Fees & Streamlining		Land Use				
LU-5.3	Incentives & Loans		Land Use				
LU-5.4	Infrastructure Preference		Land Use				
Objective LU-6 The City/County will mitigate climate change by decreasing heat gain from pavement and other hard surfaces associated with infrastructure.							
LU-6.1	Hardscape Heat Gain	Cool Houston Plan	Land Use				
LU-6.1.1	Reduce Pavement Widths		Circulation				
LU-6.1.2	Include Parkway Strips		Circulation				
LU-6.1.3	Shade Trees on South and West		Land Use				
LU-6.1.4	Replace Hardscape with Low-Water Landscape		Land Use				
LU-6.1.5	Cool Roofs & Paving	Cool Houston Plan Cool Roof Rating Council	Land Use				
LU-6.1.6	Pervious Pavement Standards		Land Use				
LU-6.1.7	Xeriscaping		Land Use				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Transportation Policies							
Goal: Reduce GHG emissions by reducing vehicle miles traveled and by increasing or encouraging the use of alternative fuels and transportation technologies.							
Objective: TR-1 The City/County will reduce VMT-related emissions by encouraging the use of public transit through adoption of new development standards that will require improvements to the transit system and infrastructure, increase safety and accessibility, and provide other incentives.							
Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
TR-1.1	Transportation Planning	San Francisco Municipal Transportation Authority	Circulation				
TR-1.1.1	Project Selection						
TR-1.1.2	Equal Pedestrian Access		Circulation				
TR-1.1.3	Public Involvement		Circulation				
TR-1.2	System Interconnectivity	San Francisco Municipal Transportation Authority	Circulation				
TR-1.2.1	Multi-modal Transportation Ctrs.	RTD Fastracks	Circulation				
TR-1.2.2	Provide Transportation Options	City of Santa Monica Sustainable Transportation	Circulation				
TR-1.2.3	Extend Transit Service & Hours	King County Night Service	Circulation				
TR-1.2.3A	Focus Transit Resources		Circulation				
TR-1.2.4	Coordinate Across Service Lines	RTD Fastracks	Circulation				
TR-1.2.5	Support "Transit Cars"	King County Free Transit Area	Circulation				
TR-1.2.6	Free Transit Feasibility		Circulation				
TR-1.2.7	Transit Preference Measures		Circulation				
TR-1.2.8	Safe Access Along Major Streets		Circulation				
TR-1.2.9	Park-and-ride Locations		Circulation				
TR-1.3	System Infrastructure	RTD Fastracks	Circulation				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
TR-1.3.1	Efficient, Convenient Bus Stops		Circulation				
TR-1.3.2	Bus Stop Signage & Access		Circulation				
TR-1.3.3	Safe, Clean, Lighted Bus Stops		Circulation				
TR-1.3.4	Transit Station Locations		Circulation				
TR-1.4	Customer Service		Circulation				
TR-1.4.1	Develop Regional Pass System	Bay Area Translink	Circulation				
TR-1.4.2	Implement Smart Bus Technology	AC Transit	Circulation				
TR-1.4.3	Online Trip Planning		Circulation				
TR-1.5	Transit Funding		Circulation				
TR-1.5.1	Funding Preference for Transit		Circulation				
TR-1.5.2	Evaluate Feasible Alternatives		Circulation				
TR-1.6	Transportation Impact Fees	San Francisco County Transportation Authority Transportation Impact Fee	Circulation				
Objective: TR-2 The City/County will implement traffic and roadway management strategies to improve mobility and efficiency, and reduce associated emissions.							
TR-2.1	System Monitoring		Circulation				
TR-2.2	Arterial Traffic Mgt.		Circulation				
TR-2.3	Signal Synchronization		Circulation				
TR-2.4	HOV Lanes	MTC Riverside County Transportation Commission SANBAG HOV	Circulation				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
TR-2.5	Delivery Schedules		Circulation				
Objective: TR-3 The City/County will reduce VMT-related emissions by implementing and supporting trip reduction programs.							
TR-3.1	Ride-Share Programs	King County Ride Share Program UC Irvine Transportation Services	Circulation				
TR-3.1.1	Designated Ride-share Parking		Circulation				
TR-3.1.2	Provide Loading, Unloading, & Waiting Areas		Circulation				
TR-3.1.3	Ride Coordination Support	San Francisco Car and Van Pool	Circulation				
TR-3.1.4	Support Car-sharing Services	San Francisco Car Sharing	Circulation				
TR-3.1.5	Ride-share Coordinator	South Coast AQMD Rule 2202	Circulation				
TR-3.2	Employer-based Trip Reduction	San Francisco Transit Benefit Ordinance	Circulation				
TR-3.2.1	Support Ride-share Organizations	South Coast AQMD Rule 2202	Circulation				
TR-3.2.2	Support Ride-share Legislation		Circulation				
TR-3.2.3	Support Transp. Mgt. Assns.		Circulation				
TR-3.2.4	Recognize Effective Programs		Circulation				
TR-3.3	Ride Home Programs	San Francisco Emergency Ride Home Metro Transit Rider Programs	Circulation				
TR-3.4	Local Area Shuttles	City of Burlingame Public Transportation Caltrain Shuttle Services	Circulation				
TR-3.4.1	Reduced-cost Shuttle Service		Circulation				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
TR-3.4.2	Shuttle Service Coordination		Circulation				
TR-3.5	Low- and No-Travel Employment Opportunities		Circulation				
TR-3.5.1	Zoning & Codes for Live-Work		Land Use				
TR-3.5.2	Support Telecommuting	San Francisco Telecommuting Policy	Circulation				
TR-3.6	Congestion Pricing		Circulation				
Objective TR-4 The City/County will support bicycle use as a mode of transportation by enhancing infrastructure to accommodate bicycles and riders, and providing incentives.							
TR-4.1	Development Standards for Bicycles	San Francisco Municipal Transportation Authority Bicycle Plan	Circulation				
TR-4.1.1	Amend Code to Accommodate Bikes & Pedestrians	San Francisco Municipal Transportation Authority Livable Streets Caltrans Pedestrian & Bicycle Facilities in CA	Circulation				
TR-4.1.1.1	"Complete Streets" Policies	San Francisco Municipal Transportation Authority Livable Streets	Circulation				
TR-4.1.1.2	Include Access thru Easements		Circulation				
TR-4.1.1.3	Dedicated Bike/Pedestrian Paths	New York City Transportation City of Berkeley Transportation	Circulation				
TR-4.1.1.4	Safe Road Crossings	City of Berkeley Transportation	Circulation				
TR-4.1.1.5	Bicycle Parking	King County Bike Facilities City of Albuquerque Biking & Walking	Circulation				
TR-4.1.1.6	Street Standards for Bike Parking		Circulation				
TR-4.1.2	Bike Facilities in New Development	King County Bike Facilities	Circulation				
TR-4.1.2.1	Weather Protected Bike Parking		Circulation				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
TR-4.1.2.2	Changing Rooms, Showers, etc.		Circulation				
TR-4.1.3	Prohibit Projects that Impede Bicycle/ Pedestrian Transit		Circulation				
TR-4.1.4	Bicycle Support Services	San Francisco Municipal Transportation Authority Bicycle Plan	Circulation				
TR-4.1.5	Connectivity Analysis		Circulation				
TR-4.2	Bicycle and Pedestrian Trails	City of Berkeley Transportation City of Albuquerque Biking & Walking	Circulation				
TR-4.3	Bicycle Safety Program	City of Berkeley Transportation California DMV Bike Rules and Safety	Circulation				
TR-4.4	Bicycle and Pedestrian Project Funding		Circulation				
TR-4.5	Bicycle Parking		Circulation				
TR-4.4.1	Apply for Infrastructure Grants	City of Olympia Neighborhood Sustainability Grants	Circulation				
TR-4.4.2	Devel. Exactions & Impact Fees		Circulation				
TR-4.4.3	Redeploy Existing Revenues		Circulation				
Objective TR-5 The City/County will establish parking policies and requirements that capture the true cost of private vehicle use and support alternative modes of transportation.							
TR-5.1	Parking Policy	Redwood City Downtown Parking Management Plan MTC Parking Best Practices	Land Use				
TR-5.1.1	More Parking for Shared Vehicles		Land Use				
TR-5.1.2	Eliminate/ Reduce Parking Minimums	City of Alameda Memo Parking Management Strategy	Land Use				
TR-5.1.3	Require Unbundled Parking	City of Santa Monica Transportation Management	Land Use				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
TR-5.1.4	Increase Parking Rates	Redwood City	Land Use				
TR-5.1.5	Limit Parking Times		Circulation				
TR-5.1.6	Performance Pricing of Parking		Circulation				
TR-5.1.7	Shared Parking		Circulation				
TR-5.2	Event Parking Policies	San Francisco Municipal Transportation Agency Events Parking City of Berkeley Special Events Parking	Circulation				
TR-5.2.1	Promote Peripheral Parking		Circulation				
TR-5.2.2	Transit Discounts to Events		Circulation				
TR-5.2.3	Carpool Parking at Events		Circulation				
TR-5.2.4	Valet Bike Parking at Events	Secure Valet Bike Parking	Circulation				
TR-5.3	Parking Cash-out Program	City of Santa Monica Transportation Management	Circulation				
TR-5.4	Elec./Alt. Fuel Vehicle Policies	City of Albuquerque Alternative Fuels Program	Circulation				
Objective TR-6 The City/County will support and promote the use of low and zero emission vehicles, and alternative fuels, and other measures to directly reduce emissions from motor vehicles.							
TR-6.1	Low and Zero Emission Vehicles	City of Olympia Sustainability City of Columbus Green Fleet	Circulation				
TR-6.1.1	Electric & Alt. Fuel Infrastructure	San Francisco Municipal Transportation Agency Clean Air Initiatives	Circulation				
TR-6.1.2	Charging Access in New Development		Circulation				
TR-6.1.3	Fleet Standards	San Jose Green Fleet Policy	Circulation				
TR-6.1.4	Elec./Alt Fuel Taxicab Incentives		Circulation				
TR-6.2	Vehicle Idling	Minneapolis Anti Idling Ordinance	Circulation				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Energy Efficiency Policies							
Goal: Reduce emissions from the generation of electricity by reducing electricity use through increased efficiency.							
Objective: EE-1 The City/County will establish green building requirements and standards for new development and redevelopment projects, and will work to provide incentives for green building practices and remove barriers that impede their use.							
Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
EE-1.1	Green Building Ordinance	Berkeley Residential Energy Conservation Ordinance San Francisco Residential Energy Conservation Ordinance Rohnert Park Green Building Ordinance City of Los Angeles – Green Building	Conservation				
EE-1.2	Green Building Flexibility	Santa Monica	Conservation				
EE-1.3	Green Building Barriers		Conservation				
EE-1.4	Green Building Incentives	Arlington Green Building Incentives Matrix of Examples Build It Green Examples	Conservation				
EE-1.4.1	Information, Training, & Technical Assistance	Mothers of East LA Local group, environmental awareness, green business	Conservation				
EE-1.4.2	Guidelines for Green Building	Build It Green Guidelines and Checklist	Conservation				
EE-1.4.3	Financial Incentives		Conservation				
Objective: EE-2 The City/County will establish policies and standards to increase energy efficiency at new developments.							
EE-2.1	Improved Building Standards	City of Boulder Residential Building Guide	Conservation				
EE-2.1.1	"Cool Roofs" Standards	CA Title 24 2008 Update	Conservation				
EE-2.1.2	Building Envelope Heat Transfer		Conservation				
EE-2.1.3	High-Efficiency Plumbing	Alliance for Water Efficiency	Conservation				
EE-2.1.4	High-Efficiency Heating & Cooling	Solano County Green Building Ordinance	Conservation				
EE-2.1.5	Overall Lighting Efficiency	San Francisco Fluorescent Lighting Efficiency Ordinance Chittenden County, VT Lighting Program	Conservation				
EE-2.1.6	Energy Star® Appliances	Palm Desert Ord. 1124 Section 24.30.050	Conservation				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
EE-2.1.7	Orientation of New Lots		Conservation				
EE-2.2	Affordable Housing Energy Efficiency	The Chicago Housing Authority Energy Cost Savings Program City of Denver	Housing Conservation				
EE-2.2.1	Redevelopment Grants		Housing Conservation				
EE-2.3	Outdoor Lighting	Chittenden County, VT Lighting Program	Land Use Conservation*				
EE-2.3.1	Outdoor Lighting Efficiency Standards		Conservation See EE-2.3				
EE-2.3.1.1	Full Cut-off Fixtures		Conservation See EE-2.3				
EE-2.3.1.2	Photocells or Timed Switches		Conservation See EE-2.3				
EE-2.3.1.3	Directional/ Shielded LED Lights		Conservation See EE-2.3				
EE-2.3.2	Light Level Standards		Land Use Conservation				
EE-2.3.3	Urban/Rural Light Levels		Land Use Conservation				
EE-2.3.4	Prohibit Continuous Lighting		Land Use Conservation				
EE-2.4	Residential Wood Burning	Bay Area AQMD	Conservation*				
Objective: EE-3 The City/County will establish policies and standards to reduce exterior heat gain and heat island effects.							
EE-3.1	Exterior Heat Gain	Cool Houston Plan Page 5	Land Use Conservation*				
EE-3.1.1	50% Paved Surface Shading	City of Fresno Performance Standard for Parking Lot Shading	Land Use Conservation				
EE-3.1.2	Standards for Paving Materials	New Jersey Standard for Paving	Land Use Conservation				
EE-3.1.3	Standards for Roofing Materials	CA Title 24 2008 Update	Land Use Conservation				

* Best-judgment category, i.e. depending on city/county circumstances and scope of General Plan elements, policy could also be included in other mandatory element or in other optional element

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click on link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
EE-3.2	Heat Island Mitigation	Cool Houston Plan City of Chicago	Land Use Conservation				
Objective EE-4 The City/County will pursue policies and programs to improve energy efficiency of existing buildings.							
EE-4.1	Energy Audits	Austin Energy Audits	Energy*				
EE-4.2	Energy Efficiency Funding	City of Ann Arbor	Energy				
EE-4.3	Community Energy Program	Community Energy Services Corporation Portland Community Energy Project	Energy				
EE-4.3.1	"Energy Efficiency Challenge"		Energy				
EE-4.3.2	Low-income Weatherization Assistance	Portland Block by Block Weatherization Program	Energy, Housing				
EE-4.3.3	Conservation Campaigns	Ashland Conservation Program	Energy				
EE-4.3.4	Promote Energy Star®		Energy				
EE-4.3.5	Promote "Green Business"	Ashland Conservation Program San Francisco Green Business Program	Energy, Economic Development*				
EE-4.3.6	Distribute Free CFL Bulbs, etc.	Los Angeles Department of Water and Power	Energy				
EE-4.3.7	Exchange Programs for High-Energy Bulbs/Fixtures	Marin County (torchiere exchange), many cities, EPA Change A Light Campaign	Energy				
EE-4.3.8	Require Point of Sale Energy Upgrades	Berkeley RECO Berkely CECO San Francisco RECO	Energy				

* Best-judgment category, i.e. depending on city/county circumstances and scope of General Plan elements, policy could also be included in other mandatory element or in other optional element

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Alternative Energy Policies							
Goal: The City/County will seek to reduce emissions associated with electrical generation by promoting and supporting the generation and use of alternative energy.							
Objective: AE-1 The City/County will establish policies and programs that facilitate the siting of new renewable energy generation.							
Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
AE-1.1	Site Designation		Energy, Land Use				
AE-1.1.1	Renewable Energy Devel. Sites		Energy, Land Use				
AE-1.1.2	Evaluate & Mitigate Constraints		Energy, Land Use				
AE-1.1.3	Protect Renewable Energy Uses		Energy, Land Use				
AE-1.2	Removing Barriers	Ontario, Canada	Energy, Land Use				
AE-1.2.1	Revise Codes, Zoning, Guidance		Energy, Land Use				
AE-1.2.2	Work with Other Agencies		Energy				
AE-1.2.3	Develop Safety Protocols		Energy				
AE-1.3	Zoning Flexibility		Energy, Land Use				
Objective: AE-2 The City/County will promote and require renewable energy generation, and co-generation projects where feasible and appropriate.							
AE-2.1	On-site Renewable Energy Generation	US EPA Renewable Energy Generation Many examples, page 26	Energy				
AE-2.2	Co-Generation Projects	City of Boulder Co-Generation	Energy				
AE-2.3	Green Utilities	Austin Energy Green Riverside	Energy				
Objective AE-3 The City/County will promote, support, and require, as appropriate, the development of solar energy.							
AE-3.1	Solar-ready Buildings	Vancouver, Canada	Energy				
AE-3.1.1	Roof Orientation & Slope	Solar Santa Monica Santa Monica Community Energy Independence Initiative – part of the Solar Santa Monica program	Energy				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click on link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
AE-3.1.2	Clear Access on South Slope		Energy				
AE-3.1.3	Include Roof Framing Support		Energy				
AE-3.1.4	Include Electrical Conduit		Energy				
AE-3.1.5	Include Plumbing and Appliance Space		Energy				
AE-3.2	Solar Homes Partnership		Energy				
AE-3.3	Passive Solar Design	City of Santa Barbara	Energy				
AE-3.4	Protection of Solar Elements	San Jose Solar Access Design Guidelines	Energy, Land Use				
Objective AE-4 The City/County will pursue and provide economic incentives and creative financing for renewable energy projects, as well as other support for community members or developers seeking funding for such projects.							
AE-4.1	Renewable Energy Incentives	City of Santa Clara California Production Incentives for Renewable Energy					
AE-4.2	Creative Financing	City of Berkeley					
AE-4.3	Partnerships	Nevada Southwest Energy Partnership					
AE-4.4	Information & Support	City of Santa Monica page 49 San Diego Regional Energy Office Page 37					
Objective AE-5 The City/County will implement measures to support the purchase and use of renewable and alternative energy.							
AE-5.1	Green Electricity Purchasing	City of Santa Clara					
AE-5.2	Community Choice Aggregation	Marin County Clean Energy					

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Municipal Operations Policies							
Goal: Reduce GHG emissions from municipal facilities and operations, and by purchasing goods and services that embody or create fewer GHG emissions.							
Objective: MO-1 The City/County will enhance the energy efficiency of its facilities.							
Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
MO-1.1	Energy Efficiency Plan	California Energy Commission GHG Reporting Protocol	Energy*				
MO-1.1.1	Conduct Audits		Energy				
MO-1.1.2	Retrofit Facilities		Energy				
MO-1.1.3	Implement Tracking & Mgt.		Energy				
MO-1.1.4	Install Efficient Traffic Signs/ Lights		Energy				
MO-1.1.5	Retrofit Indoor Lighting		Energy				
MO-1.1.6	Retrofit Heating & Cooling Systems		Energy				
MO-1.1.7	Install Energy Star® Appliances		Energy				
MO-1.1.8	Increase Water Pumping Efficiency		Energy				
MO-1.1.9	Chilled, Filtered Water Fountains		Energy				
MO-1.1.10	Centralize, Optimize Irrigation		Energy				
MO-1.1.11	Accelerate Replacement Cycles		Energy				
MO-1.2	Efficiency Requirement for New Facilities		Energy				
MO-1.2.1	LEED Certify New Buildings		Energy				

* Best-judgment category, i.e. depending on city/county circumstances and scope of General Plan elements, policy could also be included in other mandatory element or in other optional element

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click on link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
MO-1.2.2	Energy Star® New Homes Program for Residential Units		Energy				
MO-1.2.3	Incorporate Passive Solar						
MO-1.2.4	Retrofit to Title 24 or Better		Energy				
MO-1.2.5	Decrease Heat Gain		Energy				
MO-1.3	Training & Support		Energy				
MO-1.3.1	Train Design, Engineering, Operations, Maintenance Staff		Energy				
MO-1.3.2	Provide Energy Use Data		Energy				
MO-1.3.3	Provide Energy Design Review		Energy				
Objective: MO-2 The City/County will improve efficiency at municipal systems and reduce GHG emissions from vehicle and equipment engines.							
MO-2.1	Wastewater System Efficiency		Energy*				
MO-2.2	Drinking Water System Efficiency		Energy				
MO-2.3	Fleet Replacement		Energy				
MO-2.4	Small Tools & Equipment		Energy				
Objective MO-3 The City/County will implement measures to reduce employee vehicle trips and to mitigate emissions impacts from municipal travel.							
MO-3.1	Trip Reduction Program		Circulation				
MO-3.1.1	Support Employee Van/ Carpools		Circulation				
MO-3.1.2	Subsidize Mass Transit for Staff		Circulation				

* Best-judgment category, i.e. depending on city/county circumstances and scope of General Plan elements, policy could also be included in other mandatory element or in other optional element

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click on link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
MO-3.1.3	Offer Alt. Work Schedules		Circulation				
MO-3.1.4	Offer Guaranteed Ride Home		Circulation				
MO-3.2	Bicycle Transportation Support		Circulation				
MO-3.2.1	Provide "Bicycle Stations"		Circulation				
MO-3.2.2	Provide Bicycles for Check-out		Circulation				
MO-3.2.3	Implement "Police on Bikes"		Circulation				
MO-3.2.4	Implement Bike Safety Program		Circulation				
MO-3.3	Municipal Parking Mgt.		Circulation				
MO-3.31	Parking for Van/Carpools		Circulation				
MO-3.3.2	Institute Parking Cash-out Program		Circulation				
MO-3.3.3	Eliminate Parking Subsidies		Circulation				
MO-3.3.4	Fees for Private Vehicle Parking		Circulation				
MO-3.3.5	Fees for Single Occ. Vehicles		Circulation				
MO-3.4	Travel Mitigation		Circulation				
MO-3.5	Transit Access to Municipal Facilities		Circulation				
Objective MO-4 The City/County will enhance renewable energy generation, and implement programs for load management and demand response.							
MO-4.1	Load Management & Demand Response		Energy				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
MO-4.2	Renewable Energy Installation		Energy				
MO-4.2.1	Solar Collections Systems		Energy				
MO-4.2.2	Solar Water Heating Systems		Energy				
MO-4.2.3	Waste-to-Energy Systems		Energy				
Objective MO-5 The City/County will manage its vegetation inventory to reduce GHG emissions.							
MO-5.1	Urban Tree Management	Million Trees Los Angeles (considered to be part of GHG program)	Land Use				
MO-5.2	Landscaping		Land Use				
Objective MO-6 The City/County will use its purchasing power to promote reductions in GHG emissions by the suppliers of its goods and services.							
MO-6.1	Purchasing Practices		Energy, Conservation, Municipal Ops*				
MO-6.2	Contracting Practices		See MO-6.1				

* Best-judgment category, i.e. depending on city/county circumstances and scope of General Plan elements, policy could also be included in other mandatory element or in other optional element

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
Waste Reduction and Diversion Policies							
Goal: Reduce GHG emissions from waste through improved management of waste handling and reductions in waste generation.							
Objective: WRD-1 The City/County will improve emissions control at waste handling facilities.							
WRD-1.1	Methane Recovery		Conservation				
WRD-1.2	Waste to Energy	California Energy Commission California Energy Commission Bioenergy Action Plan California Energy Commission Biomass White Paper See Policies, page 29	Conservation				
WRD-1.3	Best Management Practices		Conservation				
Objective: WRD-2 The City/County will implement enhanced programs to divert solid waste from landfill operations.							
WRD-2.1	Diversion Targets	City of San Francisco Zero Waste Targets	Conservation				
WRD-2.2	Diversion Services	Petaluma 2025 General Plan General Plan 4.4 Solid Waste, page 4-10 City of Albuquerque Recycling and Waste Reduction Programs Austin Recycling Ordinance Marin Countywide Plan GOAL PFS-4, Efficient Processing and Reduced Landfill Disposal of Solid Waste. page 3-206	Conservation				
WRD-2.3	Construction & Demolition Waste	San Francisco Construction and Demolition Debris Recovery Program 1 / 2	Conservation				
WRD-2.3.1	Recycle Targets for Large Projects		Conservation				
WRD-2.3.2	Construction Waste Mgt. Plan		Conservation				
WRD-2.3.3	Establish Compliance Methods & Guidelines		Conservation				
WRD-2.3.4	Establish Reuse Guidelines		Conservation				
WRD-2.4	Reuse Center		Conservation				
WRD-2.5	Program Promotion		Conservation				
Objective WRD-3 The City/County will enhance regional coordination on waste management.							
WRD-3.1	Regional Coordination		Conservation				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Conservation and Open Space Policies							
Goal: Conserve natural resources such as water and open space to minimize energy used and GHG emissions and to preserve and promote the ability of such resources to remove carbon from the atmosphere.							
Objective: COS-1 The City/County will adopt and implement a comprehensive strategy to increase water conservation and the use of recycled water.							
Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
COS-1.1	Water Consumption Reduction Target	City of Sacramento Urban Water Management Plan 1 / 2					
COS-1.2	Water Conservation Plan	Green County San Bernardino					
COS-1.2.1	Tiered Rate Structure						
COS-1.2.2	Time-of-use Restrictions						
COS-1.2.3	Performance Standards						
COS-1.2.4	Offset New Demand						
COS-1.3	Recycled Water Use	City of San Jose Water Conservation & Recycling Honolulu Ecology of Wastewater					
COS-1.3.1	Non-potable Use Inventory	City of Olympia					
COS-1.3.2	Promote Recycled Water Use	City of Olympia Reclaimed Water					
COS-1.3.3	Potable Recycled Water Use	City of Olympia					
COS-1.4	Water Conservation Outreach	Albuquerque Bernalillo County Water Utility Authority					
Objective: COS-2 The City/County will ensure that building standards and permit approval processes promote and support water conservation.							
COS-2.1	Water Efficient Design	City of Minneapolis Green Initiatives	Conservation				
COS-2.2	Water Efficient Infrastructure & Technology	City of Santa Barbara Water Conservation Sustainable Options	Conservation				
COS-2.3	Gray Water System Standards		Conservation				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
Objective COS-3 The City/County will establish programs and policies to ensure landscaping and forests are installed and managed to optimize their climate benefits.							
COS-3.1	Water-Efficient Landscapes	Stop Waste Model Ordinance Landscaping	Conservation				
COS-3.1.1	Drought Resistant Planting		Conservation				
COS-3.1.2	High-Efficiency Irrigation	City of Santa Barbara Water Conservation	Conservation				
COS-3.1.3	Installing Edible Landscapes		Conservation				
COS-3.2	Shade Tree Planting	City of Albuquerque Urban Forestry	Conservation				
COS-3.2.1	Recommend Plants by Land Use	City of Seattle Tree and Landscaping Regulations	Conservation				
COS-3.2.2	Consider Tree Characteristics	City of Albuquerque Tree Planting	Conservation				
COS-3.2.3	Recommend Placement		Conservation				
COS-3.3	Urban Forestry Management	City of Seattle Urban Forest Management Plan	Conservation, Open Space				
COS-3.3.1	Set Tree Planting Target	Raleigh Tree Planting Program	Conservation				
COS-3.3.2	Establish Planting Guidelines	City of Seattle Street Tree Planting Procedures	Conservation				
Objective COS-4 The City/County will establish policies and programs to develop and preserve conservation areas, including forested areas, agricultural lands, wildlife habitat and corridors, wetlands, watersheds, and groundwater recharge areas, that remove and sequester carbon from the atmosphere.							
COS-4.1	Conservation Area Development		Conservation, Open Space				
COS-4.1.1	Mitigation Fees on Development		Conservation, Open Space				
COS-4.1.2	Sales Tax for Conservation		Conservation, Open Space				
COS-4.2	Conservation Area Preservation	Honolulu Exceptional Tree Program	Conservation, Open Space				

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Education and Outreach Policies							
Goal: Increase public awareness of climate change and climate protection challenges, and support community reductions of GHG emissions through coordinated, creative public education and outreach, and recognition of achievements.							
Objective: EO-1 The City/County will establish a coordinated, creative public outreach campaign, including publicizing the importance of reducing GHG emissions and steps community members can take to reduce their individual impacts.							
Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
EO-1.1	Outreach Methods	City of San Mateo SMART Speakers	Climate Change or GHG, possibly Conservation				
EO-1.1.1	TV and Radio Spots	City of San Mateo SMART Media	See EO-1.1				
EO-1.1.2	"Green Tips" in Local Paper		See EO-1.1				
EO-1.1.3	Messages in Others' Newsletters, Billing Materials, etc.		See EO-1.1				
EO-1.1.4	Climate Protection Website	City of San Mateo SMART City of Palo Alto City of Minneapolis	See EO-1.1				
EO-1.2	Outreach Topics	City of San Mateo SMART Speakers	See EO-1.1				
EO-1.2.1	Energy Efficiency & Conservation	City of San Mateo SMART Carbon Counter	Energy, Conservation, GHG*				
EO-1.2.2	Trip Reduction & Alt. Modes	City of San Mateo SMART Carbon Counter City of Albuquerque Alternative Transportation	See EO-1.1				
EO-1.2.3	Green Building & Design	City of San Mateo Green Building	Conservation, Energy, Land Use				
EO-1.2.4	Waste Reduction, Recycling & Composting	San Francisco Composting Program City of San Mateo SMART Carbon Counter San Bernardino Reusable Bag Program	Conservation				
EO-1.2.5	Water Conservation & Efficient Design	Albuquerque Bernalillo County Water Utility Authority	Conservation, Land Use				

* Best-judgment category, i.e. depending on city/county circumstances and scope of General Plan elements, policy could also be included in other mandatory element or in other optional element

Table 2: Worksheet for Model Policies Evaluation (cont'd.)

Model Policy #	Policy Name/ Subject Area	Implementation Examples (click link to visit website)	Appropriate General Plan Element	Relative Effectiveness Reducing GHGs	Relative Difficulty to Implement	Relative Time for Reductions to Occur	Relative Cost
EO-1.2.6	Buying Local	San Francisco Farmers Market San Francisco Green Map City of Minneapolis Homegrown	See EO-1.1				
Objective: EO-2 The City/County will work with local businesses and energy providers on specific, targeted outreach campaigns and incentive programs.							
EO-2.1	Energy Efficiency Campaigns	City of Minneapolis Energy Challenge	Energy				
EO-2.2	Pedestrian and Bicycle Promotion	City of Berkeley Bike and Walking Maps 511 Bicycle Maps	Circulation				
Objective EO-3 The City/County will organize events and workshops to promote GHG-reducing activities.							
EO-3.1	Waste Reduction	Bay Area Green Business Program Shop Green City of Palo Alto Zero Waste Program	Conservation				
EO-3.2	Water Conservation	Bay Area Green Business Program Shop Green	Conservation				
EO-3.3	Energy Efficiency		Energy				
EO-3.4	Climate Protection Summit/Fair	Alameda County Downtown Menlo Park Goes Green Block Parties	Conservation, GHG				
EO-3.5	Schools Programs	City of Scottsdale EnviroKidsFest The Association for the Advancement of Sustainability in Higher Education	Energy, Conservation, GHG				
Objective EO-4 The City/County will sponsor competitions and awards to encourage GHG reductions and recognize success.							
EO-4-1	Climate Champions Awards	Climate All Stars Conference Columbus Green Spot	Conservation, Energy, GHG				
EO-4.2	GHG Reduction/ Climate Protection Competitions	Climate Protection Campaign Silicon Valley Leadership Group	See EO-4.2				
EO-4.2.1	Poster Contests at Schools, with Scholarships, Public Recognition	Climate Protection Campaign	See EO-4.2				
EO-4.2.2	Waste Diversion Contests between Schools or Other Groups	Waste Free Schools	See EO-4.2 (Especially Conservation)				
EO-4.2.3	Walkathons, Relays, & Other Challenges		See EO-4.2				

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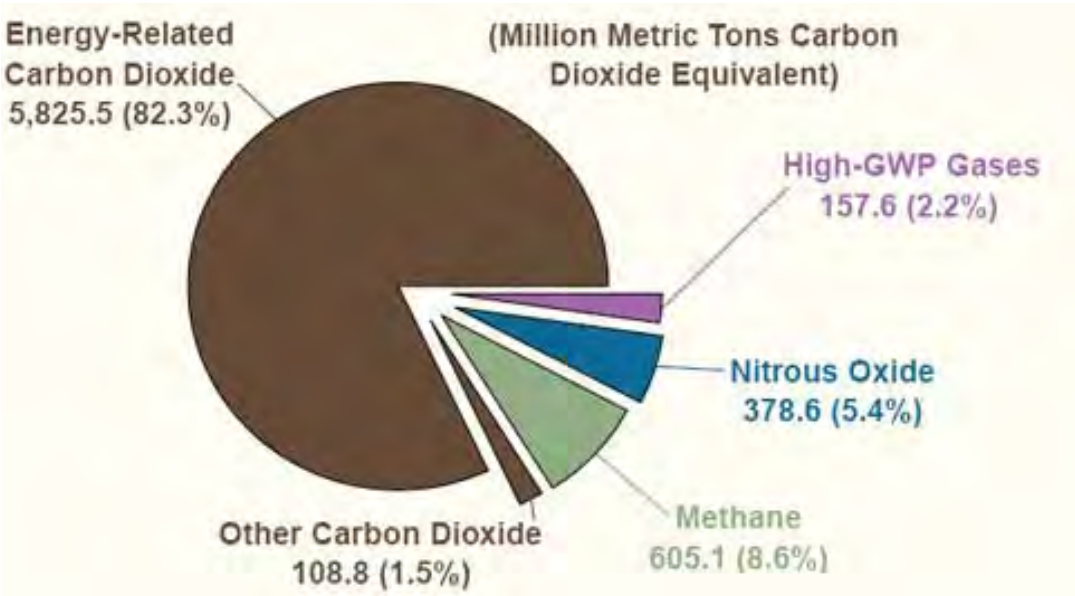
Appendix A

Greenhouse Gas Emissions in California

The characteristics, sources, and units used to quantify the six greenhouse gases (GHGs) listed in AB 32 are documented in this section in order of abundance in the atmosphere: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). (Water vapor, the most abundant GHG, is not included because natural concentrations and fluctuations far outweigh anthropogenic influences). Figure A-1 below shows U.S. emissions of these gases in 2006, with HFCs, PFCs and SF_6 collectively referred to as high-GWP (global warming potential) gases.

Figure A-1. U.S. Greenhouse Gas Emissions by Gas, 2006



Source: Energy Information Administration estimates,
http://www.eia.doe.gov/oiaf/1605/ggrpt/figure_1.html.
Note: High-GWP Gases include HFCs, PFCs, and SF_6.

In order to simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas. The most commonly accepted method to compare GHG emissions is the GWP methodology developed by the Intergovernmental Panel on Climate Change (IPCC). The IPCC defines the GWP of every GHG on a normalized scale of CO2e that compares the atmospheric heating potential of each GHG over a 100-year period to that of the same mass of CO2. (CO2 has a GWP of 1 by definition.) Generally, GHG emissions are quantified in terms of metric tons of CO2 equivalent (CO2e) emitted per year. For example, the IPCC finds that nitrous oxide has a GWP of 310 and methane has a GWP of 21. Thus, one ton of nitrous oxide emissions is represented as 310 tons of CO2e, and one ton of methane is 21 tons of CO2e. This allows for the summation of different GHG emissions into a single total.

Table A-1, below, lists the GWP of each GHG, its atmospheric life and concentration. Atmospheric concentration of a given compound is commonly described in units of parts

per million (ppm), parts per billion (ppb) or parts per trillion (ppt), referring to the number of molecules of the compound in a sampling of one million, one billion or one trillion molecules of air.

Table A-1: Global Warming Potentials, Lifetimes and Abundances of Several Significant GHGs

Gas	Global Warming Potential (100 years)	Atmospheric Life (years)	1998 Atmospheric Concentration (ppt[1])
CO_2	1	50–200	365,000,000
CH_4	21	9–15	1,745
N_2O	310	120	314
HFC-23	11,700	264	14
HFC-134a	1,300	14.6	7.5
HFC-152a	140	1.5	0.5
CF_4	6,500	50,000	80
C_2F_6	9,200	10,000	3
SF_6	23,900	3,200	4.2

[1] ppt is a mixing ratio unit indicating the concentration of a pollutant in parts per trillion by volume.
Source: IPCC 1996; IPCC 2001.

Table A-2, below, lists the anthropogenic (man-made) emissions of GHGs as CO2e equivalents. As shown, CO2 is by far the largest component of worldwide CO2e emissions, followed by CH4, N2O, and high-GWP gases.

Table A-2: Global Anthropogenic Greenhouse Gas Emissions (CO_2 e)

Gas	CO_2e Percentage
CO_2 (deforestation, decay of biomass, etc)	17.3%
CO_2 (other)	2.8%
CO_2 (fossil fuel use)	56.6%
CH_4	14.3%
N_2O	7.9%
High-GWP[1] Gases (includes HFCs, PFCs, and SF6)	1.1%

[1] GWP stands for Global Warming Potential. Source: Olivier et al., 2005, 2006 in IPCC 2007b.

CO_2

CO2 is the most important GHG and accounts for more than 75% of all anthropogenic GHG emissions. Its long atmospheric lifetime (on the order of decades to centuries) ensures that atmospheric concentrations of CO2 will remain elevated for decades after

GHG mitigation efforts to reduce GHG concentrations are implemented (Olivier et al. 2005, 2006 in IPCC 2007b).

Increasing concentrations of CO2 in the atmosphere are largely due to emissions from the burning of fossil fuels, gas flaring, cement production, and land use changes. Three quarters of anthropogenic CO2 emissions are the result of fossil burning (and to a very small extent, cement production and gas flaring); the remainder results from land-use changes (IPCC 2007a).

Anthropogenic emissions of CO2 have increased concentrations in the atmosphere most notably since the industrial revolution; the concentration of CO2 has increased from about 280 ppm to 379 ppm over the last 250 years (IPCC 2001). IPCC estimates that the present atmospheric concentration of CO2 has not been exceeded in the last 650,000 years and is likely to be the highest ambient concentration in the last 20 million years (IPCC 2007a; IPCC 2001).

CH_4

CH4 , the main component of natural gas, is the second largest contributor to anthropogenic GHG emissions and has a GWP of 21 (Association of Environmental Professionals 2007; IPCC 1996). Anthropogenic emissions of methane primarily result from growing rice, raising cattle, combusting natural gas, and coal mining (National Oceanic and Atmospheric Administration 2005). Atmospheric methane has increased from a pre-industrial concentration of 715 parts per billion to 1,775 parts per billion in 2005 (IPCC 2001). Though it is unclear why, atmospheric concentrations of CH4 have not risen as quickly as anticipated (National Oceanic and Atmospheric Administration 2005).

N_2O

N2O is a powerful GHG, with a GWP of 310 (IPCC 1996). Anthropogenic sources of N2O include agricultural processes, nylon production, fuel-fired power plants, nitric acid production and vehicle emissions. Nitrous oxide is also used in rocket engines, racecars, and as an aerosol spray propellant. Agricultural processes which result in anthropogenic N2O emissions are fertilizer use and microbial processes in soil and water (Association of Environmental Professionals 2007). N2O concentrations in the atmosphere have increased from pre-industrial levels of 270 parts per billion to 319 parts per billion in 2005 (IPCC 2001).

HFCs

HFCs are man-made chemicals used in commercial, industrial and consumer products and have high GWPs (EPA 2006a). HFCs are generally used as substitutes for ozone depleting substances (ODS) in automobile air conditioners and refrigerants. As seen in Table A-1, the most abundant HFCs, in order from most abundant to least, are HFC-134a (35 parts per trillion), HFC-23 (17.5 parts per trillion), and HFC-152a (3.9 parts per

trillion). Concentrations of HFCs have risen from zero to current levels. Because these chemicals are man-made, they do not exist naturally in ambient conditions.

PFCs

The most abundant PFCs include CF4 (PFC-14) and C2F6 (PFC-116). These man-made chemicals are emitted largely from aluminum production and semiconductor manufacturing processes. PFCs are extremely stable compounds that are only destroyed by very high-energy ultraviolet rays, which result in the very long lifetimes of these chemicals, as shown in Table A-1 (Environmental Protection Agency 2006). PFCs have large GWPs and have risen from zero to the current concentration levels shown in Table A-1.

SF_6

SF6, another man-made chemical, is used as an electrical insulating fluid for power distribution equipment, in the magnesium industry, in semiconductor manufacturing and also as a trace chemical for study of oceanic and atmospheric processes (Environmental Protection Agency 2006a). In 1998, atmospheric concentrations of sulfur hexafluoride were 4.2 parts per trillion, and steadily increasing in the atmosphere. SF6 is the most powerful of all GHGs listed in IPCC studies with a GWP of 23,900 (IPCC 1996).

Appendix B

AB 32 Programs

California's major law for reducing greenhouse gas (GHG) emissions is stipulated in Assembly Bill 32 (AB 32, Nunez) approved by Governor Schwarzenegger in 2006. The goals in AB 32 aim at reducing GHG emissions to 1990 levels by 2020 - a reduction of approximately 30 percent. The main strategies for making these reductions are outlined in the Scoping Plan adopted by the California Air Resources Board (ARB) in December 2008 and in the Discrete Early Action measures identified by ARB in 2007. The following are summaries of AB 32 Programs for reducing GHG emissions.

Discrete Early Action Measures

AB 32 established a statewide target for GHG reductions by 2020. AB 32 further required the ARB to adopt a plan and individual measures to achieve the maximum technologically feasible and cost-effective reductions in GHG emissions. AB 32 required ARB to identify a list of Discrete Early Action measures for implementation by January 1, 2010. ARB identified in 2007 nine Discrete Early Action measures, including potential regulations affecting landfills, motor vehicle fuels, refrigerants in cars, port operations and other sources. Refer to the ARB website at http://www.arb.ca.gov/cc/ccea/ccea.htm for detailed information about each measure and the timeline for implementation. Short descriptions of the Discrete Early measures follows.

Low Carbon Fuel Standard (LCFS)

The LCFS requires fuel providers to ensure that the mix of fuel they sell into the California market meets, on average, a declining standard for carbon intensity. By 2020, the LCFS will produce a 10 percent reduction in the carbon content of all passenger vehicle fuels sold in California. This is expected to replace 20 percent of on-road gasoline consumption with lower-carbon fuels, more than triple the size of the state's renewable fuels market, and place more than 7 million alternative fuel or hybrid vehicles on California's roads. The LCFS will use market-based mechanisms that allow providers to choose how they reduce emissions while responding to consumer demand. For example, providers may purchase and blend more low-carbon ethanol into gasoline products, purchase credits from electric utilities supplying low-carbon electrons (i.e., low carbon fuels used in the generation of electricity) to electric passenger vehicles, or diversify into low-carbon hydrogen as a product. In addition, new strategies yet to be developed will be included.

Landfill Methane Capture

This control measure will reduce methane emissions from municipal solid waste landfills by requiring gas collection and control systems on landfills where these systems are not currently required and will establish statewide performance standards to maximize methane capture efficiencies. Additionally, as part of this process, ARB and California Integrated Waste Management Board (CIWMB) staff will explore opportunities to increase energy recovery from landfill methane gas.

Reductions from Mobile Air Conditioning

These measures will control HFC release from do-it-yourself motor vehicle air conditioning (MVAC) servicing; require addition of leak tightness testing and repair during Smog Checks; enforce federal regulations on banning HFC release from MVAC servicing and dismantling; and require the use of low global warming potential (GWP) refrigerants for new MVAC.

Semiconductor Reduction

This measure proposes to reduce perfluorocarbon (PFC) and fluorinated gas from the semiconductor industry. The regulation will be designed to achieve the maximum reductions in PFC fluorinated gas emissions that are technically feasible and cost-effective.

SF_6 Reductions

SF6 is a potent GHG with a GWP of 23,900, one of the highest GWPs currently identified. SF6 is a versatile gas used in a multitude of sectors including the electric utility and semiconductor industries. (Utility and semiconductor industry-related emissions will be addressed under separate strategies.) This early action focuses on the non-utility and semiconductor-related emissions of SF6. Specifically, the strategy reduction measures will consider a potential ban on the use of SF6 where technologically feasible and cost-effective alternatives are available. The main uses of SF6 in California that are not directly related to utilities or semiconductor manufacturing include: magnesium casting operations; consumer products (tennis balls); medical uses (ultrasounds, eye surgery); tracer gas in leak testing (including fume hood testing), research and bioterrorism studies; insulator for particle accelerators; and etchant for flat panel display units.

High-GWP Consumer Products

Measures under this Discrete Early Action focus on reducing the use of compounds with high GWP in consumer products. This will be done by adding and modifying product category definitions in the existing consumer products regulation and establishing new or lower volatile organic compound (VOC) limits for multiple categories. The measures would also reduce the use of compounds with high GWP in pressurized gas duster products. A number of other modifications or clarifications are also proposed, including prohibiting the use of specified toxic air contaminants in carpet and upholstery cleaners, fabric protectants, multi-purpose lubricants, penetrants, sealant or caulking compounds, and spot removers. The consumer products measure is estimated to reduce CO2 equivalent emissions by 250,000 metric tons per year.

Heavy Duty Vehicle Measures

Under this Early Action measure, new and existing on-road tractors and trailers operating on California highways would need to be equipped with technologies to improve fuel efficiency. It is based on the U.S. EPA's SmartWay Program, which approves technologies, such as aerodynamic equipment and low-rolling resistance tires, and certifies tractors and trailers that incorporate these technologies. The proposed regulation would provide GHG and NOx emission reductions throughout California. Tractors and trailers that comply with the proposed regulation by proper use of aerodynamic equipment and low-rolling resistance tires are expected to achieve a fuel efficiency improvement ranging from 7 to 10 percent and provide GHG and oxides of nitrogen (NOx) emission reductions throughout California.

Tire Pressure Program

Maintaining proper tire pressure on vehicles improves fuel economy, and therefore reduces GHG emissions. This measure would place requirements on the automotive service industry regarding tire pressure checks and inflation pressure retention. While current federal law requires auto manufactures to install tire pressure monitoring systems in all new vehicles beginning September 1, 2007, owners of older vehicles lack this important tool.

Shore Power

Port electrification was identified as a Discrete Early Action measure. The proposed regulation, while reducing diesel PM and NOx emissions, would also result in significant reductions of CO2 emissions as a co-benefit of requiring cleaner grid supplied electrical generation for ocean-going vessels while docked. Auxiliary engines typically power lighting, ventilation, pumps, communication, and other onboard equipment while a ship is docked at a berth. The proposed regulations would require some vessels to turn off their auxiliary engines; it is expected, but not required, that many of those vessels would then receive their electrical power from shore while at berth.

AB 32 Scoping Plan

The Scoping Plan outlines a variety of measures and programs to reduce GHG emissions to 1990 levels by 2020. The plan includes development of a California cap-and-trade program that will be integrated with a broader regional market to maximize cost-effective opportunities to achieve GHG emissions reductions. The plan also includes transformational measures designed to help pave the path toward California’s clean energy future. The following are summaries of the proposed AB 32 measures and programs.

California Cap-and-Trade Program

A cap-and-trade program sets the total amount of GHG emissions allowable for facilities under the cap and allows covered sources, including producers and consumers of energy, to determine the least expensive strategies to comply. The emissions allowed under the cap will be denominated in metric tons of CO2e. The currency will be in the form of allowances which the State will issue based upon the total emissions allowed under the cap during any specific compliance period. Emission allowances can be banked for future use, encouraging early reductions and reducing market volatility. The ability to trade allows facilities to adjust to changing conditions and take advantage of reduction opportunities when those opportunities are less expensive than buying additional emissions allowances. California is working closely with other states and provinces in the Western Climate Initiative (WCI) to design a regional cap-and-trade program that can deliver reductions of GHG throughout the region. ARB will develop a cap-and-trade program for California that will link with the programs in the other WCI Partner jurisdictions to create a regional cap-and-trade program. In addition, a federal cap-and-trade program is being contemplated, and legislation (the Waxman-Markey Bill) is being developed. If the federal program is enacted, the development and implementation of the program will need to be closely coordinated with California. Federal preemption is a possibility.

California Light-Duty Vehicle GHG Standards

There are a number of programs identified under AB 32 that reduce GHGs by the way of light-duty vehicle emission standards. These programs include the AB 1493 (Pavley) GHG vehicle standards, zero-emission vehicle (ZEV) program, and the AB 118 (Nunez) Air Quality Improvement Program/Alternative and Renewable Fuel and Vehicle Technology Program.

AB 1493 directed ARB to adopt vehicle standards that lowered GHG emissions to the maximum extent technologically feasible, beginning with the 2009 model year. ARB adopted regulations in 2004 and applied to the U.S. EPA in 2005 for a waiver under the federal Clean Air Act to implement the regulation. The Pavley regulations incorporate both performance standards and market-based compliance mechanisms. To obtain additional reductions from the light-duty fleet, ARB plans to adopt a second, more stringent, phase of the Pavley regulations. U.S. EPA however, denied the California waiver in 2008 the issues entered litigation. As of February 2009, EPA began reconsidering the waiver request.

The ZEV program will play an important role in helping California meet its 2020 and 2050 GHG emissions reduction requirements. Through 2012, the program requires placement of hundreds of ZEVs (including hydrogen fuel cell and battery electric vehicles) and thousands of near-zero emission vehicles (including plug-in hybrids, conventional hybrids, compressed natural gas vehicles). In the mid-term (2012-2015), the program will require placement of increasing numbers of ZEVs and near-zero emission vehicles in California. In 2009, the Board will review the ZEV program to ensure it is

optimally designed to help the State meet its 2020 target and put us on the path to meeting our 2050 target of an 80 percent reduction in GHG emissions from 1990 levels.

Under AB 118 (Núñez, Chapter 750, Statutes of 2007), ARB is administering the Air Quality Improvement Program, which provides approximately $50 million per year for grants to fund clean vehicle/equipment projects and research on the air quality impacts of alternative fuels and advanced technology vehicles. AB 118 also created the Alternative and Renewable Fuel and Vehicle Technology Program and authorized CEC to spend up to $120 million per year over seven years (2008-2015) to develop, demonstrate, and deploy innovative technologies to transform California's fuel and vehicle types.

Energy Efficiency Programs

The Scoping Plan relies heavily on energy efficiency to reach its GHG emissions reduction goals. Programs include the California Long Term Energy Efficiency Strategic Plan and the Solar Hot Water and Efficiency Act of 2007.

Renewables Portfolio Standard

California's current Renewables Portfolio Standard (RPS) is intended to increase procurement from eligible renewable energy resources to reach 20 percent by 2010. Increased use of renewables will decrease California's reliance on fossil fuels, thus reducing emissions of GHGs from the electricity sector. Based on Governor Schwarzenegger's call for a statewide 33 percent RPS, the Scoping Plan anticipates that California will have 33 percent of its electricity provided by renewable resources by 2020, and includes the reduction of GHG emissions based on this level. Achieving the 33 percent goal will require broad-based participation from many parties and the removal of certain barriers. The CEC, CPUC, California Independent System Operator (CAISO), and ARB are working with California utilities and other stakeholders to formally establish and meet this goal.

Regional Transportation-Related GHG Targets

On September 30, 2008, Governor Arnold Schwarzenegger signed SB 375 (Steinberg) which establishes mechanisms for the development of regional targets for reducing passenger vehicle GHG emissions. Through the SB 375 process, regions will work to integrate development patterns and the transportation network in a way that achieves the reduction of GHG emissions while meeting housing needs and other regional planning objectives. This new law reflects the importance of achieving significant additional reductions of GHG emissions from changed land use patterns and improved transportation to help achieve the goals of AB 32. SB 375 requires ARB to develop, in consultation with metropolitan planning organizations (MPOs), passenger vehicle GHG emissions reduction targets for 2020 and 2035 by September 30, 2010. It sets forth a collaborative process to establish these targets, including the appointment by ARB of a Regional Targets Advisory Committee (RTAC) to recommend factors to be considered and methodologies for setting GHG emissions reduction targets. RTAC members were

appointed in January 2009. An explanation of SB 375 from bill author Darrell Steinberg can be found at the Institute for Local Government website at http://www.ca-ilg.org/sb375 .

Million Solar Roofs Program

The Million Solar Roofs Program is a ratepayer-financed incentive program aimed at transforming the market for rooftop solar systems by driving down costs over time. Created under Senate Bill 1, the Million Solar Roofs Program includes CPUC's California Solar Initiative and CEC's New Solar Homes Partnership, and requires publicly-owned utilities (POUs) to adopt, implement and finance a solar incentive program. This measure would offset electricity from the grid, thereby reducing GHG emissions.

Industrial Emissions

These measures would be implemented through a regulation requiring each facility to conduct an energy efficiency audit of individual combustion and other direct sources of GHGs within the facility to determine the potential reduction opportunities, including criteria air pollutants and toxic air contaminants. The audit would include an assessment of the impacts of replacing or upgrading older, less-efficient units such as boilers and heaters, or replacing units with combined heat and power units. In addition, ARB has identified four specific measures for development and implementation, two for oil and gas recovery operations and gas transmission, and two for refineries.

High-Speed Rail

The Safe, Reliable High-Speed Passenger Train Bond Act for the 21st Century was approved by California voters in 2008. A high-speed rail (HSR) system is part of the statewide strategy to provide more mobility choice and reduce GHG emissions. This measure supports implementation of plans to construct and operate an HSR system between northern and southern California. As planned, the HSR is a 700-mile-long rail system capable of speeds in excess of 200 miles per hour on dedicated, fully-grade separated tracks with state-of-the-art safety, signaling and automated rail control systems. The system would serve the major metropolitan centers of California in 2030 and is projected to displace between 86 and 117 million riders from other travel modes in 2030.

Green Building Strategy

A Green Building strategy offers a comprehensive approach to reducing direct and upstream GHG emissions that cross-cut multiple sectors including Electricity/Natural Gas, Water, Recycling/Waste, and Transportation. Green buildings are designed, constructed, renovated, operated, and maintained using an integrated approach that reduces GHG emissions by maximizing energy and resource efficiency. Employing a whole-building design approach can create synergies that result in multiple benefits at

little or no net cost, allowing for efficiencies that would never be possible on an incremental basis.

Recycling and Waste

ARB will work with the California Integrated Waste Management Board (CIWMB) to develop and implement programs to reduce waste and materials at the source of generation and increase recycling which will result in the reduction of GHG emissions and other co-benefits. ARB will also work with the California Department of Food and Agriculture, the Department of Transportation, and others to provide direct incentives for the use of compost in agriculture and landscaping. Further, CIWMB will explore the use of incentives for all recycling and waste management measures, including commercial recycling, and for local jurisdictions to encourage the collection of residentially and commercially generated food scraps for composting and in-vessel anaerobic digestion.

Sustainable Forests

The 2020 Scoping Plan target for California's forest sector is to maintain the current 5 MMTCO2e of sequestration through sustainable management practices, including reducing the risk of catastrophic wildfire, and the avoidance or mitigation of land use changes that reduce carbon storage. California's Board of Forestry and Fire Protection has the existing authority to provide for sustainable management practices, and will, at a minimum, work to maintain current carbon sequestration levels. The Resources Agency and its departments will also have an important role to play in implementing this measure.

Water

Six GHG emission reduction measures are proposed for the water sector: water use efficiency; water recycling; water system energy efficiency; reuse urban runoff; increased renewable energy production; and public goods charge. Three of the measures target reducing energy requirements associated with providing reliable water supplies and two measures are aimed at reducing the amount of non-renewable electricity associated with conveying and treating water. The final measure focuses on providing sustainable funding for implementing these actions.

Agriculture

The Scoping Plan encourages the capture of methane (CH_4) through use of manure digester systems at dairies to provide emission reductions on a voluntary basis. This measure is also a renewable energy strategy to promote the use of captured gas for fuels or power production. Nitrogen fertilizer, which produces N2O emissions, is the other significant source of GHGs in the agricultural sector. ARB has begun a research program to better understand the variables affecting fertilizer N2O emissions, and based on the findings, will explore opportunities for emission reductions.

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Appendix C

Other Programs to Reduce GHG Emissions

There are many programs already underway in California at the state, regional and local levels to reduce GHG emissions. These programs seek new and innovative ways to require or promote reductions in GHG emissions through new standards and incentives designed to increase energy efficiencies and renewable energy production, advance green technologies and cleaner fuels, and improve our land use development patterns and waste management, among others. Such programs are occurring worldwide. Appendix C focuses only on the major GHG emission reduction programs in California.

State of California

Assembly Bill 118(Nunez) - Alternative and Renewable Fuel and Vehicle Technology Funding

This program is intended to increase the use of alternative and renewable fuels and innovative technologies that will transform California's fuel and vehicle types to help attain the state's climate change policies. Upon appropriation by the State, approximately $120 million will be allocated annually as incentives to public agencies, vehicle and technology consortia, businesses, public-private partnerships, workforce training partnerships and collaboratives, fleet owners, consumers, recreational boaters, and academic institutions, for projects that:

Develop and improve alternative and renewable low-carbon fuels;

- Optimize alternative and renewable fuels for existing and developing engine technologies;
- Produce alternative and renewable low-carbon fuels in California;
- Decrease the overall impact of an alternative and renewable fuel's life-cycle carbon footprint and increase sustainability;
- Expand fuel infrastructure, fueling stations, and equipment;
- Improve light-, medium-, and heavy-duty vehicle technologies;
- Retrofit medium and heavy-duty on-road and non-road vehicle fleets;
- Expand infrastructure connected with existing fleets, public transit, and transportation corridors; and
- Establish workforce training programs, conduct public education and promotion, and create technology centers.

Senate Bill 1368 (Peralta) - GHG Emissions Performance Standards

The law limits long-term investments in baseload generation by the state's utilities to power plants that meet an emissions performance standard (EPS) jointly established by the California Energy Commission (CEC) and the California Public Utilities Commission (PUC).

The CEC has designed regulations that:

- Establish a standard for baseload generation owned by, or under long-term contract to, publicly owned utilities, of 1,100 lbs CO2 per megawatt-hour (MWh). This will encourage the development of power plants that meet California's growing energy needs while minimizing their emissions of GHGs;

- Require posting of notices of public deliberations by publicly owned utilities on long-term investments on the CEC website. This will facilitate public awareness of utility efforts to meet customer needs for energy over the long term while meeting the State's standards for environmental impact, and;

- Establish a public process for determining the compliance of proposed investments with the EPS.

California Solar Initiative

The California Solar Initiative a collaborative effort between the PUC and CEC initiated in 2006, has a statewide goal to install 3,000 MW of new solar electricity capacity by 2016 - moving the state toward a cleaner energy future and helping lower the cost of solar systems for consumers. The initiative has a statewide budget of $3.3 billion over 10 years. The California Solar Initiative provides solar incentives to customers in investor-owned utility territories of Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric. These three utilities represent about 75-80% of California's electricity use. The California Solar Initiative provides cash back for solar for existing homes, and existing and new commercial, industrial, government, non-profit, and agricultural properties.

Executive Order S-14-08

On November 17, 2008 Governor Schwarzenegger signed Executive Order (EO) S-14-08 directing all state agencies to work toward a 33% RPS by 2020. A 33% renewable energy target would further California’s efforts to address climate change and lead the nation in clean energy policy. Specifically, the Executive Order stated the following:

- The EO calls for a new, more aggressive renewable energy target, increasing the current goal of obtaining 20% of California’s energy from clean, renewable resources by 2010 to 33% by 2020.

- The EO directs a restructuring of the process for developing specific renewable energy sites. The EO has a goal of reducing permitting process times for developing renewable energy sites by 50 percent.

- The Governor will propose legislation that will codify the new higher standards and reform the renewable pricing structure at the PUC to make them competitive and get projects built sooner.

Landfill Methane Capture Strategies

The California Integrated Waste Management Board (CIWMB) has identified strategies for increasing landfill methane capture to reduce methane emissions by 2020. The Landfill Methane Capture Strategy includes three core components:

- Install New Methane Control Systems at Landfills Currently Without Control Systems. The control measure will reduce methane emissions from landfills by requiring gas collection and control systems on landfills generating significant methane where these systems are not currently required; it will also establish statewide performance standards to maximize methane capture efficiencies.

- Maximize Landfill Methane Capture Efficiencies. The CIWMB is developing a guidance document to help landfill operators and regulators evaluate potential actions to achieve additional GHG emission reductions from landfills beyond what are currently occurring with existing landfill practices. The study is based on an evaluation of existing state-of-the-practice technologies, as reflected in published literature, reports to regulatory agencies, and the project team's familiarity and experience with specific landfill and landfill gas practices and projects.

- Increase Recovery of Landfill Gas as a Biomass Renewable Energy Source. The CIWMB is providing technical assistance and incentives, and further developing options, in consultation with ARB, CEC, and PUC, to increase recovery of landfill gas. The CIWMB awarded two grants totaling $1 million to demonstrate commercial scale production of liquefied natural gas (LNG) vehicle fuel from landfill gas. The CIWMB is also providing matching funding to demonstrate an innovative anaerobic composting design and process sited at a landfill to increase recovery of biogas for energy and recover a residual compost product from yard wastes otherwise used as landfill alternative daily cover.

California Adaptation Strategy

The California Resources Agency is currently developing a California Adaptation Strategy. The strategy will be developed by collecting, synthesizing, and communicating to the greatest extent possible, how sea level rise, temperature rise and duration, and precipitation changes due to climate change will exacerbate existing fire, flood, water quality, air quality, habitat loss, human health and drought. The Strategy will also

examine how risks associated with these changes will impact the state's economy, infrastructure, human populations, and environment. In addition, it will also outline those solutions which can be implemented that promote resiliency to climate change impacts posing the greatest risks to California and consider key economic, health, and environmental issues.

Caltrans Climate Action Program

The California Department of Transportation (Caltrans) Office of Policy Analysis and Research (OPAR) Climate Action Program coordinates the department's effort in response to AB 32, the Climate Action Team (CAT), the Governor's executive orders, Administration policies, and related legislative rulings. OPAR works with the CAT, ARB, regional agencies, and other stakeholders on cross-agency policy framework and research focusing on GHG emissions reduction and energy-efficiency measures. The program's functional responsibilities include:

- Coordinating and monitoring climate activities and strategies across departmental programs, including planning functions statewide;
- Serving as a primary point of contact for issues related to climate change and transportation energy; and
- Working to mainstream GHG emissions reduction and energy-efficiency measures into transportation planning and project development.

California Water Plan

The California Department of Water Resources (DWR) addresses climate change in its California Water Plan, which is updated every five years. The plan provides a framework for water managers, legislators, and the public to consider options and make decisions regarding California's water future. In addition, DWR in October 2008 released its report *Managing an Uncertain Future; Climate Change Adaptation Strategies for California's Water* which focuses discussion on the need for California's water managers to adapt to impacts of climate change. The report proposes 10 adaptation strategies in four categories which may be incorporated into the California Water Plan

Air Districts

Air Pollution Control Districts and Air Quality Management Districts throughout the state have implemented a variety of climate protection programs over the past several years. The following is a small sampling of some air district programs.

Bay Area Air Quality Management District

In 2005, the Bay Area Air Quality Management District (BAAQMD) initiated a Climate Protection Program that acknowledges the link between climate protection and programs to reduce air pollution in the greater San Francisco Bay Area. The Board of Directors also formed a standing Committee on Climate Protection to provide direction on BAAQMD climate protection activities. BAAQMD is continually seeking ways to integrate climate protection into current District functions, including grant programs, CEQA commenting, regulations, inventory development, and outreach. In addition, the District's climate protection program emphasizes collaboration with ongoing climate protection efforts at the local and State level, public education and outreach and technical assistance to cities and counties. The following are some of BAAQMD's Climate Protection Programs:

- *Climate Protection Grant Program:* In 2007 the BAAQMD awarded $3 million to fund 53 local projects that will significantly reduce the Bay Area's carbon footprint. This $3 million represents the largest single source of funding available for climate protection projects in the Bay Area, and makes the District one of the top funders of climate protection activities in the country.

  - *4th and 5th Grade Curriculum: Protect Your Climate* is a climate protection curriculum targeted at 4th and 5th graders. The curriculum's 16 lessons investigate the science and causes of climate change and how students can take action to protect our climate. Through hands-on activities, students learn ways to reduce GHG emissions from energy, waste, and transportation. Lessons are connected to the California state content standards. After successfully completing a pilot year in 2007-2008, the curriculum program was expanded to include 40 classrooms in the 2008-2009 school year. The participating teachers and approximately 1,000 students in the program are learning how to take action for climate protection in their classrooms, homes, and communities

  - *GHG Regional Inventory*: In 2006 the BAAQMD published *Source Inventory of Bay Area GHG Emissions*, the Bay Area Regional GHG Emission Inventory for base year 2002. The District is developing an updated regional GHG emission inventory which will reflect Bay Area emissions from the year 2005.

  - *ICLEI-BAAQMD Workshop Series:* The BAAQMD has an ongoing partnership with ICLEI-Local Governments for Sustainability to host a series of local government workshops on developing GHG emission inventories and selecting climate protection strategies. Workshops have been hosted for local governments in San Mateo, Santa Clara, and Marin counties. The District and partners ICLEI, PG&E and MTC have provided workshop participants with city-specific data sets and hands-on training. Over 30 local government staff have participated and developed GHG emission inventories for their communities.

- *GHG Fee for Stationary Sources Adopted:* On May 21, 2008, BAAQMD's Board of Directors approved a new fee on air pollution sources in the region to help defray the costs of the District's climate protection work. Industrial facilities and businesses that are currently required to submit an air quality permit to operate will have the modest fee of 4.4 cents per metric ton of GHG emissions added to their permit bill. The fee will apply to Climate Protection Program activities related to stationary sources.

Sacramento Metropolitan Air Quality Management District

The Sacramento Metropolitan Air Quality Management District (SMAQMD) has started a formal program to address climate change. Elements include GHG inventory, work practices, commute incentives, building retrofits and education. Currently SMAQMD is researching and developing enhancements to the District's Climate Protection Program. Those enhancements include: 1) the creation of a GHG emissions "bank," 2) the creation of a program which would facilitate GHG mitigation for CEQA purposes, 3) an enhanced reporting system and; 4) assurances that climate protection measures do not cause increases in criteria pollutants. In addition, SMAQMD has done the following in regards to the Climate Protection Program.

- *California Climate Action Registry (CCAR) and The Climate Registry* The SMAQMD joined the CCAR in March of 2006 and is a founding member of The Climate Registry. The Climate Registry consists of organizations that are voluntarily taking actions to reduce their GHGs. Among the required actions are annually tracking and reporting their GHGs and having them certified by an independent auditer. The District has completed its emissions inventory for 2005, 2006 and 2007 and all three years of data have been certified.

- *Greenergy® member* The SMAQMD subscribes to this Sacramento Metropolitan Utility District program which matches electricity use with renewable electricity sources.

- *Clean Vehicles* Most of the SMAQMD vehicles are hybrids. Employees regularly use these vehicles to conduct air quality inspections at the sites. (Currently, of the District's 23 vehicles, 19 are 2005 Toyota Priuses. When their lease ends in February 2011, the District will look to replace the Priuses with even greener vehicles.)

- *Alternate Transportation Policies* The SMAQMD provides incentives to employees to commute using public transit, car or van pools, and bicycles or by walking. Over 60% of the District's employee work trips are made by alternate modes instead of driving alone.

- *Building Retrofits* The SMAQMD has already implemented several measures at its main office building to improve energy efficiency and reduce its carbon footprint, including: 1) replacing light bulbs with more energy-efficient bulbs, 2)

installing motion sensors on the majority of its light switches and placing other lights on timers and 3) installing a new digitally-based HVAC control system. The District is pursuing LEED EB (Existing Building) certification (level still TBD) for its building and a next step is to have a LEED EB Gap Analysis performed to determine what steps remain to achieve LEED EB certification.

San Joaquin Valley Unified Air Pollution Control District

In August 2008 the San Joaquin Valley Air Pollution (SJVAPCD) Control District's Governing Board adopted a Climate Change Action Plan (CCAP). The CCAP directed the Air Pollution Control Officer to develop guidance documents to assist land use and other permitting agencies in addressing GHG emissions as part of the CEQA process; investigate the development of a GHG banking program; enhance the existing emissions inventory process to include GHG emissions reporting consistent with new state requirements; and administer voluntary GHG emission reduction agreements. These items would then be brought before the District's Governing Board for their consideration in late summer 2009. The goals of the CCAP are to assist local land use agencies comply with CEQA for projects with GHG emissions, assist Valley businesses in complying with state law related to GHGs, and to ensure that collateral emissions from GHG emission reduction projects do not adversely impact public health or environmental justice communities in the Valley. The following are potential programs considered within the CCAP: (1) GHG guidance for CEQA; (2) carbon exchange program; (3) GHG emissions reporting; and (4) voluntary GHG mitigation agreements. The implementation of these actions, if determined to be warranted and feasible, will be determined with extensive stakeholder input.

South Coast Air Quality Management District

The South Coast Air Quality Management District (SCAQMD) is actively engaged in Climate Change activities to maximize the synergies between strategies to reduce criteria pollutants, toxics, and greenhouse gases (GHG). The following highlights selected SCAQMD efforts:

- *Climate Change Committee*: In Spring 2008, the SCAQMD established a Board-level Climate Change Committee to oversee SCAQMD's efforts related to implementation of AB 32 and provide enhanced guidance to local governments regarding climate change issues.

- *Climate Change Policy*: In September 2008, the SCAQMD Board approved a formal Climate Change Policy. It states: *"It is the policy of the South Coast Air Quality Management District (SCAQMD) to actively seek opportunities to reduce emissions of criteria, toxic, and climate change pollutants and maximize synergistic effects of strategies that reduce emissions in more than one of these categories. It is the policy of the SCAQMD to assist businesses and local governments implementing climate change measures, decrease the agency's*

carbon footprint and provide information regarding climate change to the public. If greenhouse gas reduction strategies have potential negative impacts or slow progress in reducing criteria or toxic pollutants, the impacts must be carefully evaluated and disclosed. In these instances, public health protection should prevail in the majority of circumstances. This policy provides additional direction to staff relative to future actions related to greenhouse gas emission reductions and climate change."

The Policy includes 8 specific action areas to implement the above policy.

- *Inventory*: To show its support for efforts to inventory and reduce GHG emissions, SCAQMD has voluntarily prepared a GHG inventory. The SCAQMD has also reported voluntarily to the California Climate Action Registry (CCAR) for the last several years.

- *SoCal Climate Solutions Exchange*: The objective of the SoCal Climate Solutions Exchange is to ensure real, surplus, verifiable GHG reductions from voluntary, early actions. This provides incentives for local investments and assists local businesses in capturing voluntary early GHG reductions. Added benefits are the retention of co-pollutant benefits and stimulus for the local economy. Three rules were adopted in late 2008 and early 2009 to implement this program – Rule 2700 – General; Rule 2701 – SoCal Climate Solutions Exchange; and Rule 2702 – GHG Reduction Program. SCAQMD staff serves as the verifiers for emission reductions that follow pre-approved protocols.

- *California Environmental Quality Act (CEQA)*: To provide guidance to local lead agencies on determining significance for GHG emissions in their CEQA documents, the SCAQMD convened a GHG CEQA Significance Threshold Working Group. Members of the working group include government agencies implementing CEQA and representatives from various stakeholder groups that will provide input to the SCAQMD staff on developing GHG CEQA significance thresholds. On December 5, 2008, the SCAQMD Governing Board adopted an interim GHG significance threshold for projects where the SCAQMD is lead agency. Work is underway regarding recommendations for a GHG threshold for other applications.

- *Technology Advancement Assistance:* SCAQMD oversees a comprehensive program to co-sponsor public-private demonstration and deployment projects for lower-emission fuels, vehicles, and technologies in local fleets. Co-funded fleet acquisitions include low-emission natural gas school & transit buses, clean heavy-duty vehicles, plug-in hybrid electric conversions, and other advanced propulsion vehicles & equipment.

- *Technical and Policy Forums*: The SCAQMD periodically holds clean-energy forums and roundtables to bring together experts on a variety of topics, including GHG reduction strategies. Archived event materials can be viewed at the

SCAQMD website: visit aqmd.gov, click on upper tab "Technology," then select "Technology Forums" from the drop-down menu.

- *Leading by Example*: The SCAQMD headquarters facility is considered a "green building" because of its unique design and state-of-the art features such as fuel cells, 60-kilowatt micro turbines, high efficiency chillers, and energy efficient lighting. The building's exterior design includes windows of a high-efficiency glass which allows light in, but keeps heat out. The building roof is a reflective material which aids in reducing air conditioning load during sunny days. The SCAQMD maintains one of the largest alternatively-fueled fleets in the country, with vehicles running on electricity, compressed natural gas, gasoline, hydrogen or other hybrid combinations.

San Luis Obispo County Air Pollution Control District

In November 2005, the SLOAPCD Board adopted its Climate Protection Plan. Implementation of the plan has been given a high priority and resulted in the following activities and accomplishments:

- *Community Outreach:* A comprehensive outreach program for climate protection was developed, with a countywide survey conducted to determine the level of public knowledge and action on the issue. Presentations have been made to every city council and the county as well as at various public forums regarding the impacts of climate change and how to reduce greenhouse gas emissions locally. A community stakeholder group has been formed with representatives from all local jurisdictions meeting regularly to discuss development of GHG inventories and action plans.

- *GHG Inventory Development:* Municipal and communitywide GHG inventories are being compiled for all local jurisdictions in the region, with a regional emissions report and action plan to be developed based on the inventories.

- *Grant Funding for GHG Reduction Programs:* The District has allocated $440,000 in grant funds for climate protection to provide incentive grants for reducing GHGs in the county; a third of those funds will be used as seed money for implementation of community climate action plans initiated by local jurisdictions.

- *Evaluation of Existing District Programs:* District staff have completed a review of existing regulations and programs to determine the level of GHG reductions already achieved by those programs and what changes can be made to enhance those reductions.

- *Regional Planning:* The District is working with the Council of Governments, LAFCO and the County to develop a preliminary Sustainable Communities

Strategy to include in the 2010 update of the Regional Transportation Plan.

- *Community Partnerships and Programs:* The District is a founding member or on the steering committee for several community groups working to reduce energy consumption and GHG emissions, including the following: The Strategic Energy Alliance for Change (SEAChange) which sponsors public forums and outreach on renewable energy and clean fuels; the Central Coast Clean Cities Coalition, which fosters the advancement and use of clean fuels; the 2030 Challenge Task Force, whose mission is to promote the achievement of carbon free, zero energy buildings by 2030; and SLO Car Free, whose goal is to promote car-free tourism throughout the County.

Ventura County APCD

- *Air – the search for one clean breath***:** a 41-minute award-winning high-definition film produced by the District and funded primarily by a U.S. Environmental Protection Agency grant, features information on climate change via a visit to the British Antarctic Core Survey Program at Cambridge, England, to interview Dr. Robert Mulvaney, an international ice core expert. DVD copies were given to every air district in the country, and the film is being screened throughout the United States and internationally. Teacher lessons for the film will be available online this summer at www.airthefilm.org. They will be aligned with the California State content standards for science, history, and social science. Several of the lessons will concentrate on global climate change.

- *Climate Change Presentations:* The District markets a 20-minute PowerPoint presentation on Global Climate Change to service organizations, senior groups, schools and other organizations. Since its inception in 2008, the program has been presented to over 600 individuals.

- *District Legislative Platform*: The District has amended its legislative platform to allow for the support legislation that implements cost-effective measure to reduce greenhouse gases.

- *Green Urban Fleets*: The District is providing funding to support low-carbon alternative fuel fleets operating in urban environments.

Northern Sonoma County APCD

The Northern Sonoma County Air Pollution Control District participates in climate protection programs on its own as an air district and through CAPCOA. Most District efforts, however, are undertaken in partnership with the County of Sonoma, its nine cities, the Sonoma County Water Agency, and the Agriculture and Open Space Preservation District. Key District efforts include:

- Offering small grants for projects that reduce GHG emissions through its "Sustainability and Trip Reduction Program," approved by the District's Board in 2008.

- Working with local high schools and the Sonoma County Climate Protection Campaign to incorporate climate change awareness and analysis of student travel patterns into the curriculum, and to support campaigns to reduce VMT associated with commute to school.

- Participation in the steering committee overseeing the efforts to achieve the commitment made by Sonoma County and all of its nine cities to reduce GHG emissions by 25% by 2015.

- Participation in the county-wide effort to deploy a vehicle charging network to support electric vehicle technology.

- Participation in the partnership with Nissan to deploy 1,000 electric vehicles in Sonoma County by 2011.

Regional GHG Reduction Programs

The Western Climate Initiative (WCI)

The WCI is a cooperative effort of seven U.S. states and four Canadian provinces that are collaborating to identify, evaluate, and implement policies to reduce GHG emissions, including the design and implementation of a regional cap-and-trade program. The Initiative began in February 2007 with the governors of Arizona, California, New Mexico, Oregon, and Washington, who have since been joined by the premiers of British Columbia, Manitoba, Ontario, and Quebec, and the governors of Montana and Utah. Participation in the WCI reflects each partner's strong commitment to identify, evaluate, and implement collective and cooperative actions addressing climate change. In addition, WCI was created to focus on a market-based cap-and-trade system.

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Appendix D

Projected Climate Change Impacts to California

In California and throughout western North America, signs of a changing climate are evident. During the last 50 years, winter and spring temperatures have been warmer, spring snow levels in lower- and mid-elevation mountains have dropped, snowpack has been melting one to four weeks earlier, and flowers are blooming one to two weeks earlier. These regional changes are consistent with global trends. If left unchecked, by the end of the century CO2 concentrations could reach levels at which climate change impacts would severely impact our public health, economy, and environment.

State of the art climate modeling was performed for the California Energy Commission (CEC) to determine potential future impacts of climate change in California under three different scenarios: a low emissions scenario that assumes aggressive action is taken to reduce GHG emissions, a medium emissions scenario assuming moderate level GHG reductions, and a high emissions scenario that assumes little action is taken to reduce emissions. The range of potential impacts modeled was summarized in a 2006 CEC document called: "Our Changing Climate: Assessing the Risks to California." The document details the growing severity of consequences predicted statewide as temperature rises, and also identifies those impacts that may be unavoidable and for which we will need to develop coping and adaptation strategies. That information is summarized below to aid jurisdictions in determining the scope and focus of the policies needed to address climate change through the General Plan process.

Increase in the Number of Extreme Heat Days

Current models predict that extreme heat events in California will worsen in both frequency and intensity over the next several decades. Heat waves that once lasted days could last for weeks or even most of an entire season. Heat waves are especially dangerous to vulnerable groups, such as infants, the elderly and those with pre-existing health conditions.

The impacts of heat waves tend to be greater in urban areas because of the "heat island" effect and higher levels of air pollution from transportation. The heat island effect occurs when urban areas replace natural land cover with darker man-made materials such as pavement for parking lots and roads. These materials tend to collect and retain heat at a higher rate than a natural landscape, which causes the urban areas to be hotter than nearby open spaces. Heat island area impacts are expected to increase the frequency, duration, and intensity of conditions conducive to air pollution formation. Health impacts may be influenced by the timing and characteristics of heat waves. Extreme heat events that happen early in the summer tend to result in more deaths than those that occur later in the summer, as people have not yet acclimatized to warmer weather. Moreover, nighttime minimum temperatures are increasing more rapidly than daytime maximum temperatures, which can further increase temperature stress to the elderly and people with pre-existing health conditions, such as circulatory, respiratory and nervous system problems. Furthermore, extreme heat related illnesses place stress on health infrastructure and can lead to significant economic costs.

Increased electricity demand is an additional concern associated with extreme heat days, as the heavy demand to operate air conditioning raises the risk of power shortages. Heavy electricity usage, which is often generated using fossil fuels, means more pollutant emissions, including GHGs.

Increase in the Number and Intensity of Wildfires

Wildfires can have a severe impact on California's air quality and public health. In the coming years, wildfires are expected to increase in intensity and frequency due to climate change, producing more extreme bad air days and longer fire seasons. This negatively impacts the health of the population and results in higher economic costs to California.

Smoke is made up of a mixture of gases and fine particles produced when wood and other organic matter burn. Fine particulate matter (PM) from smoke can cause a variety of adverse health effects ranging from eye and respiratory tract irritation to serious illness, such as reduced lung function, bronchitis, aggravation of asthma, and premature death. aggravation of pre-existing respiratory and cardiovascular disease and increased mortality. PM can also affect the body's immune system and make it more difficult to remove inhaled foreign materials from the lungs, such as pollen and bacteria.

Wildfires also have major economic impacts, costing California hundreds of millions of dollars in firefighting and medical costs; damage to property, natural areas and agricultural lands; loss in tourism, other businesses and employment; increased insurance rates; and a host of other impacts.

Rise in Sea Level and Increased Risk of Flooding

California sea levels have risen about 7 inches over the past 150 years and are projected to rise an additional 4 to 28 inches over the next century as a result of climate change. As sea levels rise, California can expect species and habitat shifts, changes in intensity and frequency of rainfall and coastal storms, increased flooding and changes in runoff patterns. A rise in coastal water temperatures is also anticipated, which will affect water quality and conditions for all marine life that depend on oxygen.

California coastal areas are especially vulnerable to rising sea levels. Increasingly severe winter storms, high tides, and rising mean sea levels are expected to cause more frequent and severe erosion, flooding, and damage to coastal structures. California coastal areas are at risk for the following:

- Erosion of beaches and bay shores;
- Inundation of low-lying uplands;
- Increased flooding and erosion of marshes, wetlands and tidal flats;
- Increased flooding and storm damage in low-lying coastal areas;

- Vulnerable to episodic storm surges and destructive waves that penetrate further inland; and
- Increased salinity in estuaries, marshes, coastal rivers, and coastal aquifers.

Water supplies are also at risk. Rising sea levels would aggravate saltwater intrusion which would degrade California's estuaries, coastal aquifers, wetlands, and groundwater aquifers, and threaten the quality and reliability of the Sacramento-San Joaquin River Delta water transfer system. Higher tide levels caused by higher sea levels could also pose problems to the Delta levee systems with a risk of more inland inundation and the corresponding threat to water quality.

Decrease in Snowpack and Early Run-Off: Effects on Water Supply

Water is already a scarce resource in California and is likely to become more scarce in the coming decade. Water demand is expected to increase because of rising temperatures and increasing population; at the same time, water supply is expected to decrease. California's water supply system relies on a network of dams, reservoirs and canals which are dependent upon water supplied by the snowpack in the Sierra Nevada Mountains. The Sierra Nevada snowpack provides natural water storage, storing winter precipitation in the form of snow and releasing it in the spring and early summer as the snow melts. This system is estimated to hold about half the storage capacity of California's major reservoirs.

Recent studies show that if heat-trapping GHG emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent by the end of this century. Decreasing snowmelt and spring stream flows coupled with increasing demand for water could lead to increasing water shortages, which could exacerbate drought conditions and increase the diversion of rivers in California. The Central Valley relies heavily on Sierra Nevada snowmelt in the summer for drinking water and agriculture. As river flows decrease, competition for scarce water resources increases. California Energy Commission reports project a 15% to 30% reduction in surface water supply to California's cities and farms over this century as a result of climate change.

Increase in the Intensity of Severe Storms

The IPCC predicts changes in precipitation due to increasing global surface temperatures. Rising global surface temperatures are expected to increase the activity of the world's hydrologic cycle and increase the moisture content of the atmosphere. In addition, rising temperatures are expected to increase water vapor in the atmosphere which is a GHG and will likely provide a positive feedback mechanism for climate warming. Global average precipitation is expected to increase during this century; however, it will not be

distributed evenly. Certain areas are expected to receive extra precipitation while others, including California and the southwestern deserts, are expected to receive less.

Research indicates that climate change can cause hurricanes and tropical storms to become more intense, last longer, and have stronger winds. Scientists hypothesize that higher water temperatures are one of the causes of longer and stronger storms, since hurricanes and tropical storms get their energy from warm water. As sea surface temperatures rise, developing storms will contain more energy. Weather patterns have also become more variable, causing longer and drier droughts and longer winter and spring flooding. In recent years, due to high-intensity storms, water flows on many California rivers have been the largest on record. Levees, dams, and flood bypasses are forced to manage flows for which they weren't designed.

Specifically to California, the Sacramento-San Joaquin River Delta is susceptible to flooding. The Delta is composed of 70 islands and tracts and has land surfaces at or below mean sea level. Some Delta Islands are now 25 feet below mean sea level as a result of farming and soil erosion. Levee failure is a significant threat and could result in potential loss of human life, damage to property, and agricultural crops, significant harm to the Delta's fragile ecosystem, disruption of utilities and highways, and water supply disruption due to levee failure and changes in salinity levels.

Effects on Human Health Due to Climate Change

Summer temperatures in California under some climate models are projected to increase by 2°C to 7°C (3.6°F to 12.6°F) by the end of this decade. These temperature increases are expected to affect human health in a number of ways including negative effects on air pollution, heat-related mortality, effects on various infectious diseases, and increase in wildfires.

Higher temperatures are expected to increase the frequency, duration, and intensity of conditions conducive to ozone formation, a pervasive air pollution problem in California causing a wide range of respiratory and cardiovascular problems, particularly for the elderly and very young. Considerable improvement in ozone levels has been achieved over the past three decades as a result of California's aggressive anti-pollution programs. However, under a moderate warming scenario, climate models predict a potential increase of 75 to 85 percent more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today's conditions.

Likewise, if temperatures rise to the higher warming range, by 2100 there could be up to 100 more days per year with temperatures above 90°F in Los Angeles and above 95°F in Sacramento. Extremely high temperatures increase the number of people who die on a given day by causing the cardiovascular system to work harder to keep the body cool, aggravating existing heart problems; increasing respiratory distress; and causing heat exhaustion. This is predicted to result in two to three times more heat-related deaths than occur today.

Climate change may also increase the risk of some infectious diseases, particularly those that thrive in warm areas. Diseases often associated with hot weather, including the West Nile virus, cholera, and Lyme disease are spreading rapidly throughout North America and Europe because increased temperatures in these areas allow disease carriers such as mosquitoes, ticks, and mice to thrive.

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Appendix E

Top 10 Actions by Local Governments and Communities

Top Ten Actions by Local Governments and Communities

The most effective and efficient greenhouse gas reductions within the control of local governments will depend on the particular greenhouse gas (GHG) profile within each community, the status of GHG reduction planning to date, and the economic conditions relative to different strategies. Not all strategies will work equally within the diversity of cities and counties in California. However, the following ten strategies are widely applicable throughout California in varying degrees and are the recommended initial local government focus for future General Plan policies, Climate Action Plan development, and Blueprint Planning:

1) promotion of smart growth, jobs/housing balance, transit-oriented development, and infill development through land use designations, zoning, and public-private partnerships;

2) support for and funding of transit, bicycle, and pedestrian connections through transit and trail planning and regional cooperation;

3) promotion of energy- and water-efficient buildings (e.g., LEED buildings) through green building ordinances, project timing prioritization, and other implementing tools;

4) promotion of green procurement and alternative fuel vehicle use through municipal mandates and voluntary bid incentives;

5) support for alternative fuel facilities and infrastructure through land use designations, zoning, and public-private partnerships;

6) support for renewable energy generation (utility and residential) through feasibility evaluations, land use designations, and zoning;

7) promotion of waste diversion, recycling, energy efficiency and energy recovery in cooperation with public services districts and private entities;

8) support for urban and rural forestry through tree planting requirements and programs;

9) community outreach and education to foster community involvement, input, and support for GHG reduction planning and implementation; and

10) regional cooperation to find cross-regional efficiencies in GHG reduction investments and to plan for regional transit, energy generation, and waste recovery facilities.

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Appendix F

Agency Responsibilities for Programs on Climate and GHGs

Appendix F provides information on California State agencies and how they are addressing climate change and GHG reductions in their policies and programs. The following are thumbnail summaries of State programs for reducing GHG emissions. Links are provided at the end of each summary where additional information can be found.

Climate Action Team (CAT)

Established by Governor Schwarzenegger under an Executive Order S-05-05 on June 1, 2005, the CAT coordinates state-level actions relating to Climate Change. The Team is led by the Secretary of the California Environmental Protection Agency and includes the Secretary of the Business, Transportation and Housing Agency, Secretary of the Department of Food and Agriculture, Secretary of the Resources Agency, Chairperson of the Air Resources Board, Chairperson of the Energy Commission and President of the Public Utilities Commission. The CAT is charged with implementing global warming emission reduction programs and reporting on the progress made toward meeting the statewide GHG reduction targets that were established in the Executive Order. The CAT is divided into 11 subgroups which are focused on supporting the Scoping Plan--the roadmap to meet the state's GHG reduction goals. The CAT members will play a key role in developing and implementing the reduction measures adopted in the Scoping Plan. Furthermore, the Executive Order mandated the preparation of a biennial assessment on climate change science, impacts, and adaptation. The CAT has released the draft Climate Action Team Biennial Report for 2009. The draft report can be found at this link: http://www.energy.ca.gov/2009publications/CAT-1000-2009-003/CAT-1000-2009-003-D.PDF . The draft report addresses four climate change topics which include: impacts of climate change on California's public health, infrastructure and natural resources; economic impacts of climate change on California; climate change research in California; and state efforts to adapt to current and future effects of climate change.
http://www.climatechange.ca.gov/climate_action_team/index.html

California Air Resources Board (CARB)

CARB is tasked to oversee California's major initiatives for reducing climate change or GHG emissions as outlined in AB 32, and 2005 Executive Order S-3-05. These efforts aim at reducing GHG emissions to 1990 levels by 2020 - a reduction of approximately 30 percent, and then an 80 percent reduction below 1990 levels by 2050. The main strategies for making these reductions are outlined in the Scoping Plan which was adopted by the Board in December 2008.

The Scoping Plan provides an outline for actions to reduce California's GHG emissions. The Scoping Plan now requires the CARB and other state agencies to adopt regulations and other initiatives reducing GHGs. Many of these measures will be developed in 2009 and 2010 and go into effect in 2012. The following are some of the regulations and activities that CARB will be implementing: energy efficiency/co-benefits audits of large stationary sources; refinery flare recovery; SF6 emission reduction from the electrical

sector and particle accelerators; landfill methane control measures; stationary equipment refrigerant management program; and foam recovery and destruction program. For a complete list of regulations and measures that CARB is considering, please see the Scoping Plan at:
http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm .

In addition to AB 32, CARB is involved with other state climate change programs which include SB 375 and Clean Car Standards (AB 1493—Pavley). As described in Chapter 2, SB 375 is a state law that requires CARB to set regional targets to reduce greenhouse gas emissions from passenger vehicles for 2020 and 2035. If regions develop integrated land use, housing and transportation plans that meet the SB 375 targets, new projects in these regions can be relieved of certain review requirements under CEQA. The targets apply to the regions in the State covered by the 18 metropolitan planning organizations (MPOs).

Under AB 1493, CARB adopted regulations that achieve the maximum feasible and cost-effective reduction in greenhouse gas emissions from motor vehicles. The regulations would reduce GHG emissions from California passenger vehicles by about 22 percent by 2012 and about 30 percent by 2016. For these regulations, however, the Federal Clean Air Act requires a waiver from the U.S. EPA. Initially, the request was denied, but the U.S. EPA as of February 2009 is currently reconsidering rehearing of the waiver request.
http://www.arb.ca.gov/cc/cc.htm

Board of Forestry

The Board of Forestry (BOF) has been involved in the development of forest protocols and how the Forest Practices Act could better address climate mitigation and adaptation policies. BOF has worked with Cal Fire to update the 2003 Assessment of Forests and Rangelands to provide more discussions and analysis on climate change; BOF also helps develop the State's Fire Management Plan which provides policy direction for the state on combating fires. In developing this plan, BOF will consider climate change in its considerations. Furthermore, CARB's Scoping Plan states that the forest sector must achieve a "no net loss" target, which means it must achieve reductions in CO2 equivalent to the current statewide forest carbon budget. BOF has further been tasked by CARB to implement approaches to reach this target. BOF plans to use a combination of regulatory, statutory and incentive-based approaches to meet these goals.
http://www.fire.ca.gov/resource_mgt/resource_mgt_EPRP_Climate/climate_change_board.php

California Coastal Commission

The California Coastal Commission is developing a planning manual for how stakeholders should address climate change within the California Coastal Act (CCA). The Coastal Commission is planning to develop a document and website that will help stakeholders interpret and implement projects under the CCA. In addition the Commission completed the following in connection with its climate change activities: a

workshop on climate change for the Commission Board; establishment of an internal climate change task force to better understand the relationship between climate change and the CCA; addressing how to incorporate GHG mitigation requests into permit conditions within large projects before the Commission; and participation on the Coastal States Organization Climate Change Work Group, which developed a report, "The Role of Coastal Zone Management Programs in Adaptation to Climate Change."
http://www.coastal.ca.gov/climate/climatechange.html

California Coastal Conservancy

The California Coastal Conservancy has taken the following actions in regards to climate change: developing Climate Change Grant Assessment Criteria for project design; reduction of the Conservancy's overall carbon footprint; and improved planning for future climate impacts to land and water management efforts. The Conservancy is also interested in the "permanent protection or restoration of important habitat corridors affecting significant populations of various species" as an important measure of success. The Conservancy will assess both land and freshwater species as pertaining to climate change impacts.
http://www.scc.ca.gov/index.php?cat=26

California Conservation Corps (CCC)

The CCC has taken the following actions in regards to climate change: implementing a number of programs to reduce its carbon footprint; promoting a more environmentally-friendly labor force by increasing spikes (work from mobile camps) to project work sites to reduce vehicle mileage and maximize time on tasks; increasing fleet vehicle use; developing demonstration projects that sequester carbon and reduce energy and water use; engaging in additional urban and wildland forestry projects, such as tree planting and fuel reduction activities and; participating in climate education that furthers climate action awareness through highly visible project work and public education strategies.
http://www.ccc.ca.gov/#

California Department of Food and Agriculture (CDFA)

The CDFA is addressing the issues of global warming through development of carbon sequestration strategies and GHG reduction strategies for agriculture, promotion of energy and water use efficiency in agriculture, biological control measures, and support for biofuels development. Some specific programs administered include the Rice Straw Utilization Program, which ties into carbon sequestration and biofuels production. Other projects in the Minor Crops Block Grant Program address carbon sequestration and energy efficiency in agriculture. The CDFA is also seeking to reduce the use of petrochemical-based pesticides and fertilizers, which release GHG to the atmosphere, through the Biological Control Program, which substitutes biological organisms for pesticides, and the Fertilizer Research and Education Program, which reduces fertilizer use and promotes carbon sequestration. The Drainage Water Reduction Program and

Reuse and Salt Utilization Program result in more efficient use of irrigation water, resulting in less energy used for water pumping. The CDFA promotes the California production and use of bioethanol and biodiesel as renewable fuels. The Dairy Digester Cost Share Program expands the use of dairy digesters, which convert dairy manure and the methane gas derived from it into electricity, process heat, compost, and carbon dioxide. The conversion of dairy methane to carbon dioxide reduces the global warming potential by about 90% while providing energy.
http://www.cdfa.ca.gov/AHFSS/Emergency_Preparedness/Climate_Change.html

California Department of Forestry and Fire Protection (Cal Fire)

Cal Fire has taken the following actions in regards to climate change: reducing Cal Fire's carbon footprint; participating as an active member of the CAT Forest and Land-Use Sector Groups; assisting in the development of the original forest carbon protocols that were recently adopted by CARB; actively developing new protocols on public lands, urban forestry, and working forests; developing the climate strategy for the Forestry CAT that included detailed descriptions on Reforestation/Afforestation, Forest Conservation, Forest Management, Urban Forestry, and Fuels Reduction/Biomass Production; and participating in several current programs that improve the ability of our forests to adapt to the projected impacts of climate change in California. These programs include the California Forest Improvement Program, the Vegetation Management Program, the Nursery and Seed Bank Program, the Urban Forestry Program, the Forest Legacy Program, and Fuel Hazard Reduction.
http://www.fire.ca.gov/index.php

California Energy Commission (CEC)

The CEC has played an important role in coordinating and implementing state activities addressing climate change. These activities include the following: involvement in a number of activities supporting implementation of AB 32 and other climate activities such as reductions in GHG emissions through energy efficiency, renewable energy and alternative transportation fuel programs; serving on the CAT and leading the Land Use Subgroup of the Climate Action Team (LUSCAT); participating on 11 CAT subgroups responsible for developing action items that will result in quantifiable greenhouse gas emission reductions; conducting a joint proceeding with the CPUC on AB 32 implementation in the electric sector and making joint recommendation to the ARB in February 2008; conducting scientific research on climate change through the Public Interest Energy Research Program (PIER) and the California Climate Change Center; developing climate research and a Development, Demonstration and Deployment Road Map with the ARB and other state agencies to achieve GHG emission reduction and adaptation goals; providing technical support to the California Climate Action Registry in developing greenhouse gas emission protocols; qualifying third-party organizations to provide technical assistance and certification of emissions baselines and inventories; supporting CARB's statewide greenhouse gas emissions inventory for updates and

accuracy; participating in the working groups of the Western Climate Initiative to identify, evaluate and implement collective and cooperative ways to reduce GHGs in the West; and providing policy guidance and monitoring international, national and regional developments and activities impacting clean energy and climate change issues.

Furthermore, the CEC's PIER Program supports research to produce environmentally sound, safe, reliable and affordable energy services and products. In conjunction with other state agencies, PIER is addressing climate change by leading the development of a long-term climate change research plan for California. Under PIER, energy efficiency and generation technologies are under development that could significantly contribute to the decline of in-state greenhouse gas emissions. In addition, PIER is seeking to improve understanding of the implications of climate change by supporting research on potential costs and impacts was well as possible adaptation and mitigation measures. http://www.energy.ca.gov/climatechange/index.html

California Environmental Protection Agency (Cal/EPA)

Under existing law, the CARB, CEC, and the California Climate Action Registry all have responsibilities with respect to control of greenhouse gas emissions. New legislation requires the Secretary for Environmental Protection to coordinate greenhouse gas emission reductions and climate change activity in state government. Cal/EPA is addressing climate change through its assessment of environmental indicators in the Environmental Protection Indicators for California (EPIC) project. EPIC was created to develop scientifically based measures that convey complex information on environmental status and trends in an easily understandable format. EPIC supports Cal/EPA's commitment to using measurable results in judging the effectiveness of the state's efforts directed at environmental protection. In its first year, EPIC developed a framework in which to select indicators that are important in tracking the state of California's environment. For climate change, the indicators selected were carbon dioxide emissions, air temperature, Sierra Nevada snowmelt runoff, and sea level rise in California. In the future, EPIC will investigate other greenhouse gas emissions, such as methane and nitrous oxides, and correlate different data sets that show increasing climate patterns in California. Cal/EPA will continue to evaluate, improve, and expand on the EPIC project to ensure that it provides meaningful information for understanding the state of the California environment for planning and decision making.
http://www.climatechange.ca.gov/

California Integrated Waste Management Board (CIWMB)

The CIWMB is addressing climate change issues through recycling programs, which avoid emissions from the energy-intensive processing of virgin raw materials; through sustainable building activities, which emphasize energy, water, and materials efficiency thereby reducing emissions from their production and transport; and through landfill gas collection, which directly uses landfill greenhouse gas emissions for fuel. The CIWMB is implementing the State Agency Buy Recycled Campaign (SABRC) program which,

under state law, requires all state agencies to use recycled products when available and increase acceptance and awareness of recycled-content product use in the private sector as well as state and local government. CIWMB runs the one of the largest recycled-content databases on the web, including construction and demolition recycling databases. The CIWMB has played a key role in the Sustainable Buildings Task Force, and is currently developing the Sustainable Building Training Program. In an interagency study, the CIWMB will develop a methodology to incorporate life-cycle costing into the state's capital outlay design. CIWMB participated in the Collaborative for High Performance Schools to assist in building energy and resource-efficient California schools and runs a program to promote efficient landscape design and maintenance practices among landscaping professionals. CIWMB also has been instrumental in the U.S. Green Building Council's Green Building Rating System. The CIWMB is pursing conversion technologies such as gasification and hydrolysis of solid waste to produce alternative fuels such as ethanol, thereby offsetting greenhouse gas emissions from fossil fuel sources. The conversion of solid waste destined for landfills to useful products such as ethanol reduces the organic fraction going into landfills. It is the organic fraction which generates landfill gas, a significant source of greenhouse gas emissions. The CIWMB also directly benefits greenhouse gas reduction by ensuring compliance with state minimum standards for landfill gas monitoring, collection, and control.
http://www.ciwmb.ca.gov/climate/

California Ocean Protection Council (OPC)

OPC has taken the following actions in regards to climate change: coordinating ocean impacts; establishing policies that will guide those agencies responsible for ocean protection; and helping to coordinate the state's efforts to adapt to the ocean impacts of climate change. OPC is working on determining potential impacts along the coast due to sea level rise, including impacts to public infrastructure.
http://www.opc.ca.gov/

California Public Utilities Commission (CPUC)

The CPUC is responsible for a number of energy-related policies and initiatives that benefit consumers and the economy, and have corresponding reductions in GHGs. Some of these policies and initiatives are described as follows:

- Energy Efficiency - The CPUC launched an energy efficiency and conservation campaign in which the agency allocated almost $3 billion in funding for energy efficiency programs in 2006-2008.

- Renewable Energy - California has the most ambitious goals in the nation for renewable energy. The State’s Renewable Portfolio Standard requires utilities to obtain 20% of their power from renewable resources by 2010, as mandated under SB 107 (Simitian). The CPUC oversees utility progress toward this goal and identifies steps toward meeting the Governor’s target of 33% by 2020.

- Emissions Performance - The CPUC instituted a new GHG emissions performance standard to regulate contracts with electricity generation facilities. Mandated by SB 1368 (Perata), the standard, known as EPS, ensures that any long-term power commitments to meet California's energy needs are at least as clean as California's existing energy portfolio.

- Emerging Technologies - The CPUC approved $11 million per year in funding support for emerging energy efficiency technologies from 2006 through 2008.

- Advanced Metering - The CPUC has authorized distribution tariffs since 2001 to fund utility incentives for customer-owned clean generation such as fuel cells and solar energy. This is a part of a plan for replacing conventional customer electric meters with an Advanced Metering Infrastructure (AMI), giving customer new access to information and greater control over their energy use and bills. http://www.cpuc.ca.gov/PUC/energy/climate+change/

California Resources Agency

The California Resources Agency is providing leadership in promoting and implementing climate policies across the state through its 25 departments, commissions, boards and conservancies, through the Governor's Climate Action Team efforts, and through engagement in national and international climate policy dialogues. These efforts range from working to reduce the Resource Agency's overall carbon footprint, to setting state climate policy direction through the development of a state climate adaptation strategy, to representing California in the recent U.N. Framework Convention on Climate Change Convention in Indonesia. The Resources Agency has been active in developing a climate adaptation strategy (CAS) for the state that begins to address how California can and should prepare for short-, medium-, and long-term risks from expected climate impacts. Mitigating carbon emissions has and should be a central focus of California climate policies, but helping California adapt to known climate impacts will need to be on equal footing to address climate risks to the state's resources. In addition, the Resources Agency is:

- In the process of accounting for all Resources-wide GHG emissions. At the same time, the Agency is working with all of its departments, commissions, boards, and conservancies to reduce its overall carbon footprint in internal operations, project activities, and amongst its grantees and contractors when possible;

- Leading the Forestry Climate Action Team Scoping Group. The Resources Agency has been Chairing the Forestry Climate Action Team (FCAT) sector group that has focused on developing a forest sector strategy for the Scoping Plan, revising the state's greenhouse gas inventory for the forests, developing new forest protocols, discussing offsets, and the climate adaptation strategy for the forest sector;

- Revising CEQA Guidelines to address greenhouse gas mitigation and adaptation. Under SB 97 (Dutton), the Resources Agency is working with the Governor's Office of Planning and Research to develop Technical Guidelines for how GHGs should be considered in the California Environmental Quality Act (CEQA). It is planned that this effort will be completed by 2010;

- Providing Climate Policy Coordination and Leadership within the Agency. Monthly "Climate Leaders" meetings with the Lead Climate person within each Resources organization are held to discuss recent happenings on climate-related topics;

- Revising bond-money grant guidelines to incorporate climate change. The Resources Agency is developing climate change grant criteria for several programs within its organization to begin to track the carbon emissions and sequestration from Resources programs;

- Initiating a forestry sub-group as part of the Western Climate Initiative, with Washington and Oregon;

- Partnering with the Coastal States Organization (CSO). The Resources Agency chairs the CSO where the Chair's Initiative proposes that coastal climate change be one of the three top priorities of the CSO. The organization has adopted the Adaptation to Climate Change Policy to better coordinate state and national efforts. The Coastal States Stewardship Foundation, in collaboration with the Coastal States Organization, is creating the Coastal States Campaign to Adapt to Climate Change;

- Involved with the West Coast Governors' Agreement on Ocean Health. Part of the recommendations from the West Coast Governors Agreement on Ocean Health Action Plan will be to address climate change adaptation by conducting a west-coast-wide assessment of anticipated impacts of climate change over the next several decades and setting a plan for how to adapt to such changes. http://resources.ca.gov/energy_and_climate_change.html

California Department of Transportation (Caltrans)

Caltrans is addressing climate change by reducing emissions through energy efficiency measures and use of alternative technologies to lessen the emissions from the state transportation system, vehicle fleet, and reduction of time spent in cars and in traffic. In fiscal year 2001/2002 Caltrans surpassed energy efficiency goals by saving $7.5 million, primarily due to the statewide Light Emitting Diode (LED) Traffic Signal upgrade project. This achievement has led to significant emissions reductions in energy generation, and is being expanded through implementation of non-vehicular energy conservation activities, such as reducing the energy to traffic signals, roadway and sign lighting, facility operations and procedures, and bridge and tunnel operations. Caltrans' Greening the Fleet Initiative uses viable, emerging technologies to reduce mobile source

emissions. So far, nineteen hybrids and 758-gas/propane bi-fuel trucks were purchased. Low emission trucks have replaced 54 diesel-powered trucks, and zero emission static inverters have replaced generators on 34 trucks. Solar panels have replaced fossil fuel-powered accessories. These efforts will continue with the goal of making significant emissions reductions and leading California fleet operators. Caltrans will also reduce mobile source emissions through its transportation energy efficiency program, the Smart Transportation and Livable Community Initiative, with the goal of reduced fuel consumption and vehicle miles traveled, and increased transit ridership and vehicle occupancy. The Transportation System Management and Congestion Relief programs seek to reduce emissions by minimizing travel demand and congestion while maximizing traffic efficiency. Applications include electronic toll collection on bridges, traffic signals, ramp meters, and many more. The New Technology Program will continue to research, demonstrate, and deploy new technologies to increase travel efficiency.
http://www.dot.ca.gov/hq/tpp/offices/opar/climate.html

Department of Conservation (DOC)

The DOC is addressing climate change issues and GHG reductions through a number of actions and programs which include the following:

- The DOC is working with The Climate Registry and several of its members in devising documentation procedures for several emission sources, such as work travel in personal vehicles and rental cars that are currently not required but strongly encouraged.

- Both the Division of Recycling and the Division of Land Resource Protection have revised their grant programs to include GHG reduction as a means to encourage and support lower-emitting projects.

- DOC participates on the following CAT subcommittees: Land Use, Recycling and Waste, Agriculture, Water, Energy and Economic.

- DOC's Division of Oil, Gas and Geothermal Resources is working with the California Energy Commission and other state and federal agencies, as mandated by AB 1925 (Blakesee). DOC is helping to assess the technical and economic feasibility of carbon sequestration in California.

- DOC established a department-wide Climate Action Team (CoolCATS) consisting of representatives from each Division. This team will measure DOC's carbon footprint and identify meaningful and feasible strategies to reduce that footprint.

- Each division within DOC is systematically educating their staff on the principles of sustainability. http://www.conservation.ca.gov/Index/Pages/Index.aspx

Delta Protection Committee (DPC)

The DPC has identified sea level rise as a central threat facing the Delta in the DPC 2006-2011 Strategic Plan. The DPC has initiated a process to update its 1995 Land Use and Resource Management Plan for the Primary Zone of the Delta and will include findings on climate change policies and recommendations for action that local and state government can take to address the impacts of climate change on the Delta.
http://www.delta.ca.gov/

Department of Fish and Game (DFG)

The DFG is addressing climate change issues and GHG reductions through a number of actions and programs which include the following:

- Implementing California's Wildlife Action Plan which identifies climate change as one of DFG's four primary stressors affecting wildlife (along with growth and development, water management conflicts, and invasive species) and makes recommendations to incorporate climate change science in restoration work.

- Providing climate leadership through personnel additions.

- Taking a lead among the state fish and wildlife agencies to begin to address the uncertainty associated with a changing climate through landscape scale efforts that support managing robust populations and healthy habitats. The Department also has many targeted efforts underway focused at climate change research, monitoring and other more specific actions.

- Creating a task force to provide the leadership to reduce or mitigate the production of greenhouse gases by the Department, and to prepare for the current and future harmful impacts of climate change on California's natural resources through policy and meaningful action.

- Convening stakeholders and partners from the NGO community, academia, state and federal agencies. This stakeholder group will provide direct input to the Director's Task Force as well as maintaining and increasing communication and collaboration among stakeholders and Department of Fish and Game.

- Developing a website that will serve as both a resource to Department employees as well as a message to the public and partners about the Department of Fish and Game's commitment to addressing the challenges of a changing climate in all of its endeavors.

- Evaluating the carbon impact of all departmental operations as part of the Climate Change Registry and as a Resources Agency-wide effort.

- Participating with the Resources Agency on the forestry, land-use and water, energy and transportation CAT subgroups, and advising the state on factors relating to adaptation and mitigation for climate change effects on wildlife and natural resources.

- Working with State Parks, Cal Fire and other Resources Agency departments and the Biodiversity Council to build a comprehensive library of published literature, popular articles, and other information on climate change effects that will be made available to the public. DFG has also developed complementary data and enhanced close collaboration with sister state agencies to help inform decisions ranging from levee placement to park management to highway interchange placement.

- Representing wildlife interests on the climate action working group of the Western Governors Association and the Climate Change subcommittee for the Association of Fish and Wildlife Agencies. http://www.dfg.ca.gov/climatechange/

Department of General Services (DGS)

The DGS is addressing climate change issues and GHG reduction through a number of actions and programs which include the following:

- Developing and implementing energy savings strategies such as the Better Buildings Program, ensuring energy savings in state building projects and schools.

- Assisting, through the Office of Fleet Administration's (OFA) Alternative Fuel Vehicle (AFV) Program, state agencies in meeting federal AFV purchasing requirements, which helps reduce dependence on foreign oil and help reduce GHG emissions.

- Establishing a vehicle purchase policy which requires gasoline vehicles purchased for the state fleet to meet the Air Resources Board’s ultra low-emission vehicle standard.

- Promoting the use of recycled products in the construction and maintenance of state buildings

- Monitoring in real time the energy use in state facilities to foster conservation efforts. http://www.green.ca.gov/default.htm

Department of Toxic Substances Control (DTSC)

The DTSC is addressing climate change issues through its Pollution Prevention and Technology Development Program. Hazardous waste reduction and recycling activities reduce impacts on the environment as well as the impacts from transportation, management and disposal. As one example, the development of water-based cleaning systems in lieu of solvent-based systems reduces resource consumption and promotes sustainability. Through the incorporation of life-cycle thinking, DTSC's pollution prevention activities take a holistic, multi-media approach, incorporating energy and materials efficiency as well as air, land and water emissions reductions.
http://www.dtsc.ca.gov/

Department of Water Resources (DWR)

The DWR is addressing climate change issues through a number of actions and programs which include the following:

- Developing a DWR Renewable Resources Policy that would meet the intent of the State's Renewable Portfolio Standards by establishment of a goal under which a percentage of load would be met by use of renewable resources.
- Refurbishing generating and pumping units to increase their efficiency as part of the State Water Project Energy Efficiency Improvements.
- Promoting combined-cycle plants and renewable resources at its facilities.
- Developing an adaptation plan for the state's water resources within the State Water Plan effort.
- Serving as a co-leader and actively participating in the CAT Water and Energy Scoping Group.
- Actively pursuing projects and research that promote carbon sequestration on DWR lands. www.water.ca.gov/climatechange/

Office of Planning and Research (OPR)

OPR is addressing climate change through education about using renewable energy sources, and through Smart Growth, and Vital Communities Initiatives. Innovative Clean Air Technologies (ICAT), GIS State Energy Map, Energy Educational Forum, and Stationary Fuel Cell Collaborative are among the initiatives led by the office. OPR held renewable energy forums from May through November of 2001 in an effort to meet the Governor's goal to increase renewable sources to supply twenty percent of all California's energy needs by 2010. The forums focused on biomass, wind, geothermal, solar, and fuel cell energy, which lead to significant reductions in greenhouse gas emissions as

compared to fossil fuel generated energy. OPR led an Interagency Task Force on Green Accounting that revised the 1987 Standard Practices Manual (2001) which provided finance and accounting procedures for using life-cycle analysis for state projects. The same Task Force is worked on a Comprehensive Energy Efficiency and Renewable Plan for the State On-Site State Buildings and a "Renewable Grid Connected Generation Plan" which supports the financial potential of the Governor's Renewable Portfolio Standard. Furthermore, addressing climate change and GHGs in CEQA projects has emerged as a major issue. Pursuant to Senate Bill 97 (Dutton)(Chapter 185, 2007) OPR is in the process of developing CEQA guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions." OPR is required to "prepare, develop, and transmit" the guidelines to the Resources Agency on or before July 1, 2009. As part of its continuing service to professional planners, land use officials, and CEQA practitioners, OPR, in collaboration with the California Resources Agency, Cal/EPA, and ARB, has published a technical advisory containing informal guidance for public agencies as they address the issue of climate change in their CEQA documents.
http://opr.ca.gov/index.php?a=ceqa/index.html

State and Consumer Services Agency (SCSA)

SCSA which also houses the Department of General Services (DGS) and the Department of Consumer Affairs, has used the emissions reductions of energy savings programs such as the Building Better Buildings program, energy conservation awareness programs such as the Flex Your Power campaign, as well as emissions reduced from mobile sources in the "Green Fleet" program to address climate change in California. Along with the CIWMB, the SCSA has ensured significant energy and resource savings in major state building projects which amount to over $1 billion, substantially cutting emissions from energy generation. An example of this is the Capitol Area East End project. DGS, as property managers for numerous state government buildings, is cutting energy use through building electricity metering, energy control systems, and extensive recycling. Through the DGS, the Alternative Fuel Vehicle Program is creating a government fleet that produces less greenhouse gas emissions than standard gasoline powered cars by relying on Ultra Low Emission and Super Ultra Low Emission vehicles. The program is also working to deploy fuel cell vehicles as part of the state fleet and to promote the use of electric vehicles. SCSA also promotes energy conservation and efficiency in homes and schools through education and awareness programs. An example is the Flex Your Power campaign implemented by the Department of Consumer Affairs.
http://www.scsa.ca.gov/

State Lands Commission

The State Lands Commission is addressing climate change issues through a number of actions and programs which include the following:

- Inclusion of GHG emissions from leases in environmental impact reports (EIRs). The Commission is requiring greenhouse gas reports for leases involving major

projects. For projects that completed their EIRs before AB 32, the Commission is requiring a supplemental report on greenhouse gases. For example, a supplemental greenhouse gas report was produced for the Poseidon desalination project since the EIR was completed before passage of AB 32.

- Sea Level Rise Planning. The Commission is requiring that oil terminals be modified so that they can accommodate anticipated sea level rise over the life of the terminal. The Commission is beginning to consider the effects rising sea levels will have on the mean high tide line and, consequently, State Lands' jurisdiction. http://www.slc.ca.gov/

State Parks

The State Parks is addressing climate change issues and GHG reductions through a number of actions and programs which include the following:

- Planning a reduction strategy by using solar power systems, installing better insulation, and by buying lower-emission vehicles. In addition, the buildings Parks hopes to build (e.g., restrooms, visitor centers, etc., using bond funds) will have to meet high energy-efficiency standards by Executive Order of the Governor.

- Promoting carbon sequestration in State Park projects. Because forests and other plants absorb and store carbon dioxide from the atmosphere, Parks is trying to reduce its total amount of GHGs affecting our climate through Parks land stewardship and land acquisition strategies.

- Working with universities to monitor the success of different species at different altitudes in the face of climate change. And, consistent with Parks' educational mission, the entire project will be interpreted to visitors as a working example of climate change adaptation and mitigation.

- Modifying its land stewardship priorities to help species adapt to the effects of climate change. The available science suggests Parks need to be purchasing and protecting habitat corridors that move up in elevation so species have somewhere to migrate as the temperatures increase. State Parks also have to consider how an increase in sea level could affect our properties, in particular coastal properties. Sea level rise may require relocating our coastal infrastructure.

- Hosting a seminar with UC Berkeley's California Center for Environmental Law and Policy and the Resources Legacy Fund that brought together public land managers, non-profits and significant donors (who collectively will be spending hundreds of millions of dollars in the coming several years) together with scientists, academics and other experts to develop new acquisition priorities and restoration practices.

- Engaging the public in a meaningful way to help them understand the issue of climate change and to inspire them to constructive action. Parks can teach visitors about the impacts of climate change on parks and inspire them to adapt to climate change by making positive lifestyle changes. Parks can become models of climate-change best practices showcasing both what is at risk and what can be done about it. Parks is beginning to consider how climate change fits into existing planning efforts. http://www.parks.ca.gov/?page_id=21491

State Water Resources Control Board (SWRCB)

The SWRCB is addressing adaptation to climate change with increased environmental data collection and information management that assist in determining correlation between climate change, water supply changes and water quality effects. Through the Surface Water Ambient Monitoring Program (SWAMP), water quality monitoring has increased the gathering of data about overall surface water conditions. SWRCB is also implementing the System for Water Information Management (SWIM) that will increase the availability of such information to researchers, the public, and other interests. The SWRCB is working through the Joint Agency Climate Team and other forums, to identify and coordinate water quality related issues. Increased climate variability and warming has the potential to significantly affect water quality in the state, therefore this data collection and management system will assist in the planning of adaptations to meet water quality objectives.
http://www.waterboards.ca.gov/water_issues/programs/climate/

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Appendix G

Examples and Resources

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Appendix G: Examples and Resources

Appendix G provides an example of a General Plan approach from Marin County. A link has been provided at the end of the Marin County excerpt for readers who wish to view the Marin County General Plan in its entirety. In addition there are several additional reference links for General Plans and Climate Action Plans. The intent is to augment the guidance in the main body of this report with real-world examples of what others have done.

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2.7 Atmosphere and Climate

Background

Although air quality in Marin County is generally very good, emissions from within the county may contribute to pollution problems elsewhere in the region and climate changes that are occurring on a global scale. In some parts of the Bay Area, ozone levels exceed National Ambient Air Quality Standards and particulate concentrations exceed State standards (Figures 2-9 and 2-13). Vehicle traffic produces most of the emissions leading to increased ozone levels, while construction activities, wood burning, off-road travel, and agriculture generate some measured particulate matter.

The Bay Area Air Quality Management District (BAAQMD) encourages local jurisdictions to implement policies that will help improve regional air quality, and to especially recognize sensitive receptors. This Section of the Countywide Plan provides a regulatory framework for articulating air quality objectives consistent with regional air quality programs. The Transportation, Energy and Green Building, Public Facilities and Services, and Community Development sections of the Built Environment Element also include policies and programs intended to reduce the impact of future development on air quality and global warming.

On a global scale, data indicate an increase in mean surface air temperatures over historic levels and climate models predict this warming will continue. Scientists expect that the average global surface temperature could rise 1°F to 4.5°F in the next 50 years, and 2.2° to 10°F in the next century. A rise of this magnitude is significant: For example, the difference in temperature between 1995 and the temperature during the ice ages was 5°F to 8°F. Mounting scientific evidence suggests that the discharge by human activities of gases that trap heat in the atmosphere is largely responsible for this trend. A major consequence of global warming is melting glaciers and warmer waters, which cause the oceans to expand and rise. Sea level rise and higher evaporation rates are expected to increase storm frequency and severity. The resulting economic loss from increased storm activity will be equally dramatic: It has already increased tenfold over the past 40 years. Climate change will amplify existing environmental problems, such as erosion, storm-surge floods, and landslide risk, and changes to the water cycle will further stress domestic water supply as well as indigenous plant and animal populations. Further complicating the issue of climate change is the high level of complexity and uncertainty associated with modeling and predicting climate behavior. While it is clear that damage resulting from weather-related events is already on the rise, it is not known whether future changes will be gradual or abrupt. Nor is it clearly understood what the full spectrum of impacts will be. Given the global risks to economic, environmental, and social stability, it is imperative that climate change be addressed at all levels of government.

> *"Everybody talks about the weather, but nobody does anything about it."*
>
> — Mark Twain

Fortunately, local governments can play a meaningful role in addressing climate change, by instituting measures that reduce the vulnerability and increase the adaptability of Marin's physical infrastructure, economic activities, and natural systems. Furthermore, steps taken to address climate change will yield positive benefits in local efforts to improve air quality, as vehicle traffic and energy generation are major contributors to both greenhouse gases and air pollution. For example, construction of a modern world class transportation system in Marin County will contribute to further reducing greenhouse gas emissions and improving air quality.

The issue of climate change is ultimately part of the larger challenge of fostering sustainable communities. Climate change goals are more effectively accomplished when efforts are focused on integrating principles of sustainability within sectors such as transportation, buildings, ecosystems, and water systems. While the aim of this Section is to provide a framework for addressing atmosphere and

climate change, the detailed policies and programs that address climate protection are located throughout the Countywide Plan and are referenced here in this section.

Key Trends and Issues

How clean is the air in Marin?

Air quality indicators show improvement. Marin has experienced a drop both in the total number of days exceeding State Ambient Air Quality Standards and in the number of days exceeding safe levels of ozone since 1996. Marin also has had a reduction in the number of days that safe levels of particulate matter have been exceeded in the county since 1996 (Figure 2-9). Ozone precursor pollutants have decreased locally, and are expected to continue to decline.

Figure 2-9 Summary of Measured Air Quality Exceedances

Pollutant	Standard	Monitoring Station	Days Exceeding Standard				
			2000	2001	2002	2003	2004
Ozone (O_3)	NAAQS 1-hr	San Rafael	0	0	0	0	0
		BAY AREA	3	1	2	1	0
	NAAQS 8-hr	San Rafael	0	0	0	0	0
		BAY AREA	4	7	7	7	0
	CAAQS 1-hr	San Rafael	0	0	0	0	0
		BAY AREA	12	15	16	19	7
Fine Particulate Matter (PM_{10})	NAAQS 24-hr	San Rafael	0	0	0	0	0
		BAY AREA	0	0	0	0	0
	CAAQS 24-hr	San Rafael	0	2	2	0	1
		BAY AREA	7	10	6	6	7
Fine Particulate Matter ($PM_{2.5}$)	NAAQS 24-hr	San Rafael	0	--	--	--	--
		BAY AREA	1	5	7	0	1
All Other (CO, NO_2, Lead, SO_2)	All Other	San Rafael	0	0	0	0	0
		BAY AREA	0	0	0	0	0

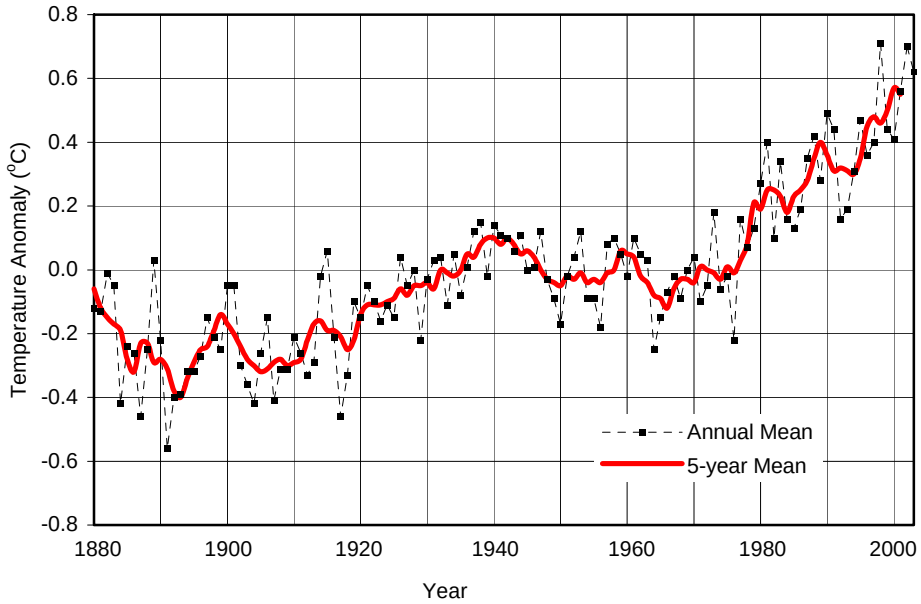
Source: 2000-2004 Bay Area Air Quality Management District.

Pollution levels can be reduced. Most particulate matter comes from areawide sources, such as combustion of wood and other nonclean fuels, and from homes and businesses without emission-control devices. Simple measures such as requiring clean-burning stoves can achieve improvements in air quality. Reducing motor vehicle use can result in significantly cleaner air.

Are temperatures rising globally?

The 10 warmest years of the 20th century all occurred after 1985, with 1998 the warmest year on record. The average of all global climate models suggests about a 3°F to 10°F rise in global temperature over the next 50 to 100 years. Global surface temperatures have increased about 1°F over the 20th century, with approximately 70% (or 0.7°F) of that change occurring in the last 25 years. The following graph illustrates the increasing rate and magnitude of global surface air temperatures.

Figure 2-10 Global Temperature



Source: NASA Goddard Institute for Space Studies.

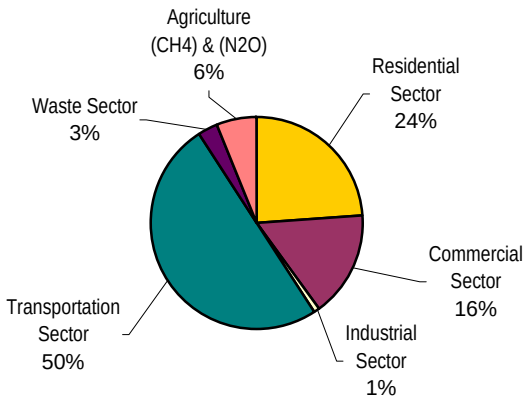
Is sea level rising?

Globally, sea level has risen 4 to 8 inches over the past century. The Intergovernmental Panel on Climate Change (IPCC) notes it is very likely that the 20th-century warming has contributed significantly to rising sea levels, through thermal expansion of seawater and loss of land ice. The EPA estimates that sea level is likely to rise 1.8 feet along most of the West Coast by 2100. By comparison, the San Francisco Bay level has increased about 4 inches since 1850. Given a 1-foot rise in sea level, the current 100-year high in the storm surge felt on the levee system of inland San Francisco Bay and Delta would become the 10-year high. In other words, the frequency of a 100-year event would increase tenfold.

What activities are contributing to the greenhouse gases in Marin?

Marin emits nearly 3 million tons of carbon dioxide every year. Vehicle traffic accounts for 50% of the total emissions, and energy use by buildings (residential, commercial and industrial combined) accounts for 41%.

Figure 2-11 Countywide Emissions Analysis



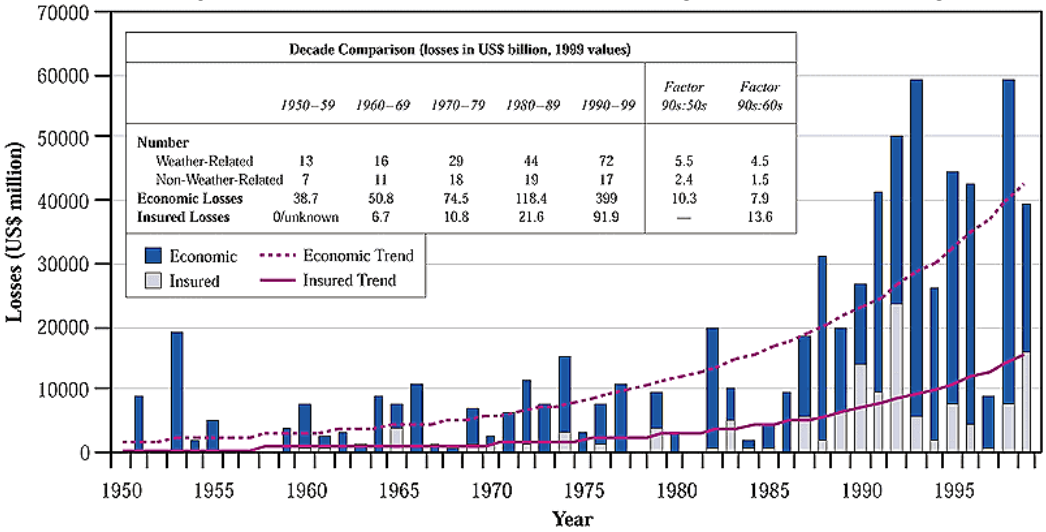
Source: Community Development Agency,
Greenhouse Gas Emissions Analysis Report 2000.

Has climate change affected the global economy?

Challenges resulting from weather- and climate-related events include changes to world food production and supply, migration, and access to clean water and energy. As indicated in the table below, costs have increased substantially since 1980.

> *"The climate system is being pushed hard enough that change will become obvious to the man in the street in the next decade."*
>
> – James E. Hansen, director of NASA's Goddard Institute for Space Studies, quoted in *Newsweek*, January 22, 1996

Figure 2-12
Cost to Society of Insurable, Weather-Related Damages from 1950 through 1999



Source: International Panel on Climate Change, 2001.

What Are the Desired Outcomes?

GOAL AIR-1

Improved Regional Air Quality. Promote planning and programs that result in the reduction of airborne pollutants measured within the county and the Bay Area.

Policies

AIR-1.1 Coordinate Planning and Evaluation Efforts. Coordinate air quality planning efforts with local, regional, and State agencies, and evaluate the air quality impacts of proposed plans and development projects.

AIR-1.2 **Meet Air Quality Standards.** Seek to attain or exceed the more stringent of federal or State Ambient Air Quality Standards for each measured pollutant (Figure 2-13).

AIR-1.3 **Require Mitigation of Air Quality Impacts.** Require projects that generate potentially significant levels of air pollutants, such as quarry, landfill operations, or large construction projects, to incorporate best available air quality mitigation in the project design.

Why is this important?

It is essential to use a regional approach to improving air quality, since polluted air flows from one place to another.

Environment: Cleaner air and water mean healthier marine and terrestrial ecosystems.

Economy: Poor air quality is linked to a higher incidence of public health costs associated with respiratory illnesses. The California Air Resources Board (CARB) suggests that the annual health impacts of exceeding state health-based standards for ozone and particulate matter include 6,500 premature deaths, 4,000 hospital admissions for respiratory disease, and 350,000 asthma attacks. The loss of productive workdays also affects the local economy. The American Lung Association (ALA) states that asthma accounts for an estimated three million lost workdays for adults nationally.

Equity: Poor air quality is linked to a higher incidence of respiratory illnesses. Asthma, which can be triggered and/or caused by poor air quality, currently affects 2.3 million Californians. In Marin, there were 17,083 cases of asthma in 2004, which translates to an impact on 7% of the population.

How will results be achieved?

Implementing Programs

AIR-1.a ***Inform Local and Regional Agencies.*** Notify local and regional jurisdictions of proposed projects in unincorporated areas that may affect regional air quality, as identified by project type and size thresholds in the *BAAQMD CEQA Guidelines, Assessing the Air Quality Impacts of Projects and Plans* (Figure 2-14).

AIR-1.b ***Evaluate Air Quality Impacts of Proposed Projects and Plans.*** As part of the Environmental Review Process, use the current BAAQMD CEQA Guidelines to evaluate the significance of air quality impacts from projects or plans, and to establish appropriate minimum submittal and mitigation requirements necessary for project or plan approval.

AIR-1.c ***Take Part in Regional Programs.*** Continue to participate in the Cities for Climate Protection and Spare the Air programs.

AIR-1.d ***Cooperate to Enforce Air Quality Standards.*** Cooperate with the U.S. Environmental Protection Agency (EPA), the California Air Resources Board, and the BAAQMD to measure air quality at emission sources (including transportation corridors) and to enforce the provisions of the Clean Air Act and State as well as regional policies and established standards for air quality.

Figure 2-13 California and National Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards	NATIONAL STANDARDS [a]	
			Primary [b,c]	Secondary [b,d]
Ozone	8-hour	0.07 ppm (154 μg/m^3)	0.08 ppm (176 μg/m^3)	—
	1-hour	0.09 ppm (180 μg/m^3)	— [e]	Same as primary
Carbon Monoxide	8-hour	9 ppm (10 μg/m^3)	9 ppm (10 μg/m^3)	—
	1-hour	20 ppm (23 μg/m^3)	35 ppm (40 μg/m^3)	—
Nitrogen Dioxide	Annual	—	0.053 ppm (100 μg/m^3)	Same as primary
	1-hour	0.25 ppm (470 μg/m^3)	—	—
Sulfur Dioxide	Annual	—	0.03 ppm (80 μg/m^3)	—
	24-hour	0.04 ppm (105 μg/m^3)	0.14 ppm (365 μg/m^3)	—
	3-hour	—	—	0.5 ppm (1,300 μg/m^3)
	1-hour	0.25 ppm (655 μg/m^3)	—	—
PM_{10}	Annual	20 μg/m^3	50 μg/m^3	Same as primary
	24-hour	50 μg/m^3	150 μg/m^3	Same as primary
$PM_{2.5}$	Annual	12 μg/m^3	15 μg/m^3	—
	24-hour	—	65 μg/m^3	—
Lead	Calendar quarter	—	1.5 μg/m^3	Same as primary
	30-day average	1.56 μg/m^3	—	—

Notes: (a) Standards, other than four ozone and those based on annual averages, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.
(b) Concentrations are expressed first in units in which they were promulgated. Equivalent units given in parenthesis.
(c) Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than three years after that state's implementation plan is approved by the EPA.
(d) Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
(e) The national one-hour ozone standard was revoked by U.S. EPA on June 15, 2005.

Source: 2004 Bay Area Air Quality Management District.

Figure 2-14
Projects with Potentially Significant Emissions

Land Use Category	Trip Generation Rate	Size of Project Likely to Generate 80 lb/day NOx
Housing		
Single Family	9.4/d.u.	320 units
Apartments	5.9/d.u.	510 units
Retail		
Discount Store	48.3/1000 sq.ft.	87,000 sq.ft.
Regional Shopping Center	96.2/1000 sq.ft.	44,000 sq.ft.
Supermarket	178/1000 sq.ft.	24,000 sq.ft.
Office		
General Office	10.9/1000 sq.ft.	280,000 sq.ft.
Government Office	68.9/1000 sq.ft.	55,000 sq.ft.
Office Park	12.8/1000 sq.ft.	210,000 sq.ft.
Medical Office	37.1/1000 sq.ft.	110,000 sq.ft.
Other		
Hospital	13.8/1000 sq.ft.	240,000 sq.ft.
Hotel	8.7/room	460 rooms

Note: Trip rates for many land uses will vary depending upon size of project. See latest edition of Trip Generation, Institute of Transportation Engineers.

Source: 1999 Bay Area Air Quality Management District.

AIR-1.e ***Conduct Public Education Program.*** Educate regarding the reason for requiring using best management practices to improve air quality.

AIR-1.f ***Limit Residential Wood Burning.*** Continue to implement the ordinance that phases out the use of older, polluting wood-burning appliances and limits the installation of wood-burning devices in new or renovated homes to pellet stoves, EPA-certified woodstoves and fireplace inserts, or natural gas or propane appliances.

AIR-1.g ***Require Control Measures for Construction and Agricultural Activity.*** Require reasonable and feasible measures to control particulate emissions (PM-10 and PM-2.5) at construction sites and during agricultural tilling activity, pursuant to the recommendations in the BAAQMD CEQA Guidelines, which may include the following:

- Watering active construction or agricultural tilling areas.
- Covering hauled materials.
- Paving or watering vehicle access roads.
- Sweeping paved and staging areas.

What Are the Desired Outcomes?

GOAL AIR-2

Protection from Emissions. Minimize the potential impacts from land uses that may emit pollution and/or odors on residential and other land uses sensitive to such emissions (see Map 2-16, Sensitive Receptor Sites in Unincorporated Marin County).

Policy

AIR-2.1 Buffer Emission Sources and Sensitive Land Uses. Consider potential air pollution and odor impacts from land uses that may emit pollution and/or odors when locating (a) air pollution sources, and (b) residential and other pollution-sensitive land uses in the vicinity of air pollution sources (which may include freeways, manufacturing, extraction, hazardous materials storage, landfill, food processing, wastewater treatment, and other similar uses).

Why is this important?

People and sensitive plants and animals need to be protected from sources of air pollution.

Environment: Air pollution creates stress on fragile and sensitive ecosystems by reducing reproductive capacity and food sources.

Economy: Lowering pollutants from area-wide and point sources would lower public health costs associated with respiratory illnesses and lead to fewer sick days at the workplace.

Equity: Children, people who are ill, and elderly people are particularly sensitive to air pollution. Places where they congregate need protection from polluted air.

How will results be achieved?

Implementing Programs

AIR-2.a *Require Separation Between Air Pollution Sources and Other Land Uses.* Only allow (a) emission sources or (b) other uses in the vicinity of air pollution or odor sources if the minimum screening distances between sources and receptors established in the BAAQMD CEQA Guidelines can be met, unless detailed project-specific studies demonstrate compatibility with adjacent uses despite separations that do not meet the screening distance requirements.

AIR-2.b *Protect Sensitive Receptors Near High-Volume Roadways.* Amend the Development Code to require mitigation measures such as increased indoor air filtration to ensure the protection of sensitive receptors (facilities where individuals are highly susceptible to the adverse effects of air pollutants, such as housing, child care centers, retirement

homes, schools, and hospitals) near freeways, arterials, and other major transportation corridors.

AIR-2.c *Health Risk Analysis for Sensitive Receptors.* Require that projects involving sensitive receptors proposed within 150 feet of freeways shall include an analysis of the potential health risks. Mitigation measures that comply with adopted standards of the BAAQMD for control of odor/toxics for sensitive receptors shall be identified in order to reduce these risks to acceptable levels.

What Are the Desired Outcomes?

GOAL AIR-3

Reduction of Vehicle-Generated Pollutants. Reduce vehicle trips and emissions, and improve vehicle efficiency, as means of limiting the volume of pollutants generated by traffic.

Policy

AIR-3.1 **Institute Transportation Control Measures.** Support a transportation program that reduces vehicle trips, increases ridesharing, and meets or exceeds the Transportation Control Measures recommended by BAAQMD in the most recent Clean Air Plan to reduce pollutants generated by vehicle use.

Why is this important?

Vehicle emissions are a major source of air pollution, and reduction of vehicle trips will improve air quality.

Environment: Vehicle travel is responsible for 54% of nitrogen oxides, 73% of carbon monoxide, and 79% of the particulate matter released in Marin. These pollutants create stress on Marin's marine and terrestrial ecosystems through a loss of species diversity and reproduction capacity.

Economy: In addition to alleviating the economic burden of public health costs, a reduction in vehicle trips will reduce traffic congestion. In 2006, over 9,400 productive hours were lost each weekday as a result of traffic congestion and delay.

Equity: Based on EPA's most current data, vehicle generated sources are responsible for 91% of the air-related cancer risk in Marin County. Furthermore, lower income neighborhoods tend to be nearest to major transportation routes; thus, these residents are exposed to higher levels of mobile source pollutants. One study finds that in the Bay Area, prevalence of asthma and bronchitis symptoms is about 7% higher for children in neighborhoods with higher levels of traffic pollutants compared with other children in the study.

How will results be achieved?

Implementing Programs

AIR-3.a *Support Voluntary Employer-Based Trip Reduction.* Provide assistance to regional and local ridesharing organizations, and advocate legislation to maintain and expand employer ridesharing incentives, such as tax deductions or credits.

AIR-3.b *Utilize Clean Vehicle Technology.* Promote new technologies and other incentives, such as allowing zero or partial zero emission vehicles rated at 45 miles or more per gallon in Marin County carpool lanes, and replacing fleet vehicles with these and similar clean vehicles.

> *"Adding lanes to solve traffic congestion is like loosening your belt to solve obesity."*
>
> — Glen Hemistra

AIR-3.c *Consider Model Clean Vehicle Requirements.* Research and consider adoption of an ordinance or standards that provide a set of voluntary measures to incorporate clean vehicles in fleets and promote the use of clean alternative fuels.

AIR-3.d *Reduce Peak-Hour Congestion.* Implement recommended Bay Area Air Quality Management District (BAAQMD) Transportation Control Measures in the Clean Air Plan to reduce vehicle emissions and congestion during peak commute periods.

AIR-3.e *Improve Arterial Traffic Management.* Modify arterial roadways to allow more-efficient bus operation, including possible signal preemption, and expand signal-timing programs where air quality benefits can be demonstrated.

What Are the Desired Outcomes?

GOAL AIR-4

Minimization of Contributions to Greenhouse Gases. Prepare policies that promote efficient management and use of resources in order to minimize greenhouse gas emissions. Incorporate sea level rise and more extreme weather information into the planning process.

Policies

AIR-4.1 **Reduce Greenhouse Gas Emissions.** Adopt practices that promote improved efficiency and energy management technologies; shift to low-carbon and renewable fuels and zero emission technologies.

AIR-4.2 **Foster the Absorption of Greenhouse Gases.** Foster and restore forests and other terrestrial ecosystems that offer significant carbon mitigation potential.

Why is this important?

Major contributors to greenhouse gas emissions, such as vehicle traffic and building energy use, can be reduced on a local level through the implementation of sustainable development policies.

Environment: Increased greenhouse gas emissions lead to climate change, which could include increases in temperature and shifting amounts of rainfall. Changes in temperature and water availability affect terrestrial and marine ecosystems. Furthermore, higher temperatures lead to higher evaporation rates, as well as reductions in stream flow and an increased frequency of droughts. Droughts are a problem in Marin, where 80% of our water comes from rainfall.

Economy: Mitigation measures that reduce emissions can result in substantial savings. The Tellus Institute estimates that California can save 1.9 billion dollars annually by 2020 through adoption of more stringent building codes and standards, efficiency programs, and increased supply of energy from renewable sources.

Equity: Access to clean water, energy, and mineral resources, and availability of productive arable land are all threatened by changes in climate. Weather- and temperature-related issues will add strain to an already overburdened public health system. Furthermore, low income families will be disproportionately impacted as they will be the least able to adapt to the effects of climate change.

How will results be achieved?

Implementing Programs

AIR-4.a ***Reduce Greenhouse Gas Emissions Resulting from Energy Use in Buildings.*** Implement energy efficiency programs and use of renewable energy. (Also see EN-1, EN-2, PFS-2, and TR-4.)

Carbon Dioxide

The Ecological Footprint shows that the single largest human demand on ecosystems comes from carbon dioxide emissions. The land area required to absorb this waste product makes up over half the Ecological Footprint of the average Marin resident. If Marin County reduced its carbon dioxide emissions by 20%, it could reduce its total footprint by an area equal to almost the entire size of Marin County.

Changing Scientific Understanding of Human Influences on Climate Change

1990: "Our judgment is that global mean surface air temperature has increased [though] the unequivocal detection of the enhanced greenhouse effect is not likely for a decade or more."

1995: "The balance of evidence suggests a discernible human influence on global climate."

2001: "The Earth's climate system has demonstrably changed on both global and regional scales. There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities."

AIR-4.b ***Reduce Greenhouse Gas Emissions Resulting from Transportation.*** Increase clean-fuel use, promote transit-oriented development and alternative modes of transportation, and reduce travel demand. (Also see TR-4, AIR-3, DES-2, HS-2, HS-3, CD-2, CD-3, and EC-1.)

AIR-4.c ***Reduce Methane Emissions Released from Waste Disposal.*** Encourage recycling, decrease waste sent to landfills, require landfill methane recovery, and promote methane recovery for energy production from other sources. (See PFS-3.)

Cities for Climate Protection Milestones

In August 2002, the Board of Supervisors partnered with the Cities for Climate Protection Campaign to address climate change through five actions:

1. Analyze baseline greenhouse gas emissions.
2. Set a target for reducing emissions.
3. Develop a local action plan for pursuing emissions reductions measures.
4. Implement local action plan.
5. Monitor progress.

Source: www.iclei.org.

"New analyses suggest that 15%–37% of a sample of 1,103 land plants and animals would eventually become extinct as a result of climate changes expected by 2050."

— *Nature Medicine*, 2004

AIR-4.d ***Reduce Greenhouse Gas Emissions from Agriculture.*** Compile an inventory of agricultural greenhouse gas emissions. Partner with AgStar, the U.S. Department of Agriculture, and the U.S. Department of Energy to encourage the use of methane recovery technologies and determine potential use in energy production.

AIR-4.e ***Reduce County Government Contributions to Greenhouse Gas Emissions.*** Where feasible, replace fleet vehicles with hybrid fuel and other viable alternative fuel vehicles, increase energy efficiency of County-maintained facilities, increase renewable energy use at County-maintained facilities, adopt purchasing practices that promote emissions reductions, and increase recycling at County-maintained facilities. (Also see EN-1, EN-2, PFS-3, TR-4, EC-1 and PH-1.)

AIR-4.f ***Establish a Climate Change Planning Process.*** Continue implementation of the approved Marin County Greenhouse Gas Reduction Plan. Integrate this plan into long-range and current planning functions of other related agencies. Establish and maintain a process to implement, measure, evaluate, and modify implementing programs, using the Cities for Climate Protection Campaign as a model (see the sidebar).

AIR-4.g ***Work with Bay Area Governments to Address Regional Climate Change Concerns.*** Play a leading role to encourage other local governments to commit to addressing climate change. Participate in programs such as the Cities for Climate Protection Campaign to address local and regional climate change concerns.

AIR-4.h *Evaluate the Carbon Emissions Impacts of Proposed Developments.* Incorporate a carbon emissions assessment into land use plans and the environmental impact report for proposed projects.

AIR-4.i *Work with Appropriate Agencies to Determine Carbon Uptake and Storage Potential of Natural Systems.* Study Marin's wetlands, forests, baylands, and agricultural lands to determine the potential to sequester carbon over time. Determine their value as carbon sinks.

AIR-4.j *Acquire and Restore Natural Resource Systems.* Take and require all technically feasible measures to avoid or minimize potential impacts on existing natural resource systems that serve as carbon sinks. (Also see CD-1, BIO-2, BIO-3, BIO-4, BIO-5, OS-1, and OS-2.)

AIR-4.k *Encourage the Planting of Trees.* Adopt urban forestry practices that encourage re-forestation as a means of storing carbon dioxide. (Also see BIO-1, DES-3.)

AIR-4.l *Preserve Agricultural Lands.* Protect agricultural lands and soils that serve as carbon sinks. (Also see AG-1.)

AIR-4.m *Focus Development in Urban Corridors.* Build in urban corridors and limit development in natural resource areas. Encourage green spaces that serve as carbon sinks in urban corridors. (Also see CD-1, CD-2, and DES-3.)

AIR-4.n *Monitor for Carbon Storage Research.* Monitor federal and international research on technological approaches to carbon storage.

AIR-4.o *Implement Proposed State Programs to Reduce Greenhouse Gas Emissions.* Implement proposed State programs to reduce greenhouse gas emissions, including the Renewable Portfolio Standards, California Fuel Efficiency (CAFE) standards, and carbon cap and trade programs.

What Are the Desired Outcomes?

GOAL AIR-5

Adaptation to Climate Change. Adopt policies and programs that promote resilient human and natural systems in order to ease the impacts of climate change.

Policies

AIR-5.1 **Determine Marin-Specific Climate Change.** Participate in research that examines the effects of climate change on human and natural systems in Marin.

AIR-5.2 **Prepare Response Strategies for Impacts.** Prepare appropriate response strategies that aid systems in adapting to climate change based on sound scientific understanding of the potential impacts.

Why is this important?

Adapting to climate change will require accurate scientific understanding as well as an institutionalized policy framework.

Environment. Wildlife distributions, population size, population density, and behavior are directly affected by changes in climate and indirectly through changes in vegetation. As wildlife tries to adapt to changes in the environment caused by shifting temperature and precipitation patterns, the already high number of threatened and endangered species could see a marked increase. New analyses suggest that 15% to 37% of a sample of 1,103 land plants and animals would eventually become extinct as a result of climate changes expected by 2050.

> *"My interest is in the future, because I am going to spend the rest of my life there."*
>
> — Charles Kettering

Economy. Aquaculture products brought $2.4 million into Marin's economy, representing 5.4% of Marin's entire agriculture industry. Warmer ocean waters and saltwater inundation due to climate change may impact coastal ecosystems by speeding the decline in fish populations and marine ecosystems already stressed from habitat loss and reduced freshwater flows. A report sponsored by the United Nations stated that worldwide economic losses could soar to $150 billion a year within the next 10 years.

Equity. Adopting and fostering resilience within the natural and built environments will save significant resources, speed recovery, and protect public health and safety for people of all income levels.

How will results be achieved?

Implementing Programs

AIR-5.a ***Coordinate with Local and Regional Agencies.*** Coordinate with the U.S. Geological Survey, Bay Conservation and Development Commission, California Coastal Commission and other monitoring agencies to study near-term and long-term high-probability climate change effects. Explore funding and collaborations with Bay Area partners in the Cities for Climate Protection Campaign in order to share resources, achieve economies of scale, and develop plans and programs that are optimized to address climate change on a regional scale.

AIR-5.b ***Study the Effect of Climate Change.*** Determine how climate change will affect the following:

Natural Systems: Changes in water availability, shifting fog regimes (and the effect on coastal redwoods and fire ecology), temperature changes, and shifting seasons.

Biological Resources: Changes in species distribution and abundance in estuary ecosystems resulting from salinity changes and flooding. For marine ecosystems, determine changes in distribution and abundance resulting from warmer waters, rising sea level, and changes in ocean currents and freshwater inflows.

Environmental Hazards: Runoff, fire hazards, floods, landslides and soil erosion, and the impact on coastal and urban infrastructure.

Built Environment: Effect of flooding and rising sea level on sewage systems, property, and infrastructure.

Water Resources: Runoff, changes in precipitation, increases and decreases in drought, salinity changes, sea level rise, and shifting seasons.

Agricultural and Food Systems: Food supply, economic impacts, and effect on grazing lands.

Public Health: Temperature-related health effects, air quality impacts, extreme weather events, and vector-, rodent-, water-, and food-borne diseases.

AIR-5.c ***Prepare Response Strategies.*** In coordination with the California Coastal Commission, the Bay Conservation and Development Commission, water districts, wildlife agencies, and flood control districts, prepare response strategies for Marin's human and natural systems. Current response strategies include the following:

Water Resources: Improve drainage systems, harvesting flows, and recharge designs in order to direct runoff to landscaped areas where the water can percolate into the soil. (See WR-1.)

Biological Resources: Limit development such that coastal wetlands are able to migrate inland in response to sea level rise, wildlife corridors and ecotones are protected, and development impacts are minimized. Promote the restoration of wetlands and riparian areas to provide capacity for high water and flood flows. (Also see BIO-2, BIO-4, BIO-5, OS-2, DES-1, and DES-5.)

Public Health: General strengthening of public health infrastructure and health-oriented environmental management, such as with air and water quality, and community and housing design.

Built Environment: Assess development located in coastal areas that are subject to sea level rise and increased flooding, and develop a response strategy, such as a planned retreat program, for the relocation of facilities in low-lying areas. Work with the County flood control and water districts to prepare a plan for responding to a potential rise in the sea level, consider developing flood control projects, and amend County Code Chapters 11, 22, 23, and 24 to include construction standards for areas potentially subject to increased flooding from a rise in sea level.

Environmental Hazards: Develop response strategies that cope with increasing storm events, flooding, fire, landslides, and soil erosion. Establish surveillance systems. With the development of advanced (spatial) surveillance technology, it is conceivable that such systems will be expanded to address forest health and productivity, monitoring biotic vectors and natural elements, as well as tree and storm responses. (Also see EH-3, EH-4, BIO-1, and PH-1.)

"The causes and effects of climate change occur around the world. Individuals, communities, and nations must work together cooperatively to stop global climate change."

— The Environmental Justice and Climate Change Initiative

AIR-5.d ***Monitor Local Climate Change.*** Encourage appropriate local and regional agencies to track the following environmental indicators of climate change:

- Sea level (also see EH-3)
- Minimum and maximum temperature
- Precipitation
- Timing and volume of river flow
- River temperatures
- Sea surface temperatures
- Diversity and abundance of fish stocks and sea birds

AIR-5.e ***Seek Resources for Response Strategies.*** Explore funding and collaborative opportunities that share resources, to develop plans and programs that are optimized on a regional scale.

AIR-5.f ***Protect and Enhance Native Habitats and Biodiversity.*** Effectively manage and enhance native habitat, maintain viable native plant and animal populations, and provide for improved biodiversity throughout Marin. Require identification of sensitive biological resources and commitment to adequate protection and mitigation. (Also see BIO-1 and BIO-2.)

"It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change."

— Charles Darwin

AIR-5.g ***Conduct Public Outreach and Education.*** Increase public awareness about climate change, and encourage Marin residents and businesses to become involved in activities and lifestyle changes that will aid in reducing greenhouse gas emissions.

AIR-5.h ***Implement Floodplain Ordinances.*** Continue to implement ordinances that regulate floodplain development to ensure that project-related and cumulative flooding impacts are minimized or avoided through conditions of project approval as required by the ordinances.

AIR-5.i ***Modify Construction Standards.*** Amend the Marin County Code to include construction standards for areas threatened by future sea level rise.

Figure 2-15 Relationships of Goals to Guiding Principles

This figure illustrates the relationships of each goal in this Section to the Guiding Principles.

Goals / Guiding Principles	1. Link equity, economy, and the environment locally, regionally, and globally.	2. Minimize the use of finite resources and use all resources efficiently and effectively.	3. Reduce the use and minimize the release of hazardous materials.	4. Reduce greenhouse gas emissions that contribute to global warming.	5. Preserve our natural assets.	6. Protect our agricultural assets.	7. Provide efficient and effective transportation.	8. Supply housing affordable to the full range of our workforce and diverse community.	9. Foster businesses that create economic, environmental, and social benefits.	10. Educate and prepare our workforce and residents.	11. Cultivate ethnic, cultural, and socioeconomic diversity.	12. Support public health, safety, and social justice.
AIR-1 Improved Regional Air Quality	●		●	●	●							●
AIR-2 Protection from Emissions	●		●	●	●							●
AIR-3 Reduction of Vehicle-Generated Pollutants	●		●	●	●		●					●
AIR-4 Minimization of Contributions to Greenhouse Gases	●	●	●	●		●	●		●			●
AIR-5 Adaptation to Climate Change					●	●				●		●

How Will Success Be Measured?

Indicator Monitoring

Nonbinding indicators, benchmarks, and targets[1] will help to measure and evaluate progress. This process will also provide a context in which to consider the need for new or revised implementation measures.

Indicators	Benchmarks	Targets
Number of days of poor air quality.	No exceedences in 2000.	No increase through 2015.
Amount of greenhouse gas emissions countywide.	2,849,000 tons CO_2 in 1990.	Reduce 15% by 2015.
Amount of greenhouse gas emissions from County government sources.	15,200 tons CO_2 in 1990.	Reduce 15% – 20% by 2015.

[1]Many factors beyond Marin County government control, including adequate funding and staff resources, may affect the estimated time frame for achieving targets and program implementation.

Program Implementation

The following table summarizes responsibilities, potential funding priorities, and estimated time frames for proposed implementation programs. Program implementation within the estimated time frame[1] will be dependent upon the availability of adequate funding and staff resources.

Figure 2-16
Atmosphere and Climate Program Implementation

Programs	Responsibility	Potential Funding	Priority	Time Frame
AIR-1.a – Inform Local and Regional Agencies.	CDA	Existing budget	High	Ongoing
AIR-1.b – Evaluate Air Quality Impacts of Proposed Projects and Plans.	CDA	Existing budget	High	Ongoing
AIR-1.c – Take Part in Regional Programs.	CDA	Existing budget	High	Ongoing
AIR-1.d – Cooperate to Enforce Air Quality Standards.	CDA, EPA, CA Air Resources Board, BAAQMD	Existing budget, State and federal funds	High	Ongoing
AIR-1.e – Conduct Public Education Program	CDA, BAAQMD	Existing budget and may require additional grants or revenue[2]	High	Ongoing
AIR-1.f – Limit Residential Wood Burning.	CDA	Existing budget, Tobacco Settlement Funds	Medium	Ongoing
AIR-1.g – Require Control Measures for Construction and Agricultural Activity.	CDA, Agricultural Commissioner	Existing budget	High	Ongoing
AIR-2.a – Require Separation Between Air Pollution Sources and Other Land Uses.	CDA, BAAQMD	Existing budget	High	Ongoing
AIR-2.b – Protect Sensitive Receptors Near High-Volume Roadways.	CDA	Existing budget	Medium	Long term
AIR-2.c – Health Risk Analysis for Sensitive Receptors.	CDA	Existing budget	Medium	Short term

[1]Time frames include: Immediate (0–1 years); Short term (1–4 years); Med. term (4–10 years); Long term (10–20 years); and Ongoing.

[2]Completion of this task is dependent on acquiring additional funding. Consequently, funding availability could lengthen or shorten the time frame and ultimate implementation of this program.

Programs	Responsibility	Potential Funding	Priority	Time Frame
AIR-3.a – Support Voluntary Employer-Based Trip Reduction.	DPW, Transportation Authority of Marin (TAM), CDA	Existing Budget, will require additional grants or other revenue[2]	Medium	Med. Term
AIR-3.b – Utilize Clean Vehicle Technology.	1. CDA/CalTrans-carpool lanes, 2. DPW- County fleet	1. Existing budget, 2. Will require additional grants or other revenue[2]	1. Medium, 2. Medium	1. Ongoing, 2. Long term
AIR-3.c – Consider Model Clean Vehicle Requirements.	DPW	Will require additional grants or other revenue[2]	Medium	Long term
AIR-3.d – Reduce Peak-Hour Congestion.	TAM	TFCA	Medium	Ongoing
AIR-3.e – Improve Arterial Traffic Management.	DPW, TAM	Grants, traffic mitigation fees, transportation sales tax[2]	Medium	Ongoing
AIR-4.a – Reduce Greenhouse Gas Emissions Resulting from Energy Use in Buildings.	CDA	Existing budget and may require additional grants or revenue[2]	Medium	Med. Term
AIR-4.b – Reduce Greenhouse Gas Emissions Resulting from Transportation.	1. TAM, CDA, 2. DPW	General Fund, TAM budget, TLC/HIP Grants, and will require additional grants or other revenue[2]	1. Medium, 2. Medium	1. Ongoing, 2. Long term
AIR-4.c – Reduce Methane Emissions Released from Waste Disposal.	DPW	Will require additional grants or other revenue[2]	Medium	Long term
AIR-4.d – Reduce Greenhouse Gas Emissions from Agriculture.	Agricultural Commissioner, CDA, USDA, USDOE	Grants, existing budget	Medium	Ongoing
AIR-4.e – Reduce County Government Contributions to Greenhouse Gas Emissions.	DPW	Will require additional grants or other revenue[2]	High	Pending
AIR-4.f – Establish a Climate Change Planning Process.	CDA	Existing budget and may require additional grants or revenue[2]	High	Immediate
AIR-4.g – Work with Bay Area Governments to Address Regional Climate Change Concerns.	CDA, ABAG, International Council for Local Environmental Initiatives (ICLEI)	Existing budget and may require additional grants or revenue[2]	High	Ongoing
AIR-4.h – Evaluate the Carbon Emissions Impacts of Proposed Developments.	CDA	Existing budget and may require additional grants or revenue[2]	High	Ongoing

Programs	Responsibility	Potential Funding	Priority	Time Frame
AIR-4.i – Work with Appropriate Agencies to Determine Carbon Uptake and Storage Potential of Natural Systems.	CDA, California Energy Commission (CEC), BAAQMD, other municipalities	Will require additional grants or revenue[2]	Low	Long term
AIR-4.j – Acquire and Restore Natural Resource Systems.	MCOSD	Will require additional grants or revenue[2]	High	Ongoing
AIR-4.k – Encourage the Planting of Trees.	CDA, NGO's, CBO's	Will require additional grants or revenue[2]	Medium	Ongoing
AIR-4.l – Preserve Agricultural Lands.	CDA, MALT, CBO's	Will require additional grants or revenue[2]	High	Ongoing
AIR-4.m – Focus Development in Urban Corridors.	CDA	Existing budget	High	Ongoing
AIR-4.n – Monitor for Carbon Storage Research.	CDA, ICLEI	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
AIR-4.o – Implement Proposed State Programs to Reduce Greenhouse Gas Emissions.	CDA	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
AIR-5.a – Coordinate with Local and Regional Agencies.	CDA, Bay Conservation and Development Commission (BCDC), CCC, BAAQMD, USGS, ICLEI	Existing budget and may require additional grants or revenue[2]	High	Ongoing
AIR-5.b – Study the Effect of Climate Change.	CDA, BCDC, CCC, BAAQMD, USGS, ICLEI	Will require additional grants or revenue[2]	Medium	Ongoing
AIR-5.c – Prepare Response Strategies.	CDA, CCC, BCDC, Water Districts, Resource Protection Agencies, ICLEI	Existing budget, will require additional grants or revenue[2]	High	Ongoing
AIR-5.d – Monitor Local Climate Change.	CDA, CCC, BCDC, Water Districts, Resource Protection Agencies, ICLEI	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
AIR-5.e – Seek Resources for Response Strategies.	CDA, CCC, BCDC, Water Districts, Resource Protection Agencies, ICLEI	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing

Programs	Responsibility	Potential Funding	Priority	Time Frame
AIR-5.f – Protect and Enhance Native Habitats and Biodiversity.	Parks & Open Space, CDA, CBO's	Existing budget and may require additional grants or revenue[2]	High	Ongoing
AIR-5.g – Conduct Public Outreach and Education.	CDA, CBO's, ICLEI	Existing budget and may require additional grants or revenue[2]	Medium	Ongoing
AIR-5.h – Implement Floodplain Ordinances.	CDA/DPW	Existing budget	High	Ongoing
AIR-5.i – Modify Construction Standards.	CDA/DPW	Existing budget and may require additional grants or revenue[2]	Medium	Long term

(Note: This is an extract of the Marin County General Plan that highlights the applicability to air quality and greenhouse gases. The entire Marin County General Plan 2020 can be found at:
(http://www.co.marin.ca.us/depts/cd/main/fm/cwpdocs/CWP_CD2.pdf)

Additional Links to General Plans and Climate Action Plans:

The following examples of general plans and climate action plans were reviewed and were also found to be good resources. These examples have addressed climate change and have provided good goals, objectives, policies, standards and/or implementations measures for their jurisdiction and environment. These goals, objectives, policies, standards and implementation measures have been addressed in a stand-alone document as in the San Francisco Climate Action Plan, Sonoma County Climate Action Plan, and the City of Riverside General Plan; or the goals, objectives, policies, standards and implementation measures have been incorporated into the existing general plan elements as in the City of Beverly Hills Draft General Plan, City of Sacramento General Plan and Sonoma County General Plan.

City of Beverly Hills Draft General Plan can be found at:
http://www.ci.beverly-hills.ca.us/services/planning/plan/draft_general_plan.asp

City of Riverside General Plan can be found at:
http://www.riversideca.gov/planning/2008-0909/GP/13_Air_Quality_Element.pdf

City of Sacramento General Plan can be found at:
http://www.sacgp.org/

San Francisco Climate Action Plan can be found at:
http://www.sfenvironment.org/downloads/library/climateactionplan.pdf

Sonoma County General Plan can be found at:
http://www.sonoma-county.org/prmd/gp2020/adopted/index.htm

Sonoma County Community Climate Action Plan can be found at:
http://www.coolplan.org/

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Appendix H

California Attorney General Guidance on General Plans

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Appendix H: California Attorney General Guidance on General Plans

The California Attorney General's Office has compiled a list of General Plan, CEQA-related Frequently Asked Questions and their answers to assist cities and counties in their General Plan updates. The following is the Attorney General Office's document entitled *'Climate Change, the California Environmental Quality Act, and General Plan Updates: Straightforward Answers to Some Frequently Asked Questions.'*

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Climate Change, the California Environmental Quality Act, and General Plan Updates: Straightforward Answers to Some Frequently Asked Questions California Attorney General's Office

At any given time in this State, well over one hundred California cities and counties are updating their general plans. These are complex, comprehensive, long-term planning documents that can be years in the making. Their preparation requires local governments to balance diverse and sometimes competing interests and, at the same time, comply with the Planning and Zoning Law and the California Environmental Quality Act (CEQA).

Local governments have decades of experience in applying state planning law and excellent resources to assist them – such as the "General Plan Guidelines" issued by The Governor's Office of Planning and Research (OPR).[1] They are also practiced in assessing whether general plans may have significant localized environmental effects, such as degradation of air quality, reductions in the water supply, or growth inducing impacts. The impact of climate change, however, has only fairly recently shown up on the CEQA radar.

The fact that climate change presents a new challenge under CEQA has not stopped local governments from taking action. A substantial number of cities and counties already are addressing climate change in their general plan updates and accompanying CEQA documents. These agencies understand the substantial environmental and administrative benefits of a programmatic approach to climate change. Addressing the problem at the programmatic level allows local governments to consider the "big picture" and – provided it's done right – allows for the streamlined review of individual projects.[2]

Guidance addressing CEQA, climate change, and general planning is emerging, for example, in the pending CEQA Guideline amendments,[3] comments and settlements by the Attorney General, and in the public discourse, for example, the 2008 series on CEQA and Global Warming organized by the Local Government Commission and sponsored by the Attorney General. In addition, the Attorney General's staff has met informally with officials and planners from numerous jurisdictions to discuss CEQA requirements and to learn from those who are leading the fight against global warming at the local level.

Still, local governments and their planners have questions. In this document, we attempt to answer some of the most frequently asked of those questions. We hope this document will be useful, and we encourage cities and counties to contact us with any additional questions, concerns, or comments.

- **Can a lead agency find that a general plan update's climate change-related impacts are too speculative, and therefore avoid determining whether the project's impacts are significant?**

  No. There is nothing speculative about climate change. It's well understood that (1) greenhouse gas (GHG) emissions increase atmospheric concentrations of GHGs; (2) increased GHG concentrations in the atmosphere exacerbate global warming; (3) a project that adds to the atmospheric load of GHGs adds to the problem.

  Making the significance determination plays a critical role in the CEQA process.[4] Where a project may have a significant effect on the environment, the lead agency must prepare an Environmental Impact Report (EIR).[5] Moreover, a finding of significance triggers the obligation to consider alternatives and to impose feasible mitigation.[6] For any project under CEQA, including a general plan update, a lead agency therefore has a fundamental obligation to determine whether the environmental effects of the project, including the project's contribution to global warming, are significant.

- **In determining the significance of a general plan's climate change-related effects, must a lead agency estimate GHG emissions?**

  Yes. As OPR's Technical Advisory states:

  > Lead agencies should make a good-faith effort, based on available information, to calculate, model, or estimate the amount of CO2 and other GHG emissions from a project, including the emissions associated with vehicular traffic, energy consumption, water usage and construction activities.[7]

  In the context of a general plan update, relevant emissions include those from government operations, as well as from the local community as a whole. Emissions sources include, for example, transportation, industrial facilities and equipment, residential and commercial development, agriculture, and land conversion.

  There are a number of resources available to assist local agencies in estimating their current and projected GHG emissions. For example, the California Air Resources Board (ARB) recently issued protocols for estimating emissions from local government operations, and the agency's protocol for estimating community-wide emissions is forthcoming.[8] OPR's Technical Advisory contains a list of modeling tools to estimate GHG emissions. Other sources of helpful information include the white paper issued by the California Air Pollution Control Officers Association (CAPCOA), "CEQA and Climate Change"[9] and the Attorney General's website,[10] both of which provide information on currently available models for calculating emissions. In addition, many cities and counties are working with the International Council for Local Environmental Initiatives (ICLEI)[11] and tapping into the expertise of this State's many colleges and universities.[12]

- **For climate change, what are the relevant "existing environmental conditions"?**

  The CEQA Guidelines define a significant effect on the environment as "a substantial adverse change in the physical conditions which exist in the area affected by the proposed project."[13]

  For local or regional air pollutants, existing physical conditions are often described in terms of air quality (how much pollutant is in the ambient air averaged over a given period of time), which is fairly directly tied to current emission levels in the relevant "area affected." The "area affected," in turn, often is defined by natural features that hold or trap the pollutant until it escapes or breaks down. So, for example, for particulate matter, a lead agency may describe existing physical conditions by discussing annual average PM10 levels, and high PM10 levels averaged over a 24-hour period, detected at various points in the air basin in the preceding years.

  With GHGs, we're dealing with a global pollutant. The "area affected" is both the atmosphere and every place that is affected by climate change, including not just the area immediately around the project, but the region and the State (and indeed the planet). The existing "physical conditions" that we care about are the current atmospheric concentrations of GHGs and the existing climate that reflects those concentrations.

  Unlike more localized, ambient air pollutants which dissipate or break down over a relatively short period of time (hours, days or weeks), GHGs accumulate in the atmosphere, persisting for decades and in some cases millennia. The overwhelming scientific consensus is that in order to avoid disruptive and potentially catastrophic climate change, then it's not enough simply to stabilize our annual GHG emissions. The science tells us that we must <u>immediately and substantially reduce</u> these emissions.

- **If a lead agency agrees to comply with AB 32 regulations when they become operative (in 2012), can the agency determine that the GHG-related impacts of its general plan will be less than significant?**

  <u>No.</u> CEQA is not a mechanism merely to ensure compliance with other laws, and, in addition, it does not allow agencies to defer mitigation to a later date. CEQA requires lead agencies to consider the significant environmental effects of their actions and to mitigate them today, if feasible.

  The decisions that we make today do matter. Putting off the problem will only increase the costs of any solution. Moreover, delay may put a solution out of reach at any price. The experts tell us that the later we put off taking real action to reduce our GHG emissions, the less likely we will be able to stabilize atmospheric concentrations at a level that will avoid dangerous climate change.

- **Since climate change is a global phenomenon, how can a lead agency determine whether the GHG emissions associated with its general plan are significant?**

  The question for the lead agency is whether the GHG emissions from the project – the general plan update – are considerable when viewed in connection with the GHG emissions from past projects, other current projects, and probable future projects.[14] The effects of GHG emissions from past projects and from current projects to date are reflected in current atmospheric concentrations of GHGs and current climate, and the effects of future emissions of GHGs, whether from current projects or existing projects, can be predicted based on models showing future atmospheric GHG concentrations under different emissions scenarios, and different resulting climate effects.

  A single local agency can't, of course, solve the climate problem. But that agency can do its fair share, making sure that the GHG emissions from projects in its jurisdiction and subject to its general plan are on an emissions trajectory that, if adopted on a larger scale, is consistent with avoiding dangerous climate change.

  Governor Schwarzenegger's Executive Order S-3-05, which commits California to reducing its GHG emissions to 1990 levels by 2020 and to eighty percent below 1990 levels by 2050, is grounded in the science that tells us what we must do to achieve our long-term climate stabilization objective. The Global Warming Solutions Act of 2006 (AB 32), which codifies the 2020 target and tasks ARB with developing a plan to achieve this target, is a necessary step toward stabilization.[15] Accordingly, the targets set in AB 32 and Executive Order S-3-05 can inform the CEQA analysis .

  One reasonable option for the lead agency is to create community-wide GHG emissions targets for the years governed by the general plan. The community-wide targets should align with an emissions trajectory that reflects aggressive GHG mitigation in the near term and California's interim (2020) [16] and long-term (2050) GHG emissions limits set forth in AB 32 and the Executive Order.

  To illustrate, we can imagine a hypothetical city that has grown in a manner roughly proportional to the state and is updating its general plan through 2035. The city had emissions of 1,000,000 million metric tons (MMT) in 1990 and 1,150,000 MMT in 2008. The city could set an emission reduction target for 2014 of 1,075,000 MMT, for 2020 of 1,000,000 MMT, and for 2035 of 600,000 MMT, with appropriate emission benchmarks in between. Under these circumstances, the city could in its discretion determine that an alternative that achieves these targets would have less than significant climate change impacts.

- **Is a lead agency required to disclose and analyze the full development allowed under the general plan?**

  Yes. The lead agency must disclose and analyze the full extent of the development allowed by the proposed amended general plan,[17] including associated GHG emissions.

This doesn't mean that the lead agency shouldn't discuss the range of development that is likely to occur as a practical matter, noting, for example, the probable effect of market forces. But the lead agency can't rely on the fact that full build out may not occur, or that its timing is uncertain, to avoid its obligation to disclose the impacts of the development that the general plan would permit. Any other approach would seriously underestimate the potential impact of the general plan update and is inconsistent with CEQA's purposes.

- **What types of alternatives should the lead agency consider?**

  A city or county should, if feasible, evaluate at least one alternative that would ensure that the community contributes to a lower-carbon future. Such an alternative might include one or more of the following options:

  - higher density development that focuses growth within existing urban areas;
  - policies and programs to facilitate and increase biking, walking, and public transportation and reduce vehicle miles traveled;
  - the creation of "complete neighborhoods" where local services, schools, and parks are within walking distance of residences;
  - incentives for mixed-use development;
  - in rural communities, creation of regional service centers to reduce vehicle miles traveled;
  - energy efficiency and renewable energy financing (see, e.g., AB 811)[18]
  - policies for preservation of agricultural and forested land serving as carbon sinks;
  - requirements and ordinances that mandate energy and water conservation and green building practices; and
  - requirements for carbon and nitrogen-efficient agricultural practices.

  Each local government must use its own good judgment to select the suite of measures that best serves that community.

- **Can a lead agency rely on policies and measures that simply "encourage" GHG efficiency and emissions reductions?**

  No. Mitigation measures must be "fully enforceable."[19] Adequate mitigation does not, for example, merely "encourage" or "support" carpools and transit options, green building practices, and development in urban centers. While a menu of hortatory GHG policies is positive, it does not count as adequate mitigation because there is no certainty that the policies will be implemented.

  There are many concrete mitigation measures appropriate for inclusion in a general plan and EIR that can be enforced as conditions of approval or through ordinances. Examples are described in a variety of sources, including the CAPCOA's white paper,[20] OPR's Technical Advisory,[21] and the mitigation list on the Attorney General's website.[22] Lead agencies should also consider consulting with other cities and counties that have recently completed general plan updates or are working on Climate Action Plans.[23]

- **Is a "Climate Action Plan" reasonable mitigation?**

  Yes. To allow for streamlined review of subsequent individual projects, we recommend that the Climate Action Plan include the following elements: an emissions inventory (to assist in developing appropriate emission targets and mitigation measures); emission targets that apply at reasonable intervals through the life of the plan; enforceable GHG control measures; monitoring and reporting (to ensure that targets are met); and mechanisms to allow for the revision of the plan, if necessary, to stay on target.[24]

  If a city or county intends to rely on a Climate Action Plan as a centerpiece of its mitigation strategy, it should prepare the Climate Action Plan at the same time as its general plan update and EIR. This is consistent with CEQA's mandate that a lead agency must conduct environmental review at the earliest stages in the planning process and that it not defer mitigation. In addition, we strongly urge agencies to incorporate any Climate Action Plans into their general plans to ensure that their provisions are applied to every relevant project.

- **Is a lead agency also required to analyze how future climate change may affect development under the general plan?**

  Yes. CEQA requires a lead agency to consider the effects of bringing people and development into an area that may present hazards. The CEQA Guidelines note the very relevant example that "an EIR on a subdivision astride an active fault line should identify as a significant effect the seismic hazard to future occupants of the subdivision."[25]

  Lead agencies should disclose any areas governed by the general plan that may be particularly affected by global warming, e.g.: coastal areas that may be subject to increased erosion, sea level rise, or flooding; areas adjacent to forested lands that may be at increased risk from wildfire; or communities that may suffer public health impacts caused or exacerbated by projected extreme heat events and increased temperatures. General plan policies should reflect these risks and minimize the hazards for current and future development.

Endnotes

[1]For a discussion of requirements under general planning law, see OPR's General Plan Guidelines (2003). OPR is in the process of updating these Guidelines. For more information, visit OPR's website at http://www.opr.ca.gov/index.php?a=planning/gpg.html.

[2]OPR has noted the environmental and administrative advantages of addressing GHG emissions at the plan level, rather than leaving the analysis to be done project-by-project. See OPR, Preliminary Draft CEQA Guideline Amendments, Introduction at p. 2

(Jan. 8, 2009), available at http://opr.ca.gov/download.php?dl=Workshop_Announcement.pdf.

[3] OPR issued its Preliminary Draft CEQA Guidelines Amendments on January 8, 2009. Pursuant to Health and Safety Code, § 21083.05 (SB 97), OPR must prepare its final proposed guidelines by July 1, 2009, and the Resources Agency must certify and adopt those guidelines by January 1, 2010.

[4]Cal. Code Regs., tit. 14 (hereinafter "CEQA Guidelines"), § 15064, subd. (a).

[5]CEQA Guidelines, § 15064, subd. (f)(1).

[6]CEQA Guidelines, § 15021, subd. (a).

[7]OPR, CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review (June 2008), available at http://opr.ca.gov/ceqa/pdfs/june08-ceqa.pdf.

[8] ARB's protocols for estimating the emissions from local government operations are available at http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm.

[9] CAPCOA, CEQA and Climate Change, Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act (January 2008) (hereinafter, "CAPCOA white paper"), available at http://www.capcoa.org/.

[10] http://ag.ca.gov/globalwarming/ceqa/modeling_tools.php

[11] http://www.iclei-usa.org

[12] For example, U.C. Davis has made its modeling tool, UPlan, available at http://ice.ucdavis.edu/doc/uplan; San Diego School of Law's Energy Policy Initiatives Center has prepared a GHG emissions inventory report for San Diego County http://www.sandiego.edu/EPIC/news/frontnews.php?id=31; and Cal Poly, San Luis Obispo City and Regional Planning Department is in the process of preparing a Climate Action Plan for the City of Benicia, see http://www.beniciaclimateactionplan.com/files/about.html.

[13]CEQA Guidelines, § 15002, subd. (g).

[14] CEQA Guidelines, § 15064(h)(1).

[15]See ARB, Scoping Plan at pp. 117-120, available at http://www.arb.ca.gov/cc/scopingplan/document/psp.pdf. (ARB approved the Proposed Scoping Plan on December 11, 2008.)

[16]In the Scoping Plan, ARB encourages local governments to adopt emissions reduction goals for 2020 "that parallel the State commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels . . . ." Scoping Plan at p. 27; see *id.* at Appendix C, p. C-50. For the State, 15 percent below current levels is approximately equivalent to 1990 levels. *Id.* at p. ES-1. Where a city or county has grown roughly at

the same rate as the State, its own 1990 emissions may be an appropriate 2020 benchmark. Moreover, since AB 32's 2020 target represents the State's *maximum* GHG emissions for 2020 (see Health & Safety Code, § 38505, subd. (n)), and since the 2050 target will require substantial changes in our carbon efficiency, local governments may consider whether they can set an even more aggressive target for 2020. See Scoping Plan, Appendix C, p. C-50 [noting that local governments that "meet or exceed" the equivalent of a 15 percent reduction in GHG emissions by 2020 should be recognized].

[17] *Christward Ministry v. Superior Court* (1986) 184 Cal.App.3d 180, 194 [EIR must consider future development permitted by general plan amendment]; see also CEQA Guidelines, §§ 15126 [impact from all phases of the project], 15358, subd. (a) [direct and indirect impacts].

[18] See the City of Palm Desert's Energy Independence Loan Program at http://www.ab811.org.

[19] Pub. Res. Code, § 21081.6, subd. (b); CEQA Guidelines, § 15091, subd. (d); see also *Federation of Hillside and Canyon Assocs.* (2000) 83 Cal.App.4th 1252, 1261 [general plan EIR defective where there was no substantial evidence that mitigation measures would "actually be implemented"].

[20]CAPCOA white paper at pp. 79-87 and Appendix B-1.

[21]OPR Technical Advisory, Attachment 3.

[22]See http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf [mitigation list];http://ag.ca.gov/globalwarming/pdf/green_building.pdf [list of local green building ordinances].

[23]See http://opr.ca.gov/ceqa/pdfs/City_and_County_Plans_Addressing_Climate_Change.pdf.

[24]See Scoping Plan, Appendix C, at p. C-49.

[25]CEQA Guidelines, § 15126.2, subd. (a).

Addressing Climate Change at the Project Level
California Attorney General's Office

Under the California Environmental Quality Act (CEQA), local agencies have a very important role to play in California's fight against global warming – one of the most serious environmental effects facing the State today. Local agencies can lead by example in undertaking their own projects, insuring that sustainability is considered at the earliest stages. Moreover, they can help shape private development. Where a project as proposed will have significant global warming related effects, local agencies can require feasible changes or alternatives, and impose enforceable, verifiable, feasible mitigation to substantially lessen those effects. By the sum of their actions and decisions, local agencies will help to move the State away from "business as usual" and toward a low-carbon future.

Included in this document are various measures that may reduce the global warming related impacts at the individual project level. (For more information on actions that local governments can take at the program and general plan level, please visit the Attorney General's webpage, "CEQA, Global Warming, and General Plans" at http://ag.ca.gov/globalwarming/ceqa/generalplans.php.)

As appropriate, the measures can be included as design features of a project, required as changes to the project, or imposed as mitigation (whether undertaken directly by the project proponent or funded by mitigation fees). The measures set forth in this package are examples; the list is not intended to be exhaustive. Moreover, the measures cited may not be appropriate for every project. The decision of whether to approve a project – as proposed or with required changes or mitigation – is for the local agency, exercising its informed judgment in compliance with the law and balancing a variety of public objectives.

Mitigation Measures by Category

Energy Efficiency

Incorporate green building practices and design elements.	The California Department of Housing and Community Development's Green Building & Sustainability Resources handbook provides extensive links to green building resources. The handbook is available at http://www.hcd.ca.gov/hpd/green_build.pdf. The American Institute of Architects (AIA) has compiled fifty readily available strategies for reducing fossil fuel use in buildings by fifty percent. AIA "50 to 50" plan is presented in both guidebook and wiki format at http://wiki.aia.org/Wiki%20Pages/Home.aspx.

Meet recognized green building and energy efficiency benchmarks.	For example, an ENERGY STAR-qualified building uses less energy, is less expensive to operate, and causes fewer greenhouse gas emissions than comparable, conventional buildings. http://www.energystar.gov/index.cfm?c=business.bus_index. California has over 1600 ENERGY STAR-qualified school, commercial and industrial buildings. View U.S. EPA's list of Energy Star non-residential buildings at http://www.energystar.gov/index.cfm?fuseaction=labeled_buildings.locator. Los Angeles and San Francisco top the list of U.S. cities with the most ENERGY STAR non-residential buildings. http://www.energystar.gov/ia/business/downloads/2008_Top_25_cities_chart.pdf. Qualified ENERGY STAR homes must surpass the state's Title 24 energy efficiency building code by at least 15%. Los Angeles, Sacramento, San Diego, and San Francisco-Oakland are among the top 20 markets for ENERGY STAR homes nationwide. http://www.energystar.gov/ia/new_homes/mil_homes/top_20_markets.html. Builders of ENERGY STAR homes can be more competitive in a tight market by providing a higher quality, more desirable product. See http://www.energystar.gov/ia/partners/manuf_res/Horton.pdf. There are a variety of private and non-profit green building certification programs in use in the U.S. See U.S. EPA's Green Building / Frequently Asked Questions website, http://www.epa.gov/greenbuilding/pubs/faqs.htm. Public-Private Partnership for Advancing Housing Technology maintains a list of national and state Green Building Certification Programs for housing. See http://www.pathnet.org/sp.asp?id=20978. These include the national Leadership in Energy and Environmental Design (LEED) program, and, at the state level, Build it Green's GreenPoint Rated system and the California Green Builder program. Other organizations may provide other relevant benchmarks.
Install energy efficient lighting (e.g., light emitting diodes (LEDs)), heating and cooling systems, appliances, equipment, and control systems.	Information about ENERGY STAR-certified products in over 60 categories is available at http://www.energystar.gov/index.cfm?fuseaction=find_a_product. The California Energy Commission maintains a database of all appliances meeting either federal efficiency standards or, where there are no federal efficiency standards, California's appliance efficiency standards. See http://www.appliances.energy.ca.gov/. The Electronic Product Environmental Assessment Tool (EPEAT) ranks computer products based on a set of environmental criteria, including energy efficiency. See http://www.epeat.net/AboutEPEAT.aspx. The nonprofit American Council for an Energy Efficient Economy maintains an Online Guide to Energy Efficient Commercial Equipment, available at http://www.aceee.org/ogeece/ch1_index.htm. Utilities offer many incentives for efficient appliances, lighting, heating and cooling. To search for available residential and commercial incentives, visit Flex Your Power's website at http://www.fypower.org/.

Use passive solar design, e.g., orient buildings and incorporate landscaping to maximize passive solar heating during cool seasons, minimize solar heat gain during hot seasons, and enhance natural ventilation. Design buildings to take advantage of sunlight.	See U.S. Department of Energy, Passive Solar Design (website) http://www.energysavers.gov/your_home/designing_remodeling/index.cfm/mytopic=10250. See also California Energy Commission, Consumer Energy Center, Passive Solar Design (website) http://www.consumerenergycenter.org/home/construction/solardesign/index.html. Lawrence Berkeley National Laboratories' Building Technologies Department is working to develop innovative building construction and design techniques. Information and publications on energy efficient buildings, including lighting, windows, and daylighting strategies, are available at the Department's website at http://btech.lbl.gov.
Install light colored "cool" roofs and cool pavements.	A white or light colored roof can reduce surface temperatures by up to 100 degrees Fahrenheit, which also reduces the heat transferred into the building below. This can reduce the building's cooling costs, save energy and reduce associated greenhouse gas emissions, and extend the life of the roof. Cool roofs can also reduce the temperature of surrounding areas, which can improve local air quality. See California Energy Commission, Consumer Energy Center, Cool Roofs (webpage) at http://www.consumerenergycenter.org/coolroof/. See also Lawrence Berkeley National Laboratories, Heat Island Group (webpage) at http://eetd.lbl.gov/HeatIsland/.
Install efficient lighting, (including LEDs) for traffic, street and other outdoor lighting.	LED lighting is substantially more energy efficient than conventional lighting and can save money. See http://www.energy.ca.gov/efficiency/partnership/case_studies/TechAsstCity.pdf (noting that installing LED traffic signals saved the City of Westlake about $34,000 per year). As of 2005, only about a quarter of California's cities and counties were using 100% LEDs in traffic signals. See California Energy Commission (CEC), Light Emitting Diode Traffic Signal Survey (2005) at p. 15, available at http://www.energy.ca.gov/2005publications/CEC 400 2005 003/CEC 400 2005 003.PDF. The California Energy Commission's Energy Partnership Program can help local governments take advantage of energy saving technology, including, but not limited to, LED traffic signals. See http://www.energy.ca.gov/efficiency/partnership/.
Reduce unnecessary outdoor lighting.	See California Energy Commission, Reduction of Outdoor Lighting (webpage) at http://www.energy.ca.gov/efficiency/lighting/outdoor_reduction.html.

Use automatic covers, efficient pumps and motors, and solar heating for pools and spas.	During the summer, a traditional backyard California pool can use enough energy to power an entire home for three months. Efficiency measures can substantially reduce this waste of energy and money. See California Energy Commission, Consumer Energy Center, Pools and Spas (webpage) at http://www.consumerenergycenter.org/home/outside/pools_spas.html. See also Sacramento Municipal Utilities District, Pool and Spa Efficiency Program (webpage) at http://www.smud.org/en/residential/saving-energy/Pages/poolspa.aspx.
Provide education on energy efficiency to residents, customers and/or tenants.	Many cities and counties provide energy efficiency education. See, for example, the City of Stockton's Energy Efficiency website at http://www.stocktongov.com/energysaving/index.cfm. See also "Green County San Bernardino," http://www.greencountysb.com at pp. 4-6. Businesses and development projects may also provide education. For example, a homeowners' association (HOA) could provide information to residents on energy-efficient mortgages and energy saving measures. See The Villas of Calvera Hills, Easy Energy Saving Tips to Help Save Electricity at http://www.thevillashoa.org/green/energy/. An HOA might also consider providing energy audits to its residents on a regular basis.

Renewable Energy and Energy Storage

Meet "reach" goals for building energy efficiency and renewable energy use.	A "zero net energy" building combines building energy efficiency and renewable energy generation so that, on an annual basis, any purchases of electricity or natural gas are offset by clean, renewable energy generation, either on-site or nearby. Both the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC) have stated that residential buildings should be zero net energy by 2020, and commercial buildings by 2030. See CEC, 2009 Integrated Energy Policy Report (Dec. 2009) at p. 226, available at http://www.energy.ca.gov/2009publications/CEC-100-2009-003/CEC-100-2009-003-CMF.PDF; CPUC, Long Term Energy Efficiency Strategic Plan (Sept. 2008), available at http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/.
Install solar, wind, and geothermal power systems and solar hot water heaters.	The California Public Utilities Commission (CPUC) approved the California Solar Initiative on January 12, 2006. The initiative creates a $3.3 billion, ten-year program to install solar panels on one million roofs in the State. Visit the one-stop GoSolar website at http://www.gosolarcalifornia.org/. As mitigation, a developer could, for example, agree to participate in the New Solar Homes program. See http://www.gosolarcalifornia.org/builders/index.html. The CPUC is in the process of establishing a program to provide solar water heating incentives under the California Solar Initiative. For more information, visit the CPUC's website at http://www.cpuc.ca.gov/puc/energy/solar/swh.htm. To search for available residential and commercial renewable energy incentives, visit Flex Your Power's website at http://www.fypower.org/.

Install solar panels on unused roof and ground space and over carports and parking areas.	In 2008 Southern California Edison (SCE) launched the nation's largest installation of photovoltaic power generation modules. The utility plans to cover 65 million square feet of unused commercial rooftops with 250 megawatts of solar technology – generating enough energy to meet the needs of approximately 162,000 homes. Learn more about SCE's Solar Rooftop Program at http://www.sce.com/solarleadership/solar-rooftop-program/general-faq.htm. In 2009, Walmart announced its commitment to expand the company's solar power program in California. The company plans to add solar panels on 10 to 20 additional Walmart facilities in the near term. These new systems will be in addition to the 18 solar arrays currently installed at Walmart facilities in California. See http://walmartstores.com/FactsNews/NewsRoom/9091.aspx. Alameda County has installed two solar tracking carports, each generating 250 kilowatts. By 2005, the County had installed eight photovoltaic systems totaling over 2.3 megawatts. The County is able to meet 6 percent of its electricity needs through solar power. See http://www.acgov.org/gsa/Alameda%20County%20-%20Solar%20Case%20Study.pdf. In 2007, California State University, Fresno installed at 1.1-megawatt photovoltaic (PV)-paneled parking installation. The University expects to save more than $13 million in avoided utility costs over the project's 30-year lifespan. http://www.fresnostatenews.com/2007/11/solarwrapup2.htm.
Where solar systems cannot feasibly be incorporated into the project at the outset, build "solar ready" structures.	U.S. Department of Energy, A Homebuilder's Guide to Going Solar (brochure) (2008), available at http://www.eere.energy.gov/solar/pdfs/43076.pdf.
Incorporate wind and solar energy systems into agricultural projects where appropriate.	Wind energy can be a valuable crop for farmers and ranchers. Wind turbines can generate energy to be used on-site, reducing electricity bills, or they can yield lease revenues (as much as $4000 per turbine per year). Wind turbines generally are compatible with rural land uses, since crops can be grown and livestock can be grazed up to the base of the turbine. See National Renewable Energy Laboratory, Wind Powering America Fact Sheet Series, Wind Energy Benefits, available at http://www.nrel.gov/docs/fy05osti/37602.pdf. Solar PV is not just for urban rooftops. For example, the Scott Brothers' dairy in San Jacinto, California, has installed a 55-kilowatt solar array on its commodity barn, with plans to do more in the coming years. See http://www.dairyherd.com/directories.asp?pgID=724&ed_id=8409 (additional California examples are included in article.)

Include energy storage where appropriate to optimize renewable energy generation systems and avoid peak energy use.	See National Renewable Energy Laboratory, Energy Storage Basics (webpage) at http://www.nrel.gov/learning/eds_energy_storage.html. California Energy Storage Alliance (webpage) at http://storagealliance.org/about.html. Storage is not just for large, utility scale projects, but can be part of smaller industrial, commercial and residential projects. For example, Ice Storage Air Conditioning (ISAC) systems, designed for residential and nonresidential buildings, produce ice at night and use it during peak periods for cooling. See California Energy Commission, Staff Report, Ice Storage Air Conditioners, Compliance Options Application (May 2006), available at http://www.energy.ca.gov/2006publications/CEC-400-2006-006/CEC-400-2006-006-SF.PDF.
Use on-site generated biogas, including methane, in appropriate applications.	At the Hilarides Dairy in Lindsay, California, an anaerobic-lagoon digester processes the run-off of nearly 10,000 cows, generating 226,000 cubic feet of biogas per day and enough fuel to run two heavy duty trucks. This has reduced the dairy's diesel consumption by 650 gallons a day, saving the dairy money and improving local air quality. See http://www.arb.ca.gov/newsrel/nr021109b.htm; see also Public Interest Energy Research Program, Dairy Power Production Program, Dairy Methane Digester System, 90-Day Evaluation Report, Eden Vale Dairy (Dec. 2006) at http://www.energy.ca.gov/2006publications/CEC 500 2006 083/CEC 500 2006 083.PDF. Landfill gas is a current and potential source of substantial energy in California. See Tom Frankiewicz, Program Manager, U.S. EPA Landfill Methane Outreach Program, Landfill Gas Energy Potential in California, available at http://www.energy.ca.gov/2009_energypolicy/documents/2009-04-21_workshop/presentations/05-SCS_Engineers_Presentation.pdf. There are many current and emerging technologies for converting landfill methane that would otherwise be released as a greenhouse gas into clean energy. See California Integrated Waste Management Board, Emerging Technologies, Landfill Gas-to-Energy (webpage) at http://www.ciwmb.ca.gov/LEACentral/TechServices/EmergingTech/default.htm.

Use combined heat and power (CHP) in appropriate applications.	Many commercial, industrial, and campus-type facilities (such as hospitals, universities and prisons) use fuel to produce steam and heat for their own operations and processes. Unless captured, much of this heat is wasted. CHP captures waste heat and re-uses it, e.g., for residential or commercial space heating or to generate electricity. See U.S. EPA, Catalog of CHP Technologies at http://www.epa.gov/chp/documents/catalog_of_%20chp_tech_entire.pdf and California Energy Commission, Distributed Energy Resource Guide, Combined Heat and Power (webpage) at http://www.energy.ca.gov/distgen/equipment/chp/chp.html. The average efficiency of fossil-fueled power plants in the United States is 33 percent. By using waste heat recovery technology, CHP systems typically achieve total system efficiencies of 60 to 80 percent. CHP can also substantially reduce emissions of carbon dioxide. http://www.epa.gov/chp/basic/efficiency.html. Currently, CHP in California has a capacity of over 9 million kilowatts. See list of California CHP facilities at http://www.eea-inc.com/chpdata/States/CA.html. The Waste Heat and Carbon Emissions Reduction Act (Assembly Bill 1613 (2007), amended by Assembly Bill 2791 (2008)) is designed to encourage the development of new CHP systems in California with a generating capacity of not more than 20 megawatts. Among other things, the Act requires the California Public Utilities Commission to establish (1) a standard tariff allowing CHP generators to sell electricity for delivery to the grid and (2) a "pay as you save" pilot program requiring electricity corporations to finance the installation of qualifying CHP systems by nonprofit and government entities. For more information, see http://www.energy.ca.gov/wasteheat/.

Water Conservation and Efficiency

Incorporate water-reducing features into building and landscape design.	According to the California Energy Commission, water-related energy use – which includes conveyance, storage, treatment, distribution, wastewater collection, treatment, and discharge – consumes about 19 percent of the State's electricity, 30 percent of its natural gas, and 88 billion gallons of diesel fuel every year. See http://www.energy.ca.gov/2007publications/CEC 999 2007 008/CEC 999 2007 008.PDF. Reducing water use and improving water efficiency can help reduce energy use and greenhouse gas emissions.
Create water-efficient landscapes.	The California Department of Water Resources' updated Model Water Efficient Landscape Ordinance (Sept. 2009) is available at http://www.water.ca.gov/wateruseefficiency/landscapeordinance/technical.cfm. A landscape can be designed from the beginning to use little or no water, and to generate little or no waste. See California Integrated Waste Management Board, Xeriscaping (webpage) at http://www.ciwmb.ca.gov/organics/Xeriscaping/.

Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls and use water-efficient irrigation methods.	U.S. Department of Energy, Best Management Practice: Water-Efficient Irrigation (webpage) at http://www1.eere.energy.gov/femp/program/waterefficiency_bmp5.html. California Department of Water Resources, Landscape Water Use Efficiency (webpage) at http://www.water.ca.gov/wateruseefficiency/landscape/. Pacific Institute, More with Less: Agricultural Water Conservation and Efficiency in California (2008), available at http://www.pacinst.org/reports/more_with_less_delta/index.htm.
Make effective use of graywater. (Graywater is untreated household waste water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines. Graywater to be used for landscape irrigation.)	California Building Standards Commission, 2008 California Green Building Standards Code, Section 604, pp. 31-32, available at http://www.documents.dgs.ca.gov/bsc/2009/part11_2008_calgreen_code.pdf. California Department of Water Resources, Dual Plumbing Code (webpage) at http://www.water.ca.gov/recycling/DualPlumbingCode/. See also Ahwahnee Water Principles, Principle 6, at http://www.lgc.org/ahwahnee/h2o_principles.html. The Ahwahnee Water Principles have been adopted by City of Willits, Town of Windsor, Menlo Park, Morgan Hill, Palo Alto, Petaluma, Port Hueneme, Richmond, Rohnert Park, Rolling Hills Estates, San Luis Obispo, Santa Paula, Santa Rosa, City of Sunnyvale, City of Ukiah, Ventura, Marin County, Marin Municipal Water District, and Ventura County.
Implement low-impact development practices that maintain the existing hydrology of the site to manage storm water and protect the environment.	Retaining storm water runoff on-site can drastically reduce the need for energy-intensive imported water at the site. See U.S. EPA, Low Impact Development (webpage) at http://www.epa.gov/nps/lid/. Office of Environmental Health Hazard Assessment and the California Water and Land Use Partnership, Low Impact Development at http://www.coastal.ca.gov/nps/lid-factsheet.pdf.
Devise a comprehensive water conservation strategy appropriate for the project and location.	The strategy may include many of the specific items listed above, plus other innovative measures that are appropriate to the specific project.
Design buildings to be water-efficient. Install water-efficient fixtures and appliances.	Department of General Services, Best Practices Manual, Water-Efficient Fixtures and Appliances (website) at http://www.green.ca.gov/EPP/building/SaveH2O.htm. Many ENERGY STAR products have achieved their certification because of water efficiency. See California Energy Commission's database, available at http://www.appliances.energy.ca.gov/.

Offset water demand from new projects so that there is no net increase in water use.	For example, the City of Lompoc has a policy requiring new development to offset new water demand with savings from existing water users. See http://www.cityoflompoc.com/utilities/pdf/2005_uwmp_final.pdf at p. 29.
Provide education about water conservation and available programs and incentives.	See, for example, the City of Santa Cruz, Water Conservation Office at http://www.ci.santa-cruz.ca.us/index.aspx?page=395; Santa Clara Valley Water District, Water Conservation at http://www.valleywater.org/conservation/index.shtm; and Metropolitan Water District and the Family of Southern California Water Agencies, Be Water Wise at http://www.bewaterwise.com. Private projects may provide or fund similar education.

Solid Waste Measures

Reuse and recycle construction and demolition waste (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard).	Construction and demolition materials account for almost 22 percent of the waste stream in California. Reusing and recycling these materials not only conserves natural resources and energy, but can also save money. For a list of best practices and other resources, see California Integrated Waste Management Board, Construction and Demolition Debris Recycling (webpage) at http://www.ciwmb.ca.gov/condemo/.
Integrate reuse and recycling into residential industrial, institutional and commercial projects.	Tips on developing a successful recycling program, and opportunities for cost-effective recycling, are available on the California Integrated Waste Management Board's Zero Waste California website. See http://zerowaste.ca.gov/. The Institute for Local Government's Waste Reduction & Recycling webpage contains examples of "best practices" for reducing greenhouse gas emissions, organized around waste reduction and recycling goals and additional examples and resources. See http://www.ca-ilg.org/wastereduction.
Provide easy and convenient recycling opportunities for residents, the public, and tenant businesses.	Tips on developing a successful recycling program, and opportunities for cost effective recycling, are available on the California Integrated Waste Management Board's Zero Waste California website. See http://zerowaste.ca.gov/.
Provide education and publicity about reducing waste and available recycling services.	Many cities and counties provide information on waste reduction and recycling. See, for example, the Butte County Guide to Recycling at http://www.recyclebutte.net. The California Integrated Waste Management Board's website contains numerous publications on recycling and waste reduction that may be helpful in devising an education project. See http://www.ciwmb.ca.gov/Publications/default.asp?cat=13. Private projects may also provide waste and recycling education directly, or fund education.

Land Use Measures

Ensure consistency with "smart growth" principles – mixed-use, infill, and higher density projects that provide alternatives to individual vehicle travel and promote the efficient delivery of services and goods.	U.S. EPA maintains an extensive Smart Growth webpage with links to examples, literature and technical assistance, and financial resources. See http://www.epa.gov/smartgrowth/index.htm. The National Oceanic and Atmospheric Administration's webpage provides smart growth recommendations for communities located near water. See Coastal & Waterfront Smart Growth (webpage) at http://coastalsmartgrowth.noaa.gov/. The webpage includes case studies from California. The California Energy Commission has recognized the important role that land use can play in meeting our greenhouse gas and energy efficiency goals. The agency's website, Smart Growth & Land Use Planning, contains useful information and links to relevant studies, reports, and other resources. See http://www.energy.ca.gov/landuse/. The Metropolitan Transportation Commission's webpage, Smart Growth / Transportation for Livable Communities, includes resources that may be useful to communities in the San Francisco Bay Area and beyond. See http://www.mtc.ca.gov/planning/smart_growth/. The Sacramento Area Council of Governments (SACOG) has published examples of smart growth in action in its region. See Examples from the Sacramento Region of the Seven Principles of Smart Growth / Better Ways to Grow, available at http://www.sacog.org/regionalfunding/betterways.pdf.
Meet recognized "smart growth" benchmarks.	For example, the LEED for Neighborhood Development (LEED-ND) rating system integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design. LEED-ND is a collaboration among the U.S. Green Building Council, Congress for the New Urbanism, and the Natural Resources Defense Council. For more information, see http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148.
Educate the public about the many benefits of well-designed, higher density development.	See, for example, U.S. EPA, Growing Smarter, Living Healthier: A Guide to Smart Growth and Active Aging (webpage), discussing how compact, walkable communities can provide benefits to seniors. See http://www.epa.gov/aging/bhc/guide/index.html. U.S. EPA, Environmental Benefits of Smart Growth (webpage) at http://www.epa.gov/dced/topics/eb.htm (noting local air and water quality improvements). Centers for Disease Control and Prevention (CDC), Designing and Building Healthy Places (webpage), at http://www.cdc.gov/healthyplaces/. The CDC's website discusses the links between walkable communities and public health and includes numerous links to educational materials. California Department of Housing and Community Development, Myths and Facts About Affordable and High Density Housing (2002), available at http://www.hcd.ca.gov/hpd/mythsnfacts.pdf.

Incorporate public transit into the project's design.	Federal Transit Administration, Transit-Oriented Development (TOD) (webpage) at http://www.fta.dot.gov/planning/planning_environment_6932.html (describing the benefits of TOD as "social, environmental, and fiscal.") California Department of Transportation (Caltrans), Statewide Transit-Oriented Development Study: Factors for Success in California (2002), available at http://transitorienteddevelopment.dot.ca.gov/miscellaneous/StatewideTOD.htm Caltrans, California Transit-Oriented Development Searchable Database (includes detailed information on numerous TODs), available at http://transitorienteddevelopment.dot.ca.gov/miscellaneous/NewHome.jsp. California Department of Housing and Community Development, Transit Oriented Development (TOD) Resources (Aug. 2009), available at http://www.hcd.ca.gov/hpd/tod.pdf.
Preserve and create open space and parks. Preserve existing trees, and plant replacement trees at a set ratio.	U.S. EPA, Smart Growth and Open Space Conservation (webpage) at http://www.epa.gov/dced/openspace.htm.
Develop "brownfields" and other underused or defunct properties near existing public transportation and jobs.	U.S. EPA, Smart Growth and Brownfields (webpage) at http://www.epa.gov/dced/brownfields.htm. For example, as set forth in the Local Government Commission's case study, the Town of Hercules, California reclaimed a 426-acre brownfield site, transforming it into a transit-friendly, walkable neighborhood. See http://www.lgc.org/freepub/docs/community_design/fact_sheets/er_case_studies.pdf. For financial resources that can assist in brownfield development, see Center for Creative Land Recycling, Financial Resources for California Brownfields (July 2008), available at http://www.cclr.org/media/publications/8-Financial_Resources_2008.pdf.
Include pedestrian and bicycle facilities within projects and ensure that existing non-motorized routes are maintained and enhanced.	See U.S. Department of Transportation, Federal Highway Administration, Bicycle and Pedestrian Program (webpage) at http://www.fhwa.dot.gov/environment/bikeped/. Caltrans, Pedestrian and Bicycle Facilities in California / A Technical Reference and Technology Transfer Synthesis for Caltrans Planners and Engineers (July 2005), available at http://www.dot.ca.gov/hq/traffops/survey/pedestrian/TR_MAY0405.pdf. This reference includes standard and innovative practices for pedestrian facilities and traffic calming.

Transportation and Motor Vehicles

Meet an identified transportation-related benchmark.	A logical benchmark might be related to vehicles miles traveled (VMT), e.g., average VMT per capita, per household, or per employee. As the California Energy Commission has noted, VMT by California residents increased "a rate of more than 3 percent a year between 1975 and 2004, markedly faster than the population growth rate over the same period, which was less than 2 percent. This increase in VMT correlates to an increase in petroleum use and GHG production and has led to the transportation sector being responsible for 41 percent of the state's GHG emissions in 2004." CEC, The Role of Land Use in Meeting California's Energy and Climate Change Goals (Aug. 2007) at p. 9, available at http://www.energy.ca.gov/2007publications/CEC-600-2007-008/CEC-600-2007-008-SF.PDF. Even with regulations designed to increase vehicle efficiency and lower the carbon content of fuel, "reduced VMT growth will be required to meet GHG reductions goals." *Id.* at p. 18.
Adopt a comprehensive parking policy that discourages private vehicle use and encourages the use of alternative transportation.	For example, reduce parking for private vehicles while increasing options for alternative transportation; eliminate minimum parking requirements for new buildings; "unbundle" parking (require that parking is paid for separately and is not included in rent for residential or commercial space); and set appropriate pricing for parking. See U.S. EPA, Parking Spaces / Community Places, Finding the Balance Through Smart Growth Solutions (Jan. 2006), available at http://www.epa.gov/dced/pdf/EPAParkingSpaces06.pdf. Reforming Parking Policies to Support Smart Growth, Metropolitan Transportation Commission (June 2007) at http://www.mtc.ca.gov/planning/smart_growth/parking_seminar/Toolbox_Handbook.pdf. See also the City of Ventura's Downtown Parking and Mobility Plan, available at http://www.cityofventura.net/community_development/resources/mobility_parking_plan.pdf, and Ventura's Downtown Parking Management Program, available at http://www.ci.ventura.ca.us/depts/comm_dev/downtownplan/chapters.asp.
Build or fund a major transit stop within or near the development.	"'Major transit stop' means a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods." (Pub. Res. Code, § 21064.3.) Transit Oriented Development (TOD) is a moderate to higher density development located within an easy walk of a major transit stop. http://transitorienteddevelopment.dot.ca.gov/miscellaneous/NewWhatisTOD.htm. By building or funding a major transit stop, an otherwise ordinary development can become a TOD.

Provide public transit incentives such as free or low-cost monthly transit passes to employees, or free ride areas to residents and customers.	See U.S. Department of Transportation and U.S. EPA, Commuter Choice Primer / An Employer's Guide to Implementing Effective Commuter Choice Programs, available at http://www.its.dot.gov/JPODOCS/REPTS_PR/13669.html. The Emery Go Round shuttle is a private transportation service funded by commercial property owners in the citywide transportation business improvement district. The shuttle links a local shopping district to a Bay Area Rapid Transit stop. See http://www.emerygoround.com/. Seattle, Washington maintains a public transportation "ride free" zone in its downtown from 6:00 a.m. to 7:00 p.m. daily. See http://transit.metrokc.gov/tops/accessible/paccessible_map.html#fare.
Promote "least polluting" ways to connect people and goods to their destinations.	Promoting "least polluting" methods of moving people and goods is part of a larger, integrated "sustainable streets" strategy now being explored at U.C. Davis's Sustainable Transportation Center. Resources and links are available at the Center's website, http://stc.ucdavis.edu/outreach/ssp.php.
Incorporate bicycle lanes, routes and facilities into street systems, new subdivisions, and large developments.	Bicycling can have a profound impact on transportation choices and air pollution reduction. The City of Davis has the highest rate of bicycling in the nation. Among its 64,000 residents, 17 percent travel to work by bicycle and 41 percent consider the bicycle their primary mode of transportation. See Air Resources Board, Bicycle Awareness Program, Bicycle Fact Sheet, available at http://www.arb.ca.gov/planning/tsaq/bicycle/factsht.htm. For recommendations on best practices, see the many resources listed at the U.S. Department of Transportation, Federal Highway Administration's Bicycle and Pedestrian website at http://www.fhwa.dot.gov/environment/bikeped/publications.htm. See also Caltrans Division of Research and Innovation, Designing Highway Facilities To Encourage Walking, Biking and Transit (Preliminary Investigation) (March 2009), available at http://www.dot.ca.gov/research/researchreports/preliminary_investigations/docs/pi-design_for_walking_%20biking_and_transit%20final.pdf.
Require amenities for non-motorized transportation, such as secure and convenient bicycle parking.	According to local and national surveys of potential bicycle commuters, secure bicycle parking and workplace changing facilities are important complements to safe and convenient routes of travel. See Air Resources Board, Bicycle Awareness Program, Bicycle Fact Sheet, available at http://www.arb.ca.gov/planning/tsaq/bicycle/factsht.htm.

Ensure that the project enhances, and does not disrupt or create barriers to, non-motorized transportation.	See, e.g., U.S. EPA's list of transit-related "smart growth" publications at http://www.epa.gov/dced/publications.htm#air, including Pedestrian and Transit-Friendly Design: A Primer for Smart Growth (1999), available at www.epa.gov/dced/pdf/ptfd_primer.pdf. See also Toolkit for Improving Walkability in Alameda County, available at http://www.acta2002.com/ped toolkit/ped_toolkit_print.pdf. Pursuant to the California Complete Streets Act of 2008 (AB 1358, Gov. Code, §§ 65040.2 and 65302), commencing January 1, 2011, upon any substantive revision of the circulation element of the general plan, a city or county will be required to modify the circulation element to plan for a balanced, multimodal transportation network that meets the needs of all users.
Connect parks and open space through shared pedestrian/bike paths and trails to encourage walking and bicycling. Create bicycle lanes and walking paths directed to the location of schools, parks and other destination points.	Walk Score ranks the "walkability" of neighborhoods in the largest 40 U.S. cities, including seven California cities. Scores are based on the distance to nearby amenities. Explore Walk Score at http://www.walkscore.com/. In many markets, homes in walkable neighborhoods are worth more than similar properties where walking is more difficult. See Hoak, *Walk appeal / Homes in walkable neighborhoods sell for more: study*, Wall Street Journal (Aug. 18, 2009), available at http://www.marketwatch.com/story/homes-in-walkable-neighborhoods-sell-for-more-2009-08-18. By creating walkable neighborhoods with more transportation choices, Californians could save $31 million and cut greenhouse gas emissions by 34 percent, according to a study released by Transform, a coalition of unions and nonprofits. See Windfall for All / How Connected, Convenient Neighborhoods Can Protect Our Climate and Safeguard California's Economy (Nov. 2009), available at http://transformca.org/windfall-for-all#download-report.
Work with the school districts to improve pedestrian and bike access to schools and to restore or expand school bus service using lower-emitting vehicles.	In some communities, twenty to twenty-five percent of morning traffic is due to parents driving their children to school. Increased traffic congestion around schools in turn prompts even more parents to drive their children to school. Programs to create safe routes to schools can break this harmful cycle. See California Department of Public Health, Safe Routes to School (webpage) and associated links at http://www.cdph.ca.gov/HealthInfo/injviosaf/Pages/SafeRoutestoSchool.aspx. See also U.S. EPA, Smart Growth and Schools (webpage), available at http://www.epa.gov/dced/schools.htm. California Center for Physical Activity, California Walk to School (website) at http://www.cawalktoschool.com Regular school bus service (using lower-emitting buses) for children who cannot bike or walk to school could substantially reduce private vehicle congestion and air pollution around schools. See Air Resources Board, Lower Emissions School Bus Program (webpage) at http://www.arb.ca.gov/msprog/schoolbus/schoolbus.htm.

Institute teleconferencing, telecommute and/or flexible work hour programs to reduce unnecessary employee transportation.	There are numerous sites on the web with resources for employers seeking to establish telework or flexible work programs. These include U.S. EPA's Mobility Management Strategies: Commuter Programs website at http://www.epa.gov/otaq/stateresources/rellinks/mms_commprograms.htm; and Telework, the federal government's telework website, at http://www.telework.gov/. Through a continuing FlexWork Implementation Program, the Traffic Solutions division of the Santa Barbara County Association of Governments sponsors flexwork consulting, training and implementation services to a limited number of Santa Barbara County organizations that want to create or expand flexwork programs for the benefit of their organizations, employees and the community. See http://www.flexworksb.com/read_more_about_the_fSBp.html. Other local government entities provide similar services.
Provide information on alternative transportation options for consumers, residents, tenants and employees to reduce transportation-related emissions.	Many types of projects may provide opportunities for delivering more tailored transportation information. For example, a homeowner's association could provide information on its website, or an employer might create a Transportation Coordinator position as part of a larger Employee Commute Reduction Program. See, e.g., South Coast Air Quality Management District, Transportation Coordinator training, at http://www.aqmd.gov/trans/traing.html.
Educate consumers, residents, tenants and the public about options for reducing motor vehicle-related greenhouse gas emissions. Include information on trip reduction; trip linking; vehicle performance and efficiency (e.g., keeping tires inflated); and low or zero-emission vehicles.	See, for example U.S. EPA, SmartWay Transport Partnership: Innovative Carrier Strategies (webpage) at http://www.epa.gov/smartway/transport/what-smartway/carrier-strategies.htm. This webpage includes recommendations for actions that truck and rail fleets can take to make ground freight more efficient and cleaner. The Air Resources Board's Drive Clean website is a resource for car buyers to find clean and efficient vehicles. The web site is designed to educate Californians that pollution levels range greatly between vehicles. See http://www.driveclean.ca.gov/. The Oregon Department of Transportation and other public and private partners launched the Drive Less/Save More campaign. The comprehensive website contains fact sheets and educational materials to help people drive more efficiently. See http://www.drivelesssavemore.com/.
Purchase, or create incentives for purchasing, low or zero-emission vehicles.	See Air Resources Board, Low-Emission Vehicle Program (webpage) at http://www.arb.ca.gov/msprog/levprog/levprog.htm. Air Resource Board, Zero Emission Vehicle Program (webpage) at http://www.arb.ca.gov/msprog/zevprog/zevprog.htm. All new cars sold in California are now required to display an Environmental Performance (EP) Label, which scores a vehicle's global warming and smog emissions from 1 (dirtiest) to 10 (cleanest). To search and compare vehicle EP Labels, visit www.DriveClean.ca.gov.

Create a ride sharing program. Promote existing ride sharing programs e.g., by designating a certain percentage of parking spaces for ride sharing vehicles, designating adequate passenger loading and unloading for ride sharing vehicles, and providing a web site or message board for coordinating rides.	For example, the 511 Regional Rideshare Program is operated by the Metropolitan Transportation Commission (MTC) and is funded by grants from the Federal Highway Administration, U.S. Department of Transportation, the Metropolitan Transportation Commission, the Bay Area Air Quality Management District and county congestion management agencies. For more information, see http://rideshare.511.org/. As another example, San Bernardino Associated Governments works directly with large and small employers, as well as providing support to commuters who wish to share rides or use alternative forms of transportation. See http://www.sanbag.ca.gov/commuter/rideshare.html. Valleyrides.com is a ridesharing resource available to anyone commuting to and from Fresno and Tulare Counties and surrounding communities. See http://www.valleyrides.com/. There are many other similar websites throughout the state.
Create or accommodate car sharing programs, e.g., provide parking spaces for car share vehicles at convenient locations accessible by public transportation.	There are many existing car sharing companies in California. These include City CarShare (San Francisco Bay Area), see http://www.citycarshare.org/; and Zipcar, see http://www.zipcar.com/. Car sharing programs are being successfully used on many California campuses.
Provide a vanpool for employees.	Many local Transportation Management Agencies can assist in forming vanpools. See, for example, Sacramento Transportation Management Association, Check out Vanpooling (webpage) at http://www.sacramento-tma.org/vanpool.html.
Create local "light vehicle" networks, such as neighborhood electric vehicle systems.	See California Energy Commission, Consumer Energy Center, Urban Options - Neighborhood Electric Vehicles (NEVs) (webpage) at http://www.consumerenergycenter.org/transportation/urban_options/nev.html. The City of Lincoln has an innovative NEV program. See http://www.lincolnev.com/index.html.
Enforce and follow limits idling time for commercial vehicles, including delivery and construction vehicles.	Under existing law, diesel-fueled motor vehicles with a gross vehicle weight rating greater than 10,000 pounds are prohibited from idling for more than 5 minutes at any location. The minimum penalty for an idling violation is now $300 per violation. See http://www.arb.ca.gov/enf/complaints/idling_cv.htm.
Provide the necessary facilities and infrastructure to encourage the use of low or zero-emission vehicles.	For a list of existing alternative fuel stations in California, visit http://www.cleancarmaps.com/. See, e.g., Baker, *Charging-station network built along 101*, S.F. Chron. (9/23/09), available at http://articles.sfgate.com/2009-09-23/news/17207424_1_recharging-solar-array-tesla-motors.

Agriculture and Forestry (additional strategies noted above)

Require best management practices in agriculture and animal operations to reduce emissions, conserve energy and water, and utilize alternative energy sources, including biogas, wind and solar.	Air Resources Board (ARB), Economic Sectors Portal, Agriculture (webpage) at http://www.arb.ca.gov/cc/ghgsectors/ghgsectors.htm. ARB's webpage includes information on emissions from manure management, nitrogen fertilizer, agricultural offroad equipment, and agricultural engines. "A full 90% of an agricultural business' electricity bill is likely associated with water use. In addition, the 8 million acres in California devoted to crops consume 80% of the total water pumped in the state." See Flex Your Power, Agricultural Sector (webpage) at http://www.fypower.org/agri/. Flex Your Power, Best Practice Guide / Food and Beverage Growers and Processors, available at http://www.fypower.org/bpg/index.html?b=food_and_bev. Antle et al., Pew Center on Global Climate Change, Agriculture's Role in Greenhouse Gas Mitigation (2006), available at http://www.pewclimate.org/docUploads/Agriculture's%20Role%20in%20GHG%20Mitigation.pdf.
Preserve forested areas, agricultural lands, wildlife habitat and corridors, wetlands, watersheds, groundwater recharge areas and other open space that provide carbon sequestration benefits.	"There are three general means by which agricultural and forestry practices can reduce greenhouse gases: (1) avoiding emissions by maintaining existing carbon storage in trees and soils; (2) increasing carbon storage by, e.g., tree planting, conversion from conventional to conservation tillage practices on agricultural lands; (3) substituting bio-based fuels and products for fossil fuels, such as coal and oil, and energy-intensive products that generate greater quantities of CO2 when used." U.S. EPA, Carbon Sequestration in Agriculture and Forestry, Frequently Asked Questions (webpage) at http://www.epa.gov/sequestration/faq.html. Air Resources Board, Economic Sectors Portal, Forestry (webpage) at http://www.arb.ca.gov/cc/ghgsectors/ghgsectors.htm.
Protect existing trees and encourage the planting of new trees. Adopt a tree protection and replacement ordinance.	Tree preservation and planting is not just for rural areas of the state; suburban and urban forests can also serve as carbon sinks. See Cal Fire, Urban and Community Forestry (webpage) at http://www.fire.ca.gov/resource_mgt/resource_mgt_urbanforestry.php.

Off-Site Mitigation

If, after analyzing and requiring all reasonable and feasible on-site mitigation measures for avoiding or reducing greenhouse gas-related impacts, the lead agency determines that additional mitigation is required, the agency may consider additional off-site mitigation. The project proponent could, for example, fund off-site mitigation projects that will reduce carbon emissions, conduct an audit of its other existing operations and agree to retrofit, or purchase verifiable carbon "credits" from another entity that will undertake mitigation.

The topic of off-site mitigation can be complicated. A full discussion is outside the scope of this summary document. Issues that the lead agency should consider include:

- The location of the off-site mitigation. (If the off-site mitigation is far from the project, any additional, non-climate related co-benefits of the mitigation may be lost to the local community.)

- Whether the emissions reductions from off-site mitigation can be quantified and verified. (The California Registry has developed a number of protocols for calculating, reporting and verifying greenhouse gas emissions. Currently, industry-specific protocols are available for the cement sector, power/utility sector, forest sector and local government operations. For more information, visit the California Registry's website at http://www.climateregistry.org/.)

- Whether the mitigation ratio should be greater than 1:1 to reflect any uncertainty about the effectiveness of the off-site mitigation.

Offsite mitigation measures that could be funded through mitigation fees include, but are not limited to, the following:

- Energy efficiency audits of existing buildings.

- Energy efficiency upgrades to existing buildings not otherwise required by law, including heating, ventilation, air conditioning, lighting, water heating equipment, insulation and weatherization (perhaps targeted to specific communities, such as low-income or senior residents).

- Programs to encourage the purchase and use of energy efficient vehicles, appliances, equipment and lighting.

- Programs that create incentives to replace or retire polluting vehicles and engines.

- Programs to expand the use of renewable energy and energy storage.

- Preservation and/or enhancement of existing natural areas (e.g., forested areas, agricultural lands, wildlife habitat and corridors, wetlands, watersheds, and groundwater recharge areas) that provide carbon sequestration benefits.

- Improvement and expansion of public transit and low- and zero-carbon transportation alternatives.

Technical Advisory

CEQA AND CLIMATE CHANGE: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review

This technical advisory is one in a series of advisories provided by the Governor's Office of Planning and Research (OPR) as a service to professional planners, land use officials and CEQA practitioners. OPR issues technical guidance from time to time on issues that broadly affect the practice of CEQA and land use planning. The emerging role of CEQA in addressing climate change and greenhouse gas emissions has been the topic of much discussion and debate in recent months. This document provides OPR's perspective on the issue.

I. PURPOSE

General scientific consensus and increasing public awareness regarding global warming and climate change have placed new focus on the California Environmental Quality Act (CEQA) review process as a means to address the effects of greenhouse gas (GHG) emissions from proposed projects on climate change. Many public agencies—along with academic, business, and community organizations—are striving to determine the appropriate means by which to evaluate and mitigate the impacts of proposed projects on climate change. Approaches and methodologies for calculating GHG emissions and addressing the environmental impacts through CEQA review are rapidly evolving and are increasingly available to assist public agencies to prepare their CEQA documents and make informed decisions.

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The Governor's Office of Planning and Research (OPR) will develop, and the California Resources Agency (Resources Agency) will certify and adopt amendments to the Guidelines implementing the California Environmental Quality Act ("CEQA Guidelines"), on or before January 1, 2010, pursuant to Senate Bill 97 (Dutton, 2007). These new CEQA Guidelines will provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents. In the interim, OPR offers the following informal guidance regarding the steps lead agencies should take to address climate change in their CEQA documents. This guidance was developed in cooperation with the Resources Agency, the California Environmental Protection Agency (Cal/EPA), and the California Air Resources Board (ARB).

II. BACKGROUND

Climate change refers to any significant change in measures of climate, such as average temperature, precipitation, or wind patterns over a period of time. Climate change may result from natural factors, natural processes, and human activities that change the composition of the atmosphere and alter the surface and features of the land. Significant changes in global climate patterns have recently been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, attributed to accumulation of GHG emissions in the atmosphere. Greenhouse gases trap heat in the atmosphere, which in turn heats the surface of the Earth. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. The emission of GHGs through the combustion of fossil fuels (i.e., fuels containing carbon) in conjunction with other human activities, appears to be closely associated with global warming.

State law defines GHG to include the following: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride (Health and Safety Code, section 38505(g).) The most common GHG that results from human activity is carbon dioxide, followed by methane and nitrous oxide.

Requirements of AB 32 and SB 97

Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006 (Nunez, 2006), recognizes that California is the source of substantial amounts of GHG emissions. The statute begins with several legislative findings and declarations of intent, including the following:

> Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snow pack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems. (Health and Safety Code, section 38501.)

In order to avert these consequences, AB 32 establishes a state goal of reducing GHG emissions to 1990 levels by the year 2020 (a reduction of approximately 25 percent from forecast emission levels) with further reductions to follow. The law requires the ARB to establish a program to track and report GHG emissions; approve a scoping plan for achieving the maximum technologically feasible and cost effective reductions from sources of GHG emissions; adopt early reduction measures to begin moving forward; and adopt, implement and enforce regulations – including market mechanisms such as "cap-and-trade" programs – to ensure the required reductions occur. The ARB recently adopted a statewide GHG emissions limit and an emissions inventory, along with requirements to measure, track, and report GHG emissions by the industries it determined to be significant sources of GHG emissions.

CEQA requires public agencies to identify the potentially significant effects on the environment of projects they intend to carry out or approve, and to mitigate significant effects whenever it is feasible to do so. While AB 32 did not amend CEQA to require new analytic processes to account for the environmental impacts of GHG emissions from projects subject to CEQA, it does acknowledge that such emissions cause significant adverse impacts to human health and the environment.

Senate Bill 97, enacted in 2007, amends the CEQA statute to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. It directs OPR to develop draft CEQA Guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions" by July 1, 2009 and directs the Resources Agency to certify and adopt the CEQA Guidelines by January 1, 2010.

Requirements of CEQA

CEQA is a public disclosure law that requires public agencies to make a

good-faith, reasoned effort, based upon available information, to identify the potentially significant direct and indirect environmental impacts—including cumulative impacts— of a proposed project or activity. The CEQA process is intended to inform the public of the potential environmental effects of proposed government decisions and to encourage informed decision-making by public agencies. In addition, CEQA obligates public agencies to consider less environmentally-damaging alternatives and adopt feasible mitigation measures to reduce or avoid a project's significant impacts.

The lead agency is required to prepare an Environmental Impact Report (EIR), a Mitigated Negative Declaration, or equivalent document, when it determines that the project's impacts on the environment are potentially significant. This determination of significance must be based upon substantial evidence in light of all the information before the agency.

Although the CEQA Guidelines, at Appendix G, provide a checklist of suggested issues that should be addressed in an EIR, neither the CEQA statute nor the CEQA Guidelines prescribe thresholds of significance or particular methodologies for performing an impact analysis. This is left to lead agency judgment and discretion, based upon factual data and guidance from regulatory agencies and other sources where available and applicable. A threshold of significance is essentially a regulatory standard or set of criteria that represent the level at which a lead agency finds a particular environmental effect of a project to be significant. Compliance with a given threshold means the effect normally will be considered less than significant. Public agencies are encouraged but not required to adopt thresholds of significance for environmental impacts. Even in the absence of clearly defined thresholds for GHG emissions, the law requires that such emissions from CEQA projects must be disclosed and mitigated to the extent feasible whenever the lead agency determines that the project contributes to a significant, cumulative climate change impact.

We realize that perhaps the most difficult part of the climate change analysis will be the determination of significance. Although lead agencies typically rely on local or regional definitions of significance for most environmental issues, the global nature of climate change warrants investigation of a statewide threshold of significance for GHG emissions. To this end, OPR has asked ARB technical staff to recommend a method for setting thresholds which will encourage consistency and uniformity in the CEQA analysis of GHG emissions throughout the state. Until such time as state guidance is available on thresholds of significance for GHG emissions, we recommend the following approach to your CEQA analysis.

III. RECOMMENDED APPROACH

Each public agency that is a lead agency for complying with CEQA needs to develop its own approach to performing a climate change analysis for projects that generate GHG emissions. A consistent approach should be applied for the analysis of all such projects, and the analysis must be based on best available information. For these projects, compliance with CEQA entails three basic steps: identify and quantify the GHG emissions; assess the significance of the impact on climate change; and if the impact is found to be significant, identify alternatives and/or mitigation measures that will reduce the impact below significance.

Lead agencies should determine whether greenhouse gases may be generated by a proposed project, and if so, quantify or estimate the GHG emissions by type and source. Second, the lead agency must assess whether those emissions are individually or cumulatively significant. When assessing whether a project's effects on climate change are "cumulatively considerable" even though its GHG contribution may be individually limited, the lead agency must consider the impact of the project when viewed in connection with the effects of past, current, and probable future projects. Finally, if the lead agency determines that the GHG emissions from the project as proposed are potentially significant, it must investigate and implement ways to avoid, reduce, or otherwise mitigate the impacts of those emissions. Although the scientific knowledge and understanding of how best to perform this analysis is rudimentary and still evolving, many useful resources are available (see Attachment 1).

Until such time as further state guidance is available on thresholds of significance, public agencies should consider the following general factors when analyzing whether a proposed project has the potential to cause a significant climate change impact on the environment.

Identify GHG Emissions

- Lead agencies should make a good-faith effort, based on available information, to calculate, model, or estimate the amount of CO_2 and other GHG emissions from a project, including the emissions associated with vehicular traffic, energy consumption, water usage and construction activities.
- Technical resources, including a variety of modeling tools, are available to assist public agencies to quantify GHG emissions. OPR recognizes that more sophisticated emissions models for particular types of projects are continually being developed and that the state-of-the-art quantification

models are rapidly changing. OPR will periodically update the examples of modeling tools identified in Attachment 2.

- There is no standard format for including the analysis in a CEQA document. A GHG/climate change analysis can be included in one or more of the typical sections of an EIR (e.g., air quality, transportation, energy) or may be provided in a separate section on cumulative impacts or climate change.

Determine Significance

- When assessing a project's GHG emissions, lead agencies must describe the existing environmental conditions or setting, without the project, which normally constitutes the baseline physical conditions for determining whether a project's impacts are significant.
- As with any environmental impact, lead agencies must determine what constitutes a significant impact. In the absence of regulatory standards for GHG emissions or other scientific data to clearly define what constitutes a "significant impact", individual lead agencies may undertake a project-by-project analysis, consistent with available guidance and current CEQA practice.
- The potential effects of a project may be individually limited but cumulatively considerable. Lead agencies should not dismiss a proposed project's direct and/or indirect climate change impacts without careful consideration, supported by substantial evidence. Documentation of available information and analysis should be provided for any project that may significantly contribute new GHG emissions, either individually or cumulatively, directly or indirectly (e.g., transportation impacts).
- Although climate change is ultimately a cumulative impact, not every individual project that emits GHGs must necessarily be found to contribute to a significant cumulative impact on the environment. CEQA authorizes reliance on previously approved plans and mitigation programs that have adequately analyzed and mitigated GHG emissions to a less than significant level as a means to avoid or substantially reduce the cumulative impact of a project.

Mitigate Impacts

- Mitigation measures will vary with the type of project being contemplated, but may include alternative project designs or locations that conserve energy and water, measures that reduce vehicle miles traveled

(VMT) by fossil-fueled vehicles, measures that contribute to established regional or programmatic mitigation strategies, and measures that sequester carbon to offset the emissions from the project.

- The lead agency must impose all mitigation measures that are necessary to reduce GHG emissions to a less than significant level. CEQA does not require mitigation measures that are infeasible for specific legal, economic, technological, or other reasons. A lead agency is not responsible for wholly eliminating all GHG emissions from a project; the CEQA standard is to mitigate to a level that is "less than significant".
- If there are not sufficient mitigation measures that the lead agency determines are feasible to achieve the less than significant level, the lead agency should adopt those measures that are feasible, and adopt a Statement of Overriding Considerations that explains why further mitigation is not feasible. A Statement of Overriding Considerations must be prepared when the lead agency has determined to approve a project for which certain impacts are unavoidable. These statements should explain the reasons why the impacts cannot be adequately mitigated in sufficient detail, and must be based on specific facts, so as not to be conclusory.
- Agencies are encouraged to develop standard GHG emission reduction or mitigation measures that can be applied on a project-by-project basis. Attachment 3 contains a preliminary menu of measures that lead agencies may wish to consider. This list is by no means exhaustive or prescriptive. Lead agencies are encouraged to develop their own measures and/or propose project alternatives to reduce GHG emissions, either at a programmatic level or on a case-by-case review.
- In some cases GHG emission reduction measures will not be feasible or may not be effective at a project level. Rather, it may be more appropriate and more effective to develop and adopt program-level plans, policies and measures that will result in a reduction of GHG emissions on a regional level.

IV. ADDITIONAL LAND USE CONSIDERATIONS

CEQA can be a more effective tool for GHG emissions analysis and mitigation if it is supported and supplemented by sound development policies and practices that will reduce GHG emissions on a broad planning scale and that can provide the basis for a programmatic approach to project-specific CEQA analysis and mitigation.

Local governments with land use authority are beginning to establish policies that result in land use patterns and practices that will result in less energy use and reduce GHG emissions. For example, some cities and counties have adopted general plans and policies that encourage the development of compact, mixed-use, transit-oriented development that reduces VMT; encourage alternative fuel vehicle use; conserve energy and water usage; and promote carbon sequestration. Models of such developments exist throughout the state (see OPR climate change website for examples of city and county plans and policies, referenced in Attachment 1).

For local government lead agencies, adoption of general plan policies and certification of general plan EIRs that analyze broad jurisdiction-wide impacts of GHG emissions can be part of an effective strategy for addressing cumulative impacts and for streamlining later project-specific CEQA reviews.

International, national, and statewide organizations such as ICLEI (Local Governments for Sustainability), the Cities for Climate Protection, and the Clean Cities Coalition —to name just a few — have published guidebooks to help local governments reduce GHG emissions through land use planning techniques and improved municipal operations. Links to these resources are provided at the end of this advisory.

Regional agencies can also employ a variety of strategies to reduce GHG emissions through their planning processes. For example, regional transportation planning agencies adopt plans and programs that address congestion relief, jobs-to-housing balance, reduction of vehicle miles traveled (VMT), and other issues that have implications for GHG emission reductions.

State agencies are also tackling the issue of climate change. Some have adopted or support policies and programs that take climate change into account, including the Department of Water Resources' State Water Plan; the Department of Transportation's State Transportation Plan; and the Business, Housing and Transportation Agency's Regional Blueprint Planning Program. These efforts not only raise public awareness of climate change and how the State can reduce GHG emissions, but also offer specific information and resources for lead agencies to consider.

V. NEXT STEPS

OPR has asked ARB technical staff to recommend a method for setting a threshold of significance for GHG emissions. OPR has requested that the ARB identify a range of feasible options, including qualitative and quantitative options.

OPR is actively seeking input from the public and stakeholder groups, as it develops draft CEQA Guidelines for GHG emissions. OPR is engaged with the Resources Agency and other expert state agencies, local governments, builders and developers, environmental organizations, and others with expertise or an interest in the development of the Guidelines.

OPR will conduct public workshops later this year to receive input on the scope and content of the CEQA Guidelines amendments. It is OPR's intent to release a preliminary draft of the CEQA Guidelines amendments for public review and comment in the fall. This will enable OPR to deliver a proposed package of CEQA Guidelines amendments to the Resources Agency as early as January 2009, well before the statutory due date of July 1, 2009.

We encourage public agencies and the public to refer to the OPR website at www.opr.ca.gov for information about the CEQA Guidelines development process and to subscribe to OPR's notification system for announcements and updates.

For more information about this technical advisory and assistance in addressing the impacts of GHG emissions on the environment, please contact:

Governor's Office of Planning and Research
State Clearinghouse
1400 Tenth Street
P.O. Box 3044
Sacramento, CA 95812-3044
Telephone: (916) 445-0613
Fax: (916) 323-3018
Web Address: www.opr.ca.gov

ATTACHMENTS

1. References and Information Sources
2. Technical Resources/Modeling Tools to Estimate GHG Emissions
3. Examples of GHG Reduction Measures

Attachment 1

References and Information Sources

The following is a list of websites of organizations that can offer additional information regarding methods to characterize, quantify, assess and reduce GHG emissions. In addition, a list of useful resources and reference materials is provided on the subject of climate change and greenhouse gases.

ORGANIZATIONS

- Governor's Office of Planning and Research
  http://www.opr.ca.gov
- California Climate Action Team
  http://www.climatechange.ca.gov/climate_action_team/
- California Climate Change Portal
  http://www.climatechange.ca.gov
- California Air Resources Board Climate Change Website
  http://www.arb.ca.gov/cc/cc.htm
- California Climate Action Registry
  http://www.climateregistry.org/
- California Department of Water Resources, Climate Change and California Water Plan Website
  http://www.waterplan.water.ca.gov/climate/
- California Energy Commission Climate Change Proceedings
  http://www.energy.ca.gov/global_climate_change/index.html
- California Public Utilities Commission, Climate Change Website
  http://www.cpuc.ca.gov/static/energy/electric/climate+change/_index.htm
- Green California Website
  http://www.green.ca.gov/default.htm
- Western Climate Initiative
  http://www.westernclimateinitiative.org

- California Air Pollution Control Officers Association
  http://www.capcoa.org
- Local Governments for Sustainability (ICLEI)
  http://www.iclei.org/
- ICLEI Cities for Climate Protection (CCP)
  http://www.iclei.org/index.php?id=800
- United Nations Framework Convention on Climate Change
  http://unfccc.int/2860.php
- Intergovernmental Panel on Climate Change
  http://www.ipcc.ch
- United States Environmental Protection Agency
  http://www.epa.gov/climatechange/
- City of Seattle U.S. Mayors Climate Protection Agreement
  http://www.seattle.gov/mayor/climate/
- Mayors for Climate Protection
  http://www..coolmayors.com
- U.S. Conference of Mayors Climate Protection Web Page
  http://usmayors.org/climateprotection
- Institute for Local Government California Climate Action Network
  http://www.ca-ilg.org/climatechange

STATUTES, REGULATIONS, AND EXECUTIVE ORDERS

- SB 97
  http://opr.ca.gov/ceqa/pdfs/SB_97_bill_20070824_chaptered.pdf
- SB 97 Governor's Signing Message
  http://opr.ca.gov/ceqa/pdfs/SB-97-signing-message.pdf
- AB 32
  http://www.leginfo.ca.gov/pub/05-06/bill/asm/ab_0001-0050/ab_32_bill_20060927_chaptered.pdf
- AB 1493
  http://www.leginfo.ca.gov/pub/01-02/bill/asm/ab_1451-1500/ab_1493_bill_20020722_chaptered.pdf

- Regulations implementing AB 1493

  http://www.arb.ca.gov/regact/grnhsgas/revfro.pdf and http://www.arb.ca.gov/regact/grnhsgas/revtp.pdf

- SB 1368

  http://www.leginfo.ca.gov/pub/05-06/bill/sen/sb_1351-1400/sb_1368_bill_20060929_chaptered.pdf

- Executive Order S-01-07 regarding low carbon standard for transportation fuels

  http://gov.ca.gov/index.php?/executive-order/5172/

- Executive Order S-20-06 regarding implementation of AB 32

  http://gov.ca.gov/index.php?/executive-order/4484/

- Executive Order S-3-05 regarding greenhouse gas goals

  http://gov.ca.gov/index.php?/executive-order/1861/

- Executive Order S-20-04 regarding energy conservation by state

  http://gov.ca.gov/index.php?/executive-order/3360/

REPORTS

- OPR List of Environmental Documents Addressing Climate Change

  http://opr.ca.gov/ceqa/pdfs/Environmental_Assessment_Climate_Change.pdf

- OPR List of Local Plans Addressing Climate Change

  http://opr.ca.gov/ceqa/pdfs/City_and_County_Plans_Addressing_Climate_Change.pdf

- *Climate Action Team Proposed Early Action Measures to Mitigate Climate Change in California*, April 2007

  http://www.climatechange.ca.gov/climate_action_team/reports/2007-04-20_CAT_REPORT.PDF

- California Air Resources Board, *Early Action Items to Mitigate Climate Change in California*, October 2007

  http://www.arb.ca.gov/cc/ccea/meetings/ea_final_report.pdf

- California Air Resourced Board, *Draft Greenhouse Gas Inventory*, November 2007

  http://www.arb.ca.gov/cc/inventory/data/tables/rpt_Inventory_IPCC_All_2007-11-19.pdf

- *Climate Action Team Report to the Governor and Legislature*, March 2006, http://www.climatechange.ca.gov/climate_action_team/reports/index.html

- California Climate Change Center, *Our Changing Planet: Assessing the Risks to California - Summary Report*

  http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF

  Detailed reports available at: http://www.climatechange.ca.gov/biennial_reports/2006report/index.html

- California Energy Commission, *2007 Integrated Energy Policy Report Update*

  http://www.energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CMF.PDF

- California Department of Water Resources, *Progress on Incorporating Climate Change into Management of California's Water Resources*

  http://baydeltaoffice.water.ca.gov/climatechange/DWRClimateChangeJuly06.pdf - pagemode=bookmarks&page=1

- *Climate Action Program at Caltrans*, December 2006

  http://www.dot.ca.gov/docs/ClimateReport.pdf

- California Air Pollution Control Officers Association, *CEQA & Climate Change,* January 2008

  http://www.capcoa.org/ceqa/CAPCOA%20White%20Paper%20-%20CEQA%20and%20Climate%20Change.pdf

- West Coast Governors' Global Warming Initiative, November 2004

  http://www.climatechange.ca.gov/westcoast/documents/2004-11_final_report/2004-11-18_STAFF_RECOMMENDS.PDF

- Western Climate Initiative Work Plan, October 2007

  http://www.westernclimateinitiative.org/ewebeditpro/items/O104F13792.pdf

- California Climate Change Center, University of California at Berkeley, *Managing Greenhouse Gas Emissions in California,* 2007

  http://calclimate.berkeley.edu/managing_GHGs_in_CA.html

- U.S. Conference of Mayors, *Energy & Environment Best Practices*

  http://www.usmayors.org/climateprotection/AtlantaEESummitCDROMVersion.pdf

- *U.S. Mayors Climate Protection Agreement Climate Action Handbook*, 2006

  http://www.seattle.gov/climate/docs/ClimateActionHandbook.pdf

- Natural Capitalism Solutions *Climate Protection Manual for Cities*, June 2007

  http://www.climatemanual.org

- National Governor's Association Center for Best Practices *Growing with Less Greenhouse Gases*, November 2002

  http://www.nga.org/cda/files/112002ghg.pdf

- National Governor's Association Center for Best Practices *State and Regional Greenhouse Gas* Initiatives, October 2006

  http://www.nga.org/Files/pdf/0610GREENHOUSE.PDF

- United States Climate Change Program *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States*, May 2008

  http://www.usda.gov/oce/global_change/sap_2007_FinalReport.htm

Attachment 2

Technical Resources/Modeling Tools to Estimate GHG Emissions

TOOL	AVAILABILITY	SCOPE LOCAL/ REGIONAL	SCOPE TRANSPORTATION/ BUILDINGS	DATA INPUT REQUIREMENTS	DATA OUTPUT
URBEMIS	• Download • Public domain (free)	• Local project level	• Transportation • Some building (area source) outputs • Construction	• Land use information • Construction, area source, and transportation assumptions	• CO2 (pounds per day) • Mitigation impacts
Clean Air and Climate Protection (CACP) Software	• Download • Available to public agencies (free)	• Local project level	• Buildings • Communities • Governments	• Energy usage • Waste generation and disposal • Transportation fuel usage or VMT	• CO2e (tons per year)
Sustainable Communities Model (SCM)	• Custom model	• Regional • Scalable to site level	• Transportation • Buildings • Neighborhoods • Master planned communities	• Location and site specific information • Transportation assumptions • On-site energy usage	• CO2e (tons per year)
Internet-accessed Planning for Community Energy, Economic and Environmental Sustainability I-PLACE^{3}S	• Web-based • Small access fee • Full model now available in eight CA counties	• Regional • Scalable to site level	• Transportation • Housing • Land Use • Buildings • Energy • Economics	• Parcel level land use data (ability to work with less data) • Project-level data for alternative comparisons	• CO2 (any quantity over any time)
Climate Action Registry Reporting On-Line Tool (CARROT)	• Web-based • Available to Registry members • General public can view entity reports	• Regional, scalable to entity and facility level	• General Reporting and Certification Protocols o Transportation o Buildings/facilities • Specific protocols for some sectors	• Mobile source combustion (VMT or fuel usage) • Stationary combustion (fuel usage) • Indirect emissions (electricity usage)	• Each GHG and CO2e (tons per year)
EMFAC	• Download • Public domain (free)	• Statewide • Regional (air basin level)	• Transportation emission factors	• Travel activity data to calculate CO2 from projects.	• CO2 and methane (grams per mile) emission factors

VMT = Vehicle miles traveled
eCO2 = Carbon dioxide equivalent emissions
Note: This is not meant to be a definitive list of modeling tools to estimate climate change emissions impacts. Other tools may be available.

Description of Modeling Tools

URBEMIS

The Urban Emissions Model is used extensively during the CEQA process by local air districts and consultants to determine the impacts of projects on criteria pollutants. It was recently updated to calculate CO2 emissions as well. Future updates will include additional greenhouse gases. URBEMIS uses the ITE Trip Generation Rate Manual and the Air Resources Board's (ARB) motor vehicle emissions model (EMFAC) to calculate transportation-related CO2 emissions and ARB's OFFROAD2007 model for CO2 emissions from off-road equipment. Area source outputs include natural gas use, landscaping equipment, consumer products, architectural coatings, and fireplaces. It also estimates construction impacts and impacts of mitigation options. Web site: http://www.urbemis.com.

Clean Air and Climate Protection (CACP) Software

This tool is available to state and local governments and members of ICLEI, NACAA, NASEO and NARUC to determine greenhouse gas and criteria pollutant emissions from government operations and communities as a whole. The user must input aggregate information about energy (usage), waste (quantity and type generated, disposal method, and methane recovery rate) and transportation (VMT) for community analyses. CACP uses emission factors from EPA, DOE, and DOT to translate the energy, waste and transportation inputs into greenhouse gas (in carbon dioxide equivalents) and criteria air pollutant emissions. If associated energy, waste and transportation reduction are provided, the model can also calculate emission reductions and money saved from policy alternatives. Web site: http://cacpsoftware.org.

Sustainable Communities Model (SCM)

This model quantifies total CO2e emissions allowing communities the ability to optimize planning decisions that result in the greatest environmental benefit for the least cost. Total CO2e emissions are based on emissions from energy usage, water consumption and transportation. The model provides an interactive comparison of various scenarios to provide environmental performance, economic performance, and cost benefit analysis.

Web site: www.ctg-net.com/energetics/documents/doc_SCM_070731.pdf

I-PLACE^{3}S

This model is an internet-accessed land use and transportation model designed specifically for regional and local governments to help understand how their growth and development decisions can contribute to improved sustainability. It estimates CO2, criteria pollutant and energy impacts on a neighborhood or

regional level for existing, long-term baseline and alternative land use plans. The data input requirements are extensive and require a fiscal commitment from the Metropolitan Planning Organization and its member local governments. Once the data is available, the IPLACES tool can be developed for that region relatively quickly, in approximately one week. The benefits include a multifunctional tool that provides immediate outputs to compare alternatives during public meetings, multilevel password protected on-line access, as well as providing access for local development project CEQA analyses. This tool also supports regional travel models and integrated land use and transportation assessments. Web site: http://www.sacregionblueprint.org/sacregionblueprint/the_project/technology.cfm and http://www.places.energy.ca.gov/places

CARROT

The California Climate Action Registry offers the Climate Action Registry Reporting On-Line Tool (CARROT) for Registry members to calculate and report annual greenhouse gas (GHG) emissions. CARROT calculates direct and indirect GHG emissions for the following emission categories by source: stationary combustion, process emissions, mobile source combustion, fugitive emissions and electricity use by source. It calculates emissions using entity collected data such as fuel purchase records, VMT and utility bills. While reporting and certification through CARROT is only available to members, the public may access entity reports online. Reporting protocols are also available to the public, including the General Reporting Protocol (www.climateregistry.org/docs/PROTOCOLS/GRP%20V2-March2007_web.pdf) and cement, forestry and power/utility sector protocols. Additional sector protocols are under development. Website: www.climateregistry.org/CARROT/

EMFAC

The Air Resources Board's EMission FACtors (EMFAC) model is used to calculate emission rates from all motor vehicles in California. The emission factors are combined with data on vehicle activity (miles traveled and average speeds) to assess emission impacts. The URBEMIS model described above uses EMFAC to calculate the transportation emission impacts of local projects. Web site: http://www.arb.ca.gov/msei/onroad/onroad.htm

Attachment 3

Examples of GHG Reduction Measures

The following are examples of measures that have been employed by some public agencies to reduce greenhouse gas emissions, either as general development policies or on a project-by-project basis. These are provided for illustrative purposes only.

LAND USE AND TRANSPORTATION

- Implement land use strategies to encourage jobs/housing proximity, promote transit-oriented development, and encourage high density development along transit corridors. Encourage compact, mixed-use projects, forming urban villages designed to maximize affordable housing and encourage walking, bicycling and the use of public transit systems.
- Encourage infill, redevelopment, and higher density development, whether in incorporated or unincorporated settings
- Encourage new developments to integrate housing, civic and retail amenities (jobs, schools, parks, shopping opportunities) to help reduce VMT resulting from discretionary automobile trips.
- Apply advanced technology systems and management strategies to improve operational efficiency of transportation systems and movement of people, goods and services.
- Incorporate features into project design that would accommodate the supply of frequent, reliable and convenient public transit.
- Implement street improvements that are designed to relieve pressure on a region's most congested roadways and intersections.
- Limit idling time for commercial vehicles, including delivery and construction vehicles.

URBAN FORESTRY

- Plant trees and vegetation near structures to shade buildings and reduce energy requirements for heating/cooling.
- Preserve or replace onsite trees (that are removed due to development) as a means of providing carbon storage.

GREEN BUILDINGS

- Encourage public and private construction of LEED (Leadership in Energy and Environmental Design) certified (or equivalent) buildings.

ENERGY CONSERVATION POLICIES AND ACTIONS

- Recognize and promote energy saving measures beyond Title 24 requirements for residential and commercial projects
- Where feasible, include in new buildings facilities to support the use of low/zero carbon fueled vehicles, such as the charging of electric vehicles from green electricity sources.
- Educate the public, schools, other jurisdictions, professional associations, business and industry about reducing GHG emissions.
- Replace traffic lights, street lights, and other electrical uses to energy efficient bulbs and appliances.
- Purchase Energy Star equipment and appliances for public agency use.
- Incorporate on-site renewable energy production, including installation of photovoltaic cells or other solar options.
- Execute an Energy Savings Performance Contract with a private entity to retrofit public buildings. This type of contract allows the private entity to fund all energy improvements in exchange for a share of the energy savings over a period of time.
- Design, build, and operate schools that meet the Collaborative for High Performance Schools (CHPS) best practices.
- Retrofit municipal water and wastewater systems with energy efficient motors, pumps and other equipment, and recover wastewater treatment methane for energy production.
- Convert landfill gas into energy sources for use in fueling vehicles, operating equipment, and heating buildings.
- Purchase government vehicles and buses that use alternatives fuels or technology, such as electric hybrids, biodiesel, and ethanol. Where feasible, require fleet vehicles to be low emission vehicles. Promote the use of these vehicles in the general community.
- Offer government incentives to private businesses for developing buildings with energy and water efficient features and recycled materials. The incentives can include expedited plan checks and reduced permit fees.
- Offer rebates and low-interest loans to residents that make energy-saving improvements on their homes.

- Create bicycle lanes and walking paths directed to the location of schools, parks and other destination points.

PROGRAMS TO REDUCE VEHICLE MILES TRAVELED

- Offer government employees financial incentives to carpool, use public transportation, or use other modes of travel for daily commutes.
- Encourage large businesses to develop commute trip reduction plans that encourage employees who commute alone to consider alternative transportation modes.
- Develop shuttle systems around business district parking garages to reduce congestion and create shorter commutes.
- Create an online ridesharing program that matches potential carpoolers immediately through email.
- Develop a Safe Routes to School program that allows and promotes bicycling and walking to school.

PROGRAMS TO REDUCE SOLID WASTE

- Create incentives to increase recycling and reduce generation of solid waste by residential users.
- Implement a Construction and Demolition Waste Recycling Ordinance to reduce the solid waste created by new development.
- Add residential/commercial food waste collection to existing greenwaste collection programs.