



**U.S. Department of Energy/Placer County Biomass Utilization Pilot Project  
DE-FG36-08GO88026  
Phase I Report**

# **New Source Review Permit Analysis Task 6.0**

Prepared for:  
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## 1.0 Introduction

This sixth task (Task 6.0) of the U.S. Department of Energy (DOE) award No. DE-FG36-08GO88026 is to study the New Source Review (NSR) permit issues for the successful deployment of a 1 to 3 megawatt woody biomass fueled bio-energy facility in the Lake Tahoe Region (LTR). Such a facility is critical to serving the hazardous forest fuels reduction programs in the LTR in future years.

The following Tasks and Subtasks were agreed to by Placer County and the DOE in 2008 for the scope of this report. The agreed upon tasks were modified in 2011 to reflect a change from the original project site of Kings Beach, CA which was within the Lake Tahoe Basin (LTB) to the alternative site located within the Eastern Regional Landfill (ERL) (now inactive and a.k.a. Cabin Creek) area just outside the LTB by the Placer County Board of Supervisors. The reason for the site location change was due to the generation of noise levels above ambient levels that could not be adequately mitigated at the Kings Beach Location. The analyses were accomplished for both sites and therefore have been presented in this report for documentation purposes.

The NSR permit issues analysis consists of several subtasks as outlined below (as agreed to in DOE approved work plan):

Subtask 6.1 (Section 2.0) – The Placer County Air Pollution Control District (PCAPCD), the agency responsible for air emissions from the woody biomass facility operations under federal law, will perform an engineering analysis which will include a compliance review of both the equipment (the facility and the fuel handling equipment) and emissions to any applicable federal, state, or local air pollution rules, regulations, or laws. The review will include a Best Available Control Technology (BACT) analysis, the determination of required offsets, and the review of air dispersion and risk assessment modeling.

Subtask 6.2 (Section 3.0) – If the offset of emission increases of the facility are required, then emission reductions credits must be identified in sufficient quantity. The source of emission reductions must meet the criteria of being real, quantifiable, enforceable, permanent and surplus. Task 1.0 “Air/Water Emissions and Carbon Credits/Emission Offsets Study” will provide information regarding avoided emissions as well as information to demonstrate that the criteria are met. PCAPCD will assist in the quantification of emission reductions to be garnered from avoided emissions based on the study information and adopted protocols and methods, and seek U.S. Environmental Protection Agency (EPA) and California Air Resources Board (CARB) approval.

PCAPCD has performed several sets of analyses for the DOE project and contributed to the Task 1.0 report “Air/Water Emissions and Carbon Credits/Emissions Offsets” report previously submitted. This report utilizes the findings of this report.

In summary, the proposed biomass facility of 2 MW capacity, at either of the LTR locations being considered -- Kings Beach or Cabin Creek – is projected to meet all PCPACD (and Tahoe Regional Planning Agency (TRPA) for the Kings Beach location)) air permitting requirements:

- Best Available Control Technology. The biomass facility will utilize BACT for the control of criteria air pollutants.
- Emission Offsets. Emission offsets are projected to be required only in the case of a combustion-based system for NOx at the Kings Beach siting location, as a result of TRPA mitigation requirements. Offsets requirements could be satisfied through the utilization of biomass wastes that would have otherwise, without the LTR biomass operations, been open pile burned inside the Lake Tahoe Basin.
- Air Toxics. A detailed risk assessment shows that at both sites, potential risks are significantly below acceptable screening thresholds.

## 2.0 Analysis of Equipment and Emissions

Engineering analyses were performed on the proposed biomass conversion equipment and emissions limit values of both potential agencies ; PCAPCD and TRPA

### 2.1 System Performance and Requirements

Biomass energy conversion systems (BECS) are being considered from three supplier vendors for the LTR project at this time -- Envio Energy, Phoenix Energy, and Nexterra. They each have been evaluated for preliminary compliance with NSR permitting requirements. BECS evaluated were assumed to each have a 2 MW electricity production rated capacity.

Two different potential project siting locations were considered -- Kings Beach (KB) and the Cabin Creek (CC) location within the Placer County ERL:

- CC operations will need to meet PCAPCD requirements. CC is located in the Mountain Counties Air Basin (MCAB). This is designated as non-attainment with the National Ambient Air Quality Standard (NAAQS) for ozone at this time, thus the BECS will need to meet specific NOx and VOC limitations.
- The KB site is located in the Tahoe Air Basin. The KB operation will need to meet PCAPCD requirements. The Tahoe Air Basin is in attainment with all NAAQS at this time. The KB operation will also need to meet the separate air permitting requirements of the TRPA.

Table 1 summarizes the results of the preliminary NSR. It includes:

- Air pollutant emissions levels from each of the BECS – both in tons/year and as emission factors (g/hp-hr or grains/dscf). The data are based on vendor-supplied data, projections from emissions factors from similar controlled systems, and/or engineering estimates.
- Permitting thresholds triggering requirements for the use of BACT.
- Permitting thresholds triggering the requirement for emissions offsets (emission reduction credits or ERC's). The KB location is in the Lake Tahoe Air Basin that is in attainment with all NAAQS, thus emissions offsets are not required under District rules. However, emission offsets may be required to meet local TRPA regulations for the KB location. The CC location is in the MCAB, which is in non-attainment with the ozone NAAQS, thus emission offset credits for NOx and VOC are required by the PCAPCD in the cases where BECS emissions levels are above the NOx and VOC thresholds. The CC location is not subject to TRPA regulations.
- Air pollution control methods used by the BECS.

- BACT for the BECS. The determination of BACT is based on a preliminary review of the performance of similar systems -- biomass energy conversion systems in the size range of the BECS (2 MW electric).

## **2.2 BACT**

It is projected that each of the BECS will use BACT or equivalent.

- For the Envio combustion system, this will likely include the use of a baghouse or equivalent for PM control, selective-non catalytic reduction for NOx control, and combustion controls (supply of sufficient combustion air, and air/fuel mixing and staging) for VOC and CO.
- For the Nexterra and Phoenix gasifier systems, this will include a scrubber or equivalent for PM control, catalytic control for NOx (selective catalytic for fuel lean IC engines, and three-way catalyst for rich burn IC engines), and IC engine air/fuel controls for VOC and CO.

The following pollutant-specific BACT requirements are based on a comparison of system emissions levels with the applicable BACT thresholds:

- NOx. BACT is required for all BECS at both locations. Projected BECS emissions are all above the applicable BACT NOx thresholds.
- PM. BACT is required for all BECS at KB. BACT is not required for any BECS at ERL. The BACT PM threshold for the CC location (PCAPCD & MCAB) is higher than for KB (TRPA).
- VOC. BACT is required for both the Phoenix and Nexterra systems at both locations.
- CO. BACT is required for all BECS at KB. BACT is not required for any of BECS at CC.

## **2.3 Emissions Offsets**

The Phoenix and Nexterra BECS are not projected to require offsets for either site location. Projected Phoenix and Nexterra BECS emissions are below the offset thresholds for both the CC (PCAPCD & MCAB) and KB (TRPA).

For the Envio Energy BECS, emissions offsets are projected to be required for NOx at KB. Envio Energy NOx emissions are higher than the TRPA offset threshold.

## **2.4 Air Toxics Risk Assessment**

A detailed air toxics risk assessment has been conducted for both site locations and is located in the DOE Final Report "Analysis of Public Health Risks Associated with Operation of a Biomass Power Plant" September 7, 2011 Placer County. Air toxics emission factor data has been taken from similar biomass energy conversion facilities. Air dispersion analysis has been conducted using the latest available models. Preliminary results indicate risk levels that fall below District screening levels.

Table 1. New Source Review Evaluation

	NOx	PM <sub>10</sub>	VOC	CO
Biomass Energy Plant (2 MW)				
Emission Control				
Nexterra	Lean Burn Engine, Selective Catalytic Reduction	Tar Cracker, Wet Scrubbing	Lean Burn Engine	Lean Burn Engine
Phoenix	Rich Burn Engine, Three way Catalytic Converter	Down Draft Gasifier, Wet Scrubbing	Rich Burn Engine, Three way Catalytic Converter	Rich Burn Engine, Three way Catalytic Converter
Envio	Staged Controlled Air Combustion, Selective Non-catalytic Reduction	Baghouse	Combustion Control	Combustion Control
Emissions (tons/year)				
Nexterra	2.1	2.4	11.8	26.5
Phoenix	2.6	1.2	2.6	13.4
Envio	9.1	2.2	1.0	22.6
Emissions				
Nexterra (g/hp-hr)	0.09	0.14	0.5	1.2
Phoenix (g/hp-hr)	0.11	0.05	0.11	0.57
Envio (grains/dscf)	0.11	0.01	0.004	0.11
Permitting Requirements				
BACT Threshold (tons/year)				
PCAPCD – CC, KB	1.8	14.6	1.8	100
TRPA – KB	1.2	0.8	3.2	4
Offsets Threshold (tons/year)				
PCAPCD – CC	10	15	10	99
PCAPCD – KB	---	---	---	---
TRPA – KB	4.4	4	22.9	40.2
BACT				
Nexterra	Selective Catalytic Reduction (0.11 g/hp-hr)	Wet Scrubbing (0.1 g/hp-hr)	Engine Combustion Control (0.5 g/hp-hr)	Engine Combustion Control (1.0 g/hp-hr)
Phoenix	Three Way Catalytic Converter (0.11 g/hp-hr)	Wet Scrubbing (0.1 g/hp-hr)	Three Way Catalytic Converter (0.5 g/hp-hr)	Three way Catalytic Converter (1.0 g/hp-hr)
Envio	Selective Non-catalytic Reduction (0.2 lb/MMBtu, 0.1 grains/dscf)	Baghouse (0.01 grains/dscf)	Combustion Control (0.02 grains/dscf)	Combustion Control (0.3 lb/MMBtu, 0.1 grains/dscf)

### 3.0 Potential Offset Emissions Analysis

Emissions estimates for the three BECS indicate that emissions offsets are not needed at the CC location. This is because the BECS emissions are all less than the applicable PCAPCD offset thresholds which apply at the CC location.

For the KB location, emission offsets for NO<sub>x</sub> are projected to be required for the Envio system to meet the TRPA offset threshold. Emission offsets would not be required for PCAPCD permitting because the Tahoe Air Basin is in attainment with all NAAQS. The TRPA NO<sub>x</sub> offset requirement might be met through the BECS use of biomass wastes that were destined for disposal through open pile burning in the Tahoe Basin – as NO<sub>x</sub> emissions are significantly reduced when comparing use of biomass wastes in the BECS with those from open pile burning, as documented in detail in the attached technical journal publication (Attachment No. 1) that was recently prepared by this project team.

Larger projects (> 2 MW electricity) may require offsets. PCAPCD has provided significant upfront support for projects that may require offsets by:

- Working closely with the U.S. EPA Region IX to allow use, in attainment areas, of ERC's derived from the emissions benefits that result due to the avoidance of the open pile burning of biomass wastes, which would be the fate of the majority of the biomass without the proposed biomass project.
- Revising Rule 502, New Source Review, by getting rid of the potential requirement for emissions offsets for projects in the Tahoe Basin, which is in attainment with all NAAQS. Revised Rule 502 is provided in Attachment No. 2.
- Revising Rule 502, New Source Review, by requiring projects in the Placer County portion which is in non-attainment with NAAQS to require emissions offsets to the threshold, as opposed to zero as required by the previous rule.
- Exploring the opportunity to value the full suite of environmental benefits that are provided by the BECS. This includes the significant greenhouse gas benefits that result from the utilization of biomass wastes for renewable energy. In particular, we are evaluating the potential for monetary investment support into the BECS in exchange for the partial ownership claim to greenhouse and criteria air pollutant emission benefits. As an example, a Letter of Intent from an independent oil exploration firm that is interested in supporting biomass operations to mitigate greenhouse gas impacts of their oil operations is included in Attachment No. 3.

Attachment Number 1

Emission Reductions from Woody Biomass Waste for Energy as an Alternative to Open Burning

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Attachment Number 2

Rule 502, New Source Review  
Placer County Air Pollution Control District

Attachment Number 3

Letter of Intent  
Santa Maria Pacific to PCAPCD, Letter dated July 25, 2011