Placer County
AIR POLLUTION CONTROL DISTRICT

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www.placer.ca.gov/apcd Thomas J. Christofk, Air Pollution Control Officer

DOCKET
10-BAP-1
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December 29, 2010

Attn: Jim Boyd, Chair, Bioenergy Interagency Working Group
California Energy Commission
Dockets Office, MS-4
Re: Docket No. 10-BAP-01
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: CEC Docket Number 10-BAP-01 -- "Preparation of the 2011 Bioenergy Action Plan" -- Placer County Air Pollution Control District Comments

Dear Mr. Boyd:

Placer County Air Pollution Control District ("District") appreciates the opportunity to comment on the draft 2011 Bioenergy Action Plan. The District contains significant and highly productive agricultural and forested land, integrated with urban and rural populations. Much of the land within the District is at risk for catastrophic wildfire. Land management activities produce a wide range of biomass wastes, much of which is primarily disposed of through open pile burning. The societal (ecological and economic) value of harvesting biomass and diverting it from its "natural" fate (i.e., burned in the open through either prescribed, unintentional ignition, or natural decomposition) to controlled use to produce energy or wood products is overwhelming, and can be portrayed by the following:

- Production of renewable energy through utilization of woody biomass fuels generated as a by-product of forest management activities, displacing the need for fossil fuels.

- Increase in carbon sequestration through improving forest health which stimulates forest growth, and reducing the intensity and size of forest fires.

- Production of wood products, which have a lower carbon footprint than other comparable building materials (e.g., steel, cement).

- Reduction of the cost of wildfire suppression, and property and resource loss.

- Protection and enhancement of watershed value through improved water quality, water quantity, and timing of flow. This is achieved through maintenance of soil productivity and integrity by reducing soil erosion impacts associated with wildfires.

- Reduction of air pollution -- including criteria (particulate matter, NOx, CO, and VOC's), greenhouse gases, and air toxics -- associated with the open burning of forest biomass and with wildfires. Improvement in air quality, and associated impact on human health and visibility impairment (regional haze).

- Improvement of wildlife habitat (including fisheries habitat) by increasing the forests ability to support more diverse and robust wildlife populations.

- Improvement of recreational and tourist opportunities in the public and private forests.

- Reduction of public and private health care expenditures for treating air quality related health problems stemming from wildfires.

- Creation and retention of jobs in rural communities. A study sponsored by the National Renewable Energy Laboratory[1] found that approximately 4.9 jobs are generated for each megawatt of biopower generated.

Given this portrayal of the societal values of biomass, the District has a strong interest in policy and programs that impact forest and biomass waste management alternatives.

Generally, we support the objectives and actions that are contained in the draft plan. Specifically, we have particular interest in the proposed Action Item 1.4 -- AB 1318 – Wildfire Emissions Offset Credits for PM. We have three suggestions regarding this Action Item:

- It should include the evaluation of Emission Reduction Credits for additional criteria air pollutants including nitrogen oxides (NOx), volatile organic compounds (VOC), and carbon monoxide (CO), and greenhouse gases including carbon dioxide (CO_2) and methane (CH_4). In addition to particulate matter (PM), all of these air emissions may also be substantially reduced through hazardous fuel forest treatment projects which modify wildfire behavior. There are many air districts in California where one or more of these criteria pollutants are lacking ERCs needed for biomass utilization.

- It should reference, build upon, and leverage identical, on-going work being conducted by the U.S. Forest Service and Spatial Informatics Group, which is being funded in part by the District.

[1]Morris, G, The Value of the Benefits of US Biomass Power, National Renewable Energy Laboratory, Golden, CO, November, 1999.

- It should be expanded to include biomass energy projects which utilize biomass waste streams that would have otherwise been open burned due to economic and institutional considerations. The District has sponsored numerous demonstration projects which show significant life-cycle air emission benefits when utilizing biomass waste for energy. The results of one of these projects is attached. The work should utilize and build upon an Emission Reduction Offset protocol for biomass waste energy projects which has been developed by the District, a copy, including letters of support, is attached.

Thank you for considering these comments. Please call me, at (530) 745-2330, with any questions.

Sincerely,

Thomas Christofk
Air Pollution Control Officer

Attachments:

"Forest Biomass Removal on National Forest Lands, First Progress Report," November 17, 2008, prepared for The Sierra Nevada Conservancy, Auburn, CA, prepared by the Placer County Chief Executive Office, Auburn, CA, and TSS Consultants, Rancho Cordova, CA.

Biomass Waste for Energy Project Reporting Protocol, GHG Emission Reduction Accounting, Version 3.1, May 2009, prepared by Placer County Air Pollution Control District.

Letters of support for the Placer County Air Pollution Control District Biomass Waste for Energy Project Reporting Protocol.

FOREST BIOMASS REMOVAL ON NATIONAL FOREST LANDS

First Progress Report

November 17, 2008

Prepared For:
THE SIERRA NEVADA CONSERVANCY
AUBURN, CALIFORNIA

Prepared By:
PLACER COUNTY CHIEF EXECUTIVE OFFICE
AUBURN, CALIFORNIA

And
TSS CONSULTANTS
RANCHO CORDOVA, CALIFORNIA

Funding for this research was provided by the Sierra Nevada Conservancy, Placer County, and the Placer County Air Pollution Control District

Background

This represents the first progress report for grant agreement #G0770005 between the Sierra Nevada Conservancy (SNC) and Placer County. The project grant, "Biomass Removal on National Forest Lands," was proposed and sponsored by Placer County in a partnership with the USDA Forest Service (USFS), Placer County Air Pollution Control District (PCAPCD), and Sierra Pacific Industries (SPI). Representatives from the SNC participated in the implementation planning discussions and the drafting of the communications plan for this project.

The primary objective of the Forest Biomass Removal on National Forest Lands project is the removal of woody biomass waste material from national forests located within the SNC service area. Placer County proposed that the woody biomass material be removed as a byproduct of fuels treatment/timber management activities and that this byproduct is recovered as fuel for renewable energy generation rather than its current fate which is pile and burn or leave on site. The first project sites located near Foresthill, California were chosen to ensure that proposed objectives were met as outlined in the grant proposal:

Specific project sites will receive fuels treatments consistent with existing Land Management Plans for the National Forests and treatments will be implemented with the assistance of USFS and SPI foresters to ensure that projects are targeted to produce lasting effects on the landscape and are accomplished in conjunction with other relevant public and private ecosystem projects that enhance forest and watershed health.

This progress report provides Phase I findings. Phase II of this project is already underway and should be completed by December 2008.

Introduction

Public and private forest lands in Placer County are severely overstocked with very high concentrations of hazardous forest fuels. These hazardous conditions place important natural resources and assets at significant risk, including upland watersheds, human communities and biological communities. To reduce the risk of catastrophic wildfire, forest fuels treatment (e.g., thinning, mastication, prescribed fire) is needed. In many parts of the Sierra Nevada Range, merchantable timber in the form of sawlogs are harvested and transported to local sawmills. Leftover material (slash) in the form of limbs, tops and small stems is piled at a collection point (landing) for eventual disposal through pile burning typically conducted in the late fall. Air pollutant emissions (including CO, NOx, and particulate matter) generated can be significant.

Historically, it has not been economical to utilize this slash because the costs to collect, process and transport are higher than its value as either fuel or wood product (e.g., posts/poles). Slash pile burning is constrained by the limited time of year it can be conducted due to weather conditions, is expensive to conduct (in part because the piles can burn for days), produces large amount of unhealthy air emissions, and pile burn residuals (blackened logs and woody debris) are aesthetically unpleasing. In addition, by limiting the amount of burning taking place in these watersheds, potential impacts such as soil and ash runoff are reduced, thus enhancing water quality while preparing these forested sites for reforestation activities (tree planting). Slash pile burning can also impact soil chemistry, loss of soil organic matter and nitrogenous materials, and potentially, soil mineralogy. There is evidence also suggesting that slash pile burning negatively impacts the viability of seeds and native plants, opening up the possibility of allowing exotic species to invade impacted land.[1]

As a result of commercial harvesting and forest fuels reduction activities, there are numerous existing slash piles located throughout the central sierra National Forests, and many more will be generated from future forest fuels reduction efforts. As an alternative to slash pile burning, the Placer County Team[2] is evaluating the economic costs and environmental benefits of utilizing slash generated in selected regions of Placer County as fuel in a biomass-to-power cogeneration facility.

This demonstration project will take several years to implement. We anticipate evolving the projects to encompass strategies during forest thinning treatments (rather than after as is current practice) that will improve logistical, economic and watershed enhancement possibilities of future forest health operations. We plan to evaluate and monitor selected fuels treatment projects on four national forests during this project:

- Tahoe National Forest
- Plumas National Forest
- Lake Tahoe Basin Management Unit[3]
- Eldorado National Forest

Key metrics that will be analyzed in the evaluation and monitoring process include:

- Economics of woody biomass material collection, processing and transport.
- Performance of the biomass-to-energy recovery boiler (located at SPI Lincoln).
- Net air quality impacts from open pile burning and utilizing woody biomass in a biomass power cogeneration facility, including criteria on? air pollutants and greenhouse gases.
- Potential benefits to watersheds (water quality, wildlife habitat, recreation).
- Mitigation of wildfire behavior.

Findings will be delivered in summary report format as projects are completed.

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[1]Elliot et al. "Vegetation Management in Sensitive Areas of the Lake Tahoe Basin: A Workshop to Evaluate Risks and Advance Existing Strategies and Practices." March-April 2008.
[2]Staff from Placer County, Placer County Air Pollution Control District, and TSS Consultants.
[3]Not part of the Sierra Nevada Conservancy boundary.

Phase I SSO/BFP Project Description

The first project implemented in this research study was located on the Tahoe National Forest, American River Ranger District near Foresthill, California. This location was chosen for several reasons, including the fact that it is in the American River watershed. Woody biomass waste material generated as a result of two timber harvest projects (SSO Stewardship Project and Big Reservoir Timber Sale) was collected, processed and transported to the Sierra Pacific Industries (SPI) power cogeneration facility located at Lincoln, California. Originally these USFS stewardship contracts were awarded and implemented in 2007, at which time it was not economical to remove the byproducts (limbs, tops small stems) generated. In the course of this Phase I implementation, approximately 16 piles were removed.

Figure 1 highlights the approximate locations of the projects and the SPI facility.

Figure 1. Location of SSO/BFP Projects and SPI Lincoln Facility

Exhibit 1 is an image of a typical slash pile on the BFP Project.

Exhibit 1. Slash Pile at the BFP Project

In order to better forecast the volume and type of recoverable woody biomass material that will be generated during timber harvest activities a general understanding of the timber sale and forest fuels reduction project is important. Outlined below are brief project overviews for each timber harvest project where slash piles were processed and removed as biomass fuel.

SSO Stewardship Project Overview

The objective of the SSO Stewardship Project was to improve tree health, reduce hazardous fuels and enhance wildlife habitat by thinning overcrowded forest stands.

Treated Acreage: 1,309 acres.

Sawlog Volume Removed: 8,500 MBF.[4]

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[4]MBF is an industry standard unit of measure that equals approximately one thousand board feet. One board foot is a board that measures 12" wide by 12" long and 1" thick.

Stand Conditions – Pre Treatment: The forest stands were overcrowded and trees were weakened. Densities greater than 200-400 trees per acre were common and insect infestations were on the rise.

Targeted Stand Conditions – Post Treatment: 70 to 100 trees/acre remaining. Average about 22' to 25' spacing between the largest, healthiest tree.

Harvest Prescription:

- No trees over 20" DBH[5] harvested.
- Selected trees 4" to 20" DBH removed.
- Minimum utilization standard for sawlogs – 10' length, 6" DBH.

BFP Project Overview

The BFP Project fuel reduction and biomass utilization effort was a follow-up treatment to the Big Reservoir Timber Sale. The Big Reservoir Timber Sale commercially thinned Ponderosa pine plantations that were created after the Volcano Fire of 1960.

Treated Acreage: 1,585 acres.

Stand Conditions – Pre Treatment: Overcrowded conditions in contiguous ponderosa pine plantations that were roughly 45 years old. The plantations had closed crowns, high stocking levels, and relatively low species diversity. Stands had from 200-500 trees per acre, basal area ranges from 200 to 400 square feet per acres, and stand diameters ranging from 5 to 18 inches in diameter at breast height.

Targeted Stand Conditions – Post Treatment: Well-spaced, healthy trees with hazardous fuels reduced. Average spacing was 25' between the largest, healthiest trees.

Harvest Prescription:

- No trees over 20" DBH harvested.
- Selected trees 4" to 20" DBH removed.
- Minimum utilization standard for sawlogs – 10' length, 6" DBH.

USFS Plans for Reclaimed Areas

Now that biomass piles have been removed and the landings cleared of woody debris, the USFS will rehabilitate the landings in preparation for planting. Landings and roads will be prepared (tilled) during fall 2008 and readied for planting. Tree planting activities will likely occur late spring 2009. Genetically superior tree seedlings grown from local seed sources will be planted. In this way the USFS will be able to reestablish fast-growing

[5]Diameter at breast height (4.5' up bole of the tree).

and resilient trees to take advantage of high site lands and thus reestablish a robust and productive forest ecosystem.

Economics of Collection, Processing and Transport

Processing and Transport Methodology

A primary objective of this study was to better understand the logistics and financial costs of woody biomass collection, processing and transport. Current practices include pile burning of this material following one or two years of drying. Financial costs to burn are relatively low with US Forest Service estimates at $500 per pile (can be considerably higher if smoldering piles require supervision for an extended period of time). An alternative fate for this material is to process the piles into woody biomass fuel suitable for use as fuel in a biomass power generation facility. Typically this fuel is collected using excavators or rubber-tired loaders, processed using portable grinders, and transported using large capacity trailers (i.e., chip vans).

SPI retained Brushbuster, Inc., a Foresthill area contractor, to provide processing and transport services on the SSO and BFP projects. Exhibit 2 shows the Brushbuster equipment processing a slash pile on the BFP project.

Slash piles were collected and processed at the landing site, and conveyed directly into chip vans (see Exhibit 2). Collection was accomplished using two Linkbelt excavators and processing was performed using a Bandit Beast horizontal grinder with a rated production of approximately 60 green tons / hr (about 2.5 loads per hour). Slash material was collected and transported from the pile to the grinder utilizing the excavator type equipment. Two excavators were required for the Phase I work due in part to the fact that slash piles were arranged for burning and not for processing. If the slash piles had been created so that slash was stacked and not pushed (into piles) then only one excavator would likely have been required.[6] See Observations section of this report (below) for more information regarding methods to create piles that are more efficient to collect and process. The processed slash was conveyed directly from the grinder into chip vans and transported 60 miles (one way) to the SPI Lincoln biomass power generation facility. Chip vans have a loaded net capacity of about 25 green tons.

[6]Discussions with Ben Wing, Brushbuster, Inc.

Exhibit 2. Brushbuster Processing Equipment and Chip Truck – BFP Project

Table 1 lists the equipment utilized to collect, process, and transport biomass fuel to the SPI Lincoln facility.

Table 1. Equipment Utilized to Process and Transport Biomass Fuel to SPI Lincoln

EQUIPMENT	VENDOR/MODEL/YEAR	ENGINE	FUEL USAGE
Horizontal Grinder	Bandit Beast - 2008	Caterpillar 3680	30 gallons/hour
Excavator Loader	Linkbelt Model 290 - 2003	Isuzu	5 gallons/hour
Excavator Loader	Linkbelt Model 135 - 2003	Isuzu	2.6 gallons/hour
Truck/Chip Van	Kenworth - 1997	Cummins N14	4.5 miles/gallon
Truck/Chip Van	Kenworth - 1997	Cummins N14	4.5 miles/gallon
Truck/Chip Van	Kenworth - 2006	Caterpillar C 13	4.5 miles/gallon
Water Truck (dust control)	Ford Model L9000 - 1995	Detroit Series 60	6 miles/gallon
Truck/Low Bed	Kenworth - 2003	Caterpillar C 15	4.5 miles/gallon
Truck – Crew Transport	Ford F 250 - 2003	7.3 liter Powerstroke	14 miles/gallon
Service Truck	Ford F 350 - 2000	7.3 liter Powerstroke	13 miles/gallon

Collection, Processing and Transport Costs

There are numerous opportunities throughout the Sierra Nevada Range to recover and utilize woody biomass material. However, the financial costs are generally much higher than the current market value of the wood fuel delivered to biomass power generation facilities. Findings from our Phase I analysis confirm this hypothesis. The financial costs to collect, process and transport biomass fuel from the SSO and BFP project sites to a biomass power generation facility were significantly higher than the current market value. Total costs (see Table 2) amount to approximately $58.43/bone dry ton[7] (BDT). Current market value of biomass fuel sourced from timber harvest residuals in the central Sierra Nevada region is about $30/BDT.

Table 2 summarizes the findings from 45 days of operational data as provided by Brushbuster, Inc. See Appendix C for the full dataset of daily production rates and operating performance.

Table 2. Financial Cost Estimate for Collection, Processing and Transport 4/14/08 to 7/24/08

EQUIPMENT	$/OPERATING HOUR	AVERAGE OPERATING HOURS/DAY	COST $/BDT[8]
Grinder – Bandit Beast	$400	4	$17.19
Excavator – Linkbelt 135	$125	3.7	$4.97
Excavator – Linkbelt 290	$150	3.7	$5.96
Chip Truck - Kenworth	$85	9	$27.13
Water Truck – Ford L9000	$60	3	$1.93
Service Truck – Ford F 350	$25	2	$0.54
Crew Truck – Ford F 250	$20	2	$0.43
Low Bed – Kenworth	$100	.27[9]	$0.29
TOTAL			**$58.43**

Additional Data Generated

Progress on-site was measured by the amount of biomass collected, processed, transported, and utilized as fuel at the biomass power generation facility (SPI – Lincoln). Phase I operations provided the empirical evidence of the potential baseline performance of a contractor on a site with similar conditions as the site studied. During Phase I, approximately 7,080 green tons of biomass were collected, processed, and transported. Given the moisture content of the fuel (41%), it was estimated that this was the

[7]Bone dry ton (BDT) equals 2,000 pounds of wood fiber at zero percent moisture. BDT is a common unit of measure in the biomass power generation market sector.
[8]Reported cost per bone dry ton is on the basis of daily average production rate which is reported in bone dry tons per day.
[9]Lowbed truck was utilized for a total of 12 hours to transport grinder and both excavators.

equivalent of 4,191 bone dry tons. Each truck that removed biomass from the site carried an average of 23.9 green tons, or 14.1 bone dry tons. On a daily basis, 93.1 bone dry tons of biomass were removed from the site and transported to the biomass power generation facility.

The fuel that was processed and delivered to the generation facility was generally of good quality. Laboratory tests of the material collected indicated that the fuel which was processed and delivered had a higher heating value (HHV) with a range of 8,589 Btu per dry pound to 9,957 Btu[10] per dry pound. Of the samples that were tested, the average HHV reported was approximately 9,000 Btu per dry pound. When considering the financial costs of collection, processing, and transport, the average cost of this fuel (delivered to SPI – Lincoln) expressed as cost per unit measure of heating value is $3.25M per million Btu.[11]

Future Optimization

As a result of implementing Phase I, it became quite clear that there are opportunities to improve the efficiencies and drive down the associated expenses. Plans are to work with the contractors involved in Phases II + to test methods that will ultimately improve the economics of these biomass utilization operations. See Observations section for specific recommendations regarding operational efficiencies.

SPI Lincoln Boiler Operating Performance

The SPI – Lincoln sawmill facility includes a wood-fired boiler that produces steam for on-site use. The steam is utilized to provide process steam to support the lumber drying process (dry kilns), and in a steam turbine to produce approximately 18 MW of electricity. The boiler, a McBurney stoker grate design, was installed in 2005 and has a firing rate capacity of 300 MMBtu/hour. The boiler is fueled by biomass waste including: (1) lumber mill wood wastes generated on site; (2) agricultural wastes, including nut shells and orchard removals/prunings; and (3) woody wastes from timber operations. The boiler uses Selective Non-Catalytic Reduction for NOx control and multiclones, followed by an electrostatic precipitator (ESP), for particulate control. The cogeneration plant is shown in Exhibit 3. The net boiler heat rate is 16,145 Btu/kWhe, translating to a net efficiency of 22%.

[10]British Thermal Unit – the quantity of heat required to raise the temperature of one pound of water from 60 degrees to 61 degrees Fahrenheit at a constant pressure of one atmosphere.
[11]Million British Thermal units (MMBtu) per hour. This is a common unit of measure used to convey the relative amount of thermal energy produced.

Exhibit 3. SPI – Lincoln Biomass-Fired Cogeneration Plant

The SPI Lincoln boiler produced 4,652 megawatt hours of electricity (MWhe) from the 4,191 BDT of biomass removed by the SSO/BFP projects, as shown in Table 3. This electricity is the equivalent of the annual consumption of approximately 517 single family households.

Table 3. SPI Boiler Performance

Chipped Material Moved to SPI – Lincoln	
Chip van loads	297
Bone dry tons	4,191
Green tons	7,089
Chip Heating Value (Btu/lb, dry pound)	8,700
Total Energy from Chipped Biomass (MMBtu)	72,923
SPI – Lincoln Boiler Firing Rate (MMBtu/hr)	300
Equivalent Boiler Operating Time on Biomass	
hour	243
days	10.1
SPI – Lincoln Boiler Efficiency (%)	22
Electricity Production from Biomass (MWhe)	4652.5

Air Quality Impacts – Criteria Air Pollutant Emissions

Open Pile Burning

Under historical, "baseline as usual" operations, criteria air pollutant emissions that would have resulted from open pile burning of the forest slash are listed below and detailed in Table 4:

- CO (carbon monoxide)
- NO_x (nitrogen oxides)
- PM_{10} (particulate matter, diameter less than 10 microns)
- NMOC (non-methane organic hydrocarbons)

Table 4. Emissions Summary – Criteria Air Pollutants

	PM10	NOx	CO	NMOC
Baseline, Business as Usual				
Open Pile Burn (lb)	106,335	28,356	1,063,350	106,335
Biomass to Energy				
SPI – Lincoln Boiler (lb)	1,338	8,921	12,744	299
Transport (lb)	32	1,335	3,140	39
Chipping (lb)	1,632	829	874	26
TOTAL (lb)	3,002	11,084	16,759	365
Reduction (tons)	51.7	8.6	523.3	53.0
% Reduction	97.2	60.9	98.4	99.7

Emission factors (EF) used for open slash pile burning are provided in Appendix A.

Utilizing Woody Biomass in a Biomass Power Generation Facility

As an alternative to open pile burning, criteria air pollutant emissions from collection, processing, transport, and use of biomass slash to energy, as conducted in this program, are also shown in Table 4. Sources of emissions include:

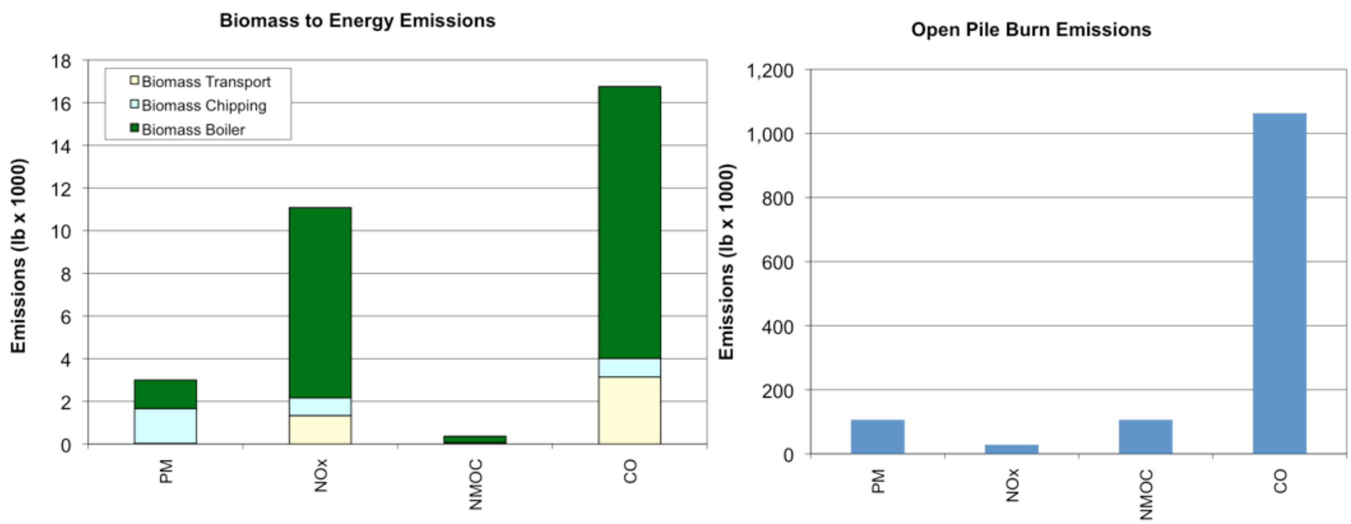
- Diesel engines on grinder and loaders.
- Diesel engines on chip van transports.
- Dust from grinding operation.
- Dust from vehicle travel on dirt roads.
- Biomass-to-energy plant.

Factors used for these sources of emissions are also provided in Appendix A.

As highlighted in Figure 2, using forest slash for energy provides significant reductions in all criteria pollutants:

- PM10 – Reduced by 97.1% (51.7 tons). This is the equivalent of the yearly output of 3,447 residential wood burning appliances.
- NOx – Reduced by 60.1% (8.6 tons).
- CO – Reduced by 98.4% (523 tons).
- NMOC – Reduced by 99.7% (53 tons).

Figure 2. Criteria Air Pollutant Emissions Comparison Between Open Pile Burn and Biomass-to-Energy Operations



Air Quality Impacts – Greenhouse Gases

Table 5 shows the greenhouse gas (GHG) reductions achieved by using the forest slash for biomass to energy.

Table 5. Emission Summary – Greenhouse Gases

Baseline, Business as Usual	
Open burning	
CH_4 (tons)	18
CO_2e[12] (tons)	372
Displaced grid electricity (tons)	2,003
Biomass to Energy	
Biomass power plant	
CH_4 (tons)	0.4
CO_2e (CH_4*25) (tons)	9
Chipping	
Fuel (gallons)	6,623
CO_2 (tons)	73
Transport	
Travel (miles)	35,640
Fuel (gallons)	7,920
CO_2 (tons)	87
Net Reduction	
CO_2 Cost Effectiveness ($/ton)	38
CO_2e (tons)	**2,205**
CO_2e reduction per BDT biomass (ton CO_2e/ton biomass)	**0.526**

Reductions are determined as the difference of:

- Baseline, business as usual. GHG emissions are associated with:
  - Open pile burning. Accounts for CH_4 that is released from open pile burning. The CH_4 EF is shown in Appendix A.
  - Electricity from the existing grid (from associated fossil fuel combustion) displaced by that produced from the waste biomass fuel. An existing electricity grid EF of 861 lb CO_2 / MWhe is used (taken from that used by the California Air Resources Board AB32 Scoping Plan).
- Biomass to energy. GHG emissions associated with:
  - Biomass power plant. Accounts for CH_4 released from the combustion of biomass in the power plant boiler. The CH_4 EF is shown in Appendix A.

[12] CO_2e is determined by using the global warming potential of CH_4. The GWP of CH_4 utilized in this model is 21 tons CO_2e/ton CH_4.

- Collection, Processing and Transport. Accounts for CO_2 produced from diesel fuel combustion from engines on grinder, loader, and chip van transport operations.

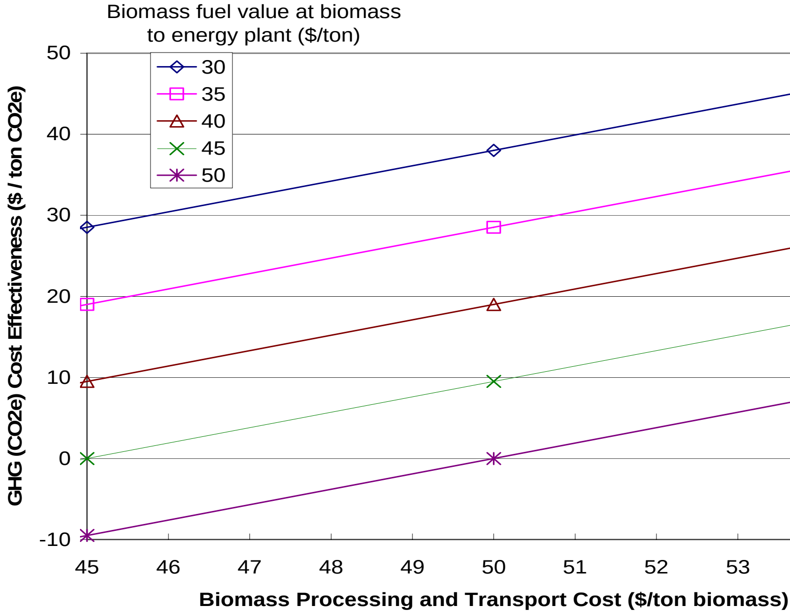
An overall reduction of 2,205 tons of GHG is achieved from the biomass-to-energy operations. Based on an assumption that an average passenger vehicle emits 5.75 tons of CO_2e per vehicle per year,[13] this overall reduction is equivalent to removing approximately 380 vehicles off the road.

The project team is in the process of developing a formal biomass waste-to-energy GHG protocol for official issuance of GHG offset credits from these types of projects. The protocol will be based on the data gathering and calculations presented from this forest biomass waster recovery and utilization program.

The cost effectiveness of CO_2 reductions is shown as a function of biomass fuel value at the energy recovery plant and collection/processing/transport costs (see Figure 3). Cost effectiveness is the measure of the projected cost to remove or avoid GHG emissions as a function of the fuel value and collection/processing/transport costs. As a result of this analysis based on the data generated at the SSO project, a lower cost effectiveness would indicate that a project would have to generate fewer funds in order to make the project economical to avoid GHG emissions. If cost effectiveness is zero or negative, this indicates that the project is economical without consideration of GHG, and thus the project avoids emissions without any additional incentive.

[13] http://www.epa.gov/otaq/climate/420f05004.htm, accessed October 23, 2008.

Figure 3. GHG Reduction Cost Effectiveness as a Function of Biomass Fuel Value and Biomass Waste Collection, Processing, and Transport Cost



Potential Benefits to Watersheds

Exhibit 4 shows a typical slash pile along with the before and after images of treatment (processing and removal) on the SSO project.

Exhibit 4. Slash Pile at SSO Project Near Foresthill, California

Before Treatment

After Treatment

Natural resource managers have found that treating hazardous forest fuels in the upland watersheds of California provides numerous societal benefits. For example, the hydrologic response following fuels treatment activities indicates that there is a net increase in water yield if the forest stand density (basal area) is reduced at least 20 percent.[14]

While increasing the water yield in selected watersheds is important, so too is the net improvement in overall forest health as a result of treating unnaturally high concentrations of forest fuels. Watersheds are more fire resilient following landscape level vegetation management activities, helping to mitigate the propensity for catastrophic wildfire events. History has shown that watersheds which experience high intensity wildfire events are likely to experience significant water quality degradation from the accelerated erosion and deposition of organic carbon, ash, and sediment.

In some cases wildfire events will severely impact watersheds for decades. The Buffalo Creek Fire (1996) and Hayman Fire (2002) consumed almost 150,000 acres in the domestic watershed for the City of Denver. Due to the severe degradation and increased erosion, the Denver Water Board is estimating that sediment removal operations for the Strontia Springs and Cheesman Reservoirs will cost approximately 31 million dollars.[15] In direct response to the issue of wildfire defensible watersheds, the Colorado State

[14]C.A. Troendle et al. *The Herger-Feinstein Quincy Library Group Project Impacts of Vegetation Management on Water Yield,* May, 2007.
[15]Interview with Chips Barry, Denver Water Manager. Denver Post, April 11, 2008 editorial.

legislature has sponsored a bill authorizing the Colorado Water Resources and Power Development Authorities to issue bonds to initiate forest health improvement projects.

While much of the information available regarding the benefits of forest fuels reduction to the health of watersheds is anecdotal, there are some recent studies underway that are structured to monitor watershed impacts in the central Sierra Nevada Range. The Sierra Nevada Adaptive Management Project (SNAMP) is currently seeking full funding and will likely be implemented. This project will include research sites in the headwaters of the North Fork of the Middle Fork of the American River. The research team anticipates that all instrumentation should be installed and operational by the end of 2008.[16] Current study plan indicates that this research project will take about seven years to implement.

Key factors relative to watershed health to be monitored in the SNAMP research include:

- Timing and magnitude of both peak flows and overall flow regime.
- Changes in water cycle affecting water quality.
- Soil disturbance (may affect terrestrial and aquatic flora/fauna and water resources for downstream users).

Exhibit 5 provides an image of one of the tributaries to the Middle Fork of the American River.

Exhibit 5. Sugar Pine Dam and Shirttail Creek Watershed Near Foresthill, California

[16]Sierra Nevada Adaptive Management Plan, Field Protocol and Study Plan Water, May, 2008.

Mitigation of Wildfire Behavior

Proactive removal of excess biomass material generated as a result of timber management and forest fuels reduction activities have a significant impact on wildfire behavior. Communities and forest managers throughout the Inland West have employed this tactic to create defensible space to protect lives, property, habitat and forest ecosystems.

Fire officials in Placer County have been very supportive of the SSO/BFP biomass removal project. Luana Dowling, Administration Manager for the Foresthill/Iowa Hill Fire Safe Council, noted:[17]

> *"First I would like to thank you for your help with fuels mitigation in our area, this is never easy and we can use all the help we can get.*
>
> *The removal of these large piles is essential to fire mitigation efforts in the forest. Two of the piles in the area were set fire this summer and had the potential of becoming major forest fires. These piles in our forests are a tinder box waiting to be lit. They seem to attract our young folks as party sites and are easily set ablaze.*
>
> *The cost to extinguish these piles after accidental ignition is substantial. The money and personnel time is quite extensive. Dozers, engine crews, water tenders, and hand crews are needed to pull apart the piles so that they can be put out without the threat of re-ignition."*

See Appendix B for full text of this correspondence.

Observations

As this analysis represents the first of several phases, numerous observations or "lessons learned" should be noted.

Regarding the selection of timber harvest slash piles for processing:

- Best to select piles that are located on fairly flat ground.
- Piles that are more than two years old typically yield low quality wood fuel (low heating value).
- At higher elevations (snow zone), moisture content of the slash will be high following winter. Best to process these piles mid summer (July or later) to allow drying due to the impacts of snow load.
- Piles that have been stacked neatly (not "jack strawed") are easier to manage when feeding grinder. Less equipment time is needed to break down the piles. This may eliminate need for two excavators.

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[17]Correspondence to Placer County, 10/7/2008.

- Piles that are pushed up with a dozer blade will likely have a relatively high amount of dirt which will impact fuel quality (high amount of non-combustible material).
- Develop a set of guidelines that forest managers can utilize when directing contractors to build slash piles.
- Select strategic locations for project implementation so that wildfire mitigation and watershed enhancement opportunities are maximized.

Regarding the efficient collection, processing and transport of biomass fuel:

- Large piles with a minimum amount of slash (e.g., ten truckloads minimum) will allow contractors to amortize mobilization costs over more tons produced. Small piles have fewer tons and thus a higher cost per ton for mobilization into and out of the landing.
- Maximize chipping operations productive machine hours by scheduling trucks so the grinder is continuously operating. Grinding equipment only averaged 4 operational hours per day in Phase I.
- If trucks cannot be scheduled (or are not available) to maximize productive machine hours per day, then alternative strategies should be considered, such as grinding onto the ground and loading out trucks using a rubber-tired loader.

Meetings Conducted and Funds Allocated

Several meetings have been held to discuss this project with stakeholders both at the policy team level and with members of the project team to review project objectives, initial findings and discuss next steps. Field trips to the project site within the Tahoe National Forest have been offered to all stakeholders. A short documentary video has been developed regarding this project and will be made available to the SNC. In addition, meetings have been held with the Tahoe Basin Management Unit and Eldorado National Forest to determine which projects should be accomplished in those forests. To date, no specific projects have been identified, but several in each forest are being studied to determine which sites would be optimum and most strategic.

Each national forest has a specific implementation schedule. Coordination and timing of project implementation is taking more time than anticipated and there have been some delays. In addition, the Plumas National Forest suffered from multiple fires this year, thus impacting where the next phase projects are implemented. Additional coordination meetings are scheduled in upcoming months.

Placer County is currently on track to allocate projected budget funds and expects to expend all grant funds as provided by the SNC. To date, approximately 20% of the SNC funds have been expended.

Phase II Analysis

Additional woody biomass material from slash piles on the SSO project and Gorman Ranch project (also located on the American River Ranger District) is currently being collected, processed and transported to the SPI – Lincoln power plant. The Placer County Team continues to monitor financial costs, production, and emission levels. It is anticipated that Phase II findings will be available in the early spring of 2009 and will be included in the next progress report to the SNC.

Appendix A – Emission Factors

Emission Factors for Open Pile Burning

Open Pile Burning of Sierra Nevada Forest Slash Material -- Air Pollutant Emissions Factors

	PM10 lb/wet ton	CO lb/wet ton	NMOC lb/wet ton	CH4 lb/wet ton	NOx lb/wet ton	SOx lb/wet ton
EPA Emissions Factors for Open Burning (1)	4 - 17	90 - 195	4 - 19	2 - 6		
EPA Emissions Factors for Prescribed Burning Piles (2)	8 - 14	56 - 230	4 - 15	4 - 19		
U.C. Davis Lab Scale Study (3)	9 - 11	65 - 85	6 - 11	2 - 3	3 - 4.5	0.14
Literature Review (4) (5)	7 - 20	35 - 180		3 - 10	3.8	
Emission Factor Used for this Study	**15**	**150**	**15**	**5**	**4**	**0.1**

Sources:

(1) U.S. EPA, Compilation of Air Pollutant Emission Factors, AP-42, Section 2.5, Open Burning, October 1992.

(2) U.S. EPA, Compilation of Air Pollutant Emission Factors, AP-42, Section 13.1, Prescribed Burning, October 1996.

(3) B. Jenkins, et al., Atmospheric Pollutant Emission Factors from Open Burning of Agricultural and Forest Biomass by Wind Tunnel Simulations, CARB Report No. A932-196, April 1996

(4) R. Kopmann, K. von Czapiewski, and J.S. Reid, "A review of biomass burning emissions, part I; gaseous emission of carbon monoxide, methane, volatile organic compounds, and nitrogen containing compounds," Amos. Chem. Phys. Discuss., Vol. 5, pp. 10455-10516, 2005.

(5) J.S. Reid, R. Koppmann, T.F. Eck, and D.P. Eleuterio, "A review of biomass burning emissions, part II; intensive physical properties of biomass burning particles," Amos. Chem. Phys. Discuss., Vol. 5, pp. 799-825, 2005.

Biomass Power Plant Emission Factors

	PM10 lb/dry ton	SO2 lb/dry ton	CO lb/dry ton	NOx lb/dry ton	NMOC lb/dry ton	CH4 lb/dry ton
Rio Bravo Rocklin (1)	0.205	1.477	0.196	0.002	0.064	0.192
SPI Lincoln (2)	0.319	2.129	0.018	3.041	0.071	0.214
SPI Loyalton (3) (4)	0.344	2.499	0.031	9.359	0.175	0.524

Sources:
(1) From June 2007 Source Test of Rio Bravo Rocklin Circulating Fluidized Bed Boiler, burning urban wood waste and agricultural biomass wastes
(2) From June 2007 Source Test of Sierra Pacific Industry Lincoln McBurney Grate Fired Boiler, burning mill wood wastes and agricultural biomass wastes
(3) From August 2007 Source Test of Sierra Pacific Industry Loyalton Riley Grate Fired Boiler, burning urban wood wastes, mill residues and in-forest biomass wastes
(4) Loyalton PM10 is based on 16 year average due to 2007 being extremely low (0.47 pph) and not representative of normal.

Transport Related Emission Factors

Chip Van

	PM10 g/mile	NOx g/mile	CO g/mile	NMOC g/mile	CH4 g/mile
Chip Van (1)	0.4	17	40	0.5	0.5

Source:
(1) Carl Moyer Program Guidelines, Diesel Heavy Duty Vehicles, November 2005

Emissions from Chip Van travel over dirt road surfaces

	PM10 g/mile traveled
Unpaved Road (1)	2.1

Source:
(1) California Air Resources Board, Emission Inventory, Section 7.10, Unpaved Road Dust (Non-Farm Roads)

Chipper Equipment Emission Factors

Engine

Engine Emission Factor (1)	NOx g/HP-hr	VOC g/HP-hr	PM10 g/HP-hr	CO g/HP-hr
Tier I, 300-750 HP	5.93	0.38	0.12	5
Tier II, 300-750 HP	3.79	0.12	0.088	4
Tier III, 300-750 HP	2.32	0.12	0.088	3

Source:
(1) Carl Moyer Program Guidelines, Agricultural Engines, Off-Road Diesel, Table B-12, November 2005

Engine Emission Factor (1)	NOx lb/wet ton	VOC lb/wet ton	PM10 lb/wet ton	CO lb/wet ton
Tier I	0.1829	0.0117	0.0037	0.1542
Tier II	0.1169	0.0037	0.0027	0.1233
Tier III	0.0715	0.0037	0.0027	0.0925

Source:
(1)Carl Moyer Program Guidelines, Agricultural Engines, Off-Road Diesel, Table B-12, November 2005. Also assumes a 700 HP grinder processing 50 green tons slash per hour.

Uncontrolled (1) PM10 lb/green ton	Controlled (2) PM10 lb/green ton
0.35	0.105

Sources:
(1) EPA, AP-42, Log Sawing, Chapter 12
(2) PM control efficiency of 70% with water spray
(3) EPA, AP-42, Log Debarking, Chapter 12, 0.024 lb PM/ton

Appendix B – Foresthill Fire Protection District

Foresthill Fire Protection District
P.O. Box 1099 Foresthill, CA 95631
Office: (530) 367-2465 Fax: (530) 367-3498

October 7, 2008

Brett Storey:

RE: Pile removal impact on fire mitigation

First I would like to thank you for your help with fuels mitigation in our area, this is never easy and we can use all the help we can get.

The removal of these large piles is essential to fire mitigation efforts in the forest. Two of the piles in the area were set fire this summer and had the potential of becoming major forest fires. These piles in our forests are a tinder box waiting to be lit. They seem to attract our young folks as party sites and are easily set ablaze.

The cost to extinguish these piles after accidental ignition is substantial. The money and personnel time is quite extensive. Dozers, Engine crews, Water tenders, and hand crews are needed to pull apart the piles so that they can be put out without the threat of re-ignition.

Burning these piles when the weather permits, has been in vain as they are too tightly packed and seem to go out without burning completely.

Mastication of this material may be an option, but this is also costly and as the recent report on the American River Complex shows even mastication has the potential need to be followed up by low intensity under story burns during low fire danger periods outside of fire season. This would leave the 100 and 1000 hour dead fuel (1 to 3 inches and 3 to 8 inches respectively) unavailable reducing fire intensity and less likely to cause tree mortality particularly for the more mature trees.

Chipping and removing these piles from our forest seems to be the most economical and environmentally prudent approach to continued forest health and reduction of wild fires. Without thinning, our forest is overstocked and more susceptible and prone to disease and fire.

In my opinion we need to continue to keep as many tools in our tool box as possible. Chipping and removing these pile from our forest will help reduce the threat of wildfire and take more fuel bed out of our forest.

Sincerely,

Luana R. Dowling
Admin Manager
Foresthill/Iowa Hill FSC Chairman

Appendix C – Daily Operation Performance Data

Date	Chip Van Loads	Chip Production (bone dry tons)	Chip Production (green tons)	Landing #	Equipment Operation (hours)	Fuel Usage Chipping (gal)	Grinder gal	Loader gal	Excavator gal	Green Tons/operating hour
4/14/08	2	23.5	43.3	2	2.5	93.5	75	6.5	12	17.3
4/15/08	5	57.6	116.5	2	11.8	0				9.9
4/16/08	6	80.1	148.7	2	2.8	105	84	7	14	53.1
4/17/08	7	84.9	162.9	2	5.8	218	174	15	29	28.1
4/18/08	1	12.9	23.0	2						
4/21/08	1	13.7	24.5	2						
4/22/08	5	73.2	124.0	2	1.8	68	54	5	9	68.9
4/23/08	1	13.0	22.9	2	2.3	86	69	6	11	9.9
4/24/08					3.3	124	99	9	16	0.0
4/25/08	3	35.6	74.5	2						
4/28/08	1	13.4	25.4	2						
5/5/08	4	54.5	120.2	BFP	3.1	116	93	8	15	38.8
5/6/08	8	123.6	195.8	BFP	2.2	83	66	6	11	89.0
5/7/08	10	135.9	253.9	BFP	3.1	116	93	8	15	81.9
5/8/08	8	103.4	211.6	BFP	2.6	98	78	7	13	81.4
5/9/08	9	130.0	217.8	BFP	2.8	105	84	7	14	77.8
5/12/08	7	107.7	166.5	BFP	3.5	132	105	9	18	47.6
5/13/08	6	83.7	149.5	BFP	1.9	71	57	5	9	78.7
5/27/08	4	71.1	102.4	BFP	1.7	63	51	4	8	60.2
5/28/08	3	30.9	69.2	BFP	0.7	26	21	2	3	98.9
5/29/08	8	118.0	213.4	BFP	4.8	180	144	12	24	44.4
5/30/08	9	119.4	225.2	BFP	2.0	75	60	5	10	112.6
6/2/08	8	102.9	185.3	BFP	3.1	116	93	8	15	59.8
6/3/08	7	79.0	157.4	1	4.8	180	144	12	24	32.8
6/4/08	1	11.7	21.3	1						
6/5/08	8	112.5	192.4	1	4.5	169	135	12	22	42.8
6/6/08	7	91.4	183.3	1	5.1	191	153	13	25	35.9
6/9/08	11	131.8	244.5	1	5.5	206	165	14	27	44.4
6/10/08	6	83.8	138.0	1, 3	4.3	161	129	11	21	32.1

Date	Chip Van Loads	Chip Production		Landing #	Equipment Operation	Fuel Usage Chipping	Grinder	Loader	Excavator	Green Tons/operating hour
6/11/08	10	152.6	234.4	3	5.2	196	156	14	26	45.1
6/12/08	8	108.9	198.9	3	5.5	206	165	14	27	36.2
6/13/08	7	110.0	170.4	3	4.7	176	141	12	23	36.2
6/16/08	7	95.4	158.6	3	3.5	131	105	9	17	45.3
6/17/08	7	96.3	156.8	4, 5	5.4	203	162	14	27	29.0
6/18/08	8	109.6	178.8	4, 5	3.3	124	99	9	16	54.2
6/20/08	5	73.7	104.1	6	6.3	236	189	16	31	16.5
6/23/08	8	107.2	187.6	6	6.1	229	183	16	30	30.7
6/24/08	2	29.0	47.2	6	3.4	128	102	9	17	13.9
6/25/08	10	144.9	253.9	6	4.3	161	129	11	21	59.1
6/26/08	8	116.1	196.4	6, 7	5.6	211	168	15	28	35.1
6/27/08	9	127.8	227.8	7	3.7	139	111	10	18	61.6
7/9/08	5	62.9	91.4	8	5.0	188	150	13	25	18.3
7/10/08	8	114.8	169.6	8	4.9	184	147	13	24	34.6
7/11/08	9	124.6	208.8	8	4.9	184	147	13	24	42.6
7/16/08	7	116.0	152.0	8	5.5	206	165	14	27	27.6
7/17/08	8	133.8	180.7	8	5.8	218	174	15	29	31.2
7/18/08	5	78.0	107.2	8	4.5	169	135	12	22	23.8
7/21/08	2	29.8	45.4	8						
7/22/08	4	76.9	99.6	8	2.1	78	63	5	10	47.4
7/23/08	4	84.2	106.2	8	2.5	93	75	6	12	42.5
7/24/08				8	0.1	4	3	0.5	0.5	0.0
8/1/08					3.0	63	40	8	15	0.0
8/4/08					3.2	70	46	8	16	0.0
8/5/08					4.4	165	132	11	22	0.0
8/6/08					2.1	78	63	5	10	0.0

Biomass for Energy
Project Reporting Protocol

GHG Emission Reduction Accounting

Version 3.1

May 2009

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Forms

1. Introduction

This protocol provides accounting, reporting, and monitoring procedures to determine greenhouse gas (GHG) reductions associated with biomass for energy projects.

The protocol is for projects which process and transport biomass for the generation of energy (e.g. electricity and process heat). The protocol is limited to projects where, under baseline, business as usual conditions, at the start of the project, the biomass would have otherwise been disposed of through: (1) open burning, or (2) decay and decomposition in the field. The protocol is also limited to biomass that is the result of sustainable harvesting operations or urban biomass waste generation.

Biomass for energy projects potentially reduce GHG emissions through: (1) avoiding methane (CH_4) and nitrous oxide (N_2O) emissions that occur during disposal through open burning and/or decay and decomposition, and (2) producing renewable energy that displaces GHG emissions from fossil fuel combustion needed for an equivalent energy supply.

2. GHG Reduction Project – Biomass for Energy

Biomass is generated from forestry, agriculture, urban landscape, and related industries. Biomass is defined as non-fossilized and biodegradable organic material originating from plant material, and is disposed of through open burning, or decay and decomposition in the field. Biomass includes:

- Forest slash / non-merchantable remains from forest management activities including timber harvesting or forest thinning. These include small trees, brush, tree tops, and branches.
- Defensible space clearing residues (brush, tree branches and trunks, clippings).
- Orchard and vineyard removals and prunings.
- Field straws and stalks.
- Urban prunings/cuttings residues

Biomass has energy content that can be utilized in energy recovery facilities, which include:

- Direct biomass combustion, producing heat and/or electricity.

- Biomass gasification, producing syngas used for heat or electricity production, or conversion into alternative transportation fuels (e.g. biofuels).

Sources of GHG emissions from a biomass for energy project are shown in Table 1.

2.1. Project Definition

For this protocol, the GHG reduction project involves the use of biomass for energy recovery, where otherwise under baseline, business as usual conditions, the biomass would have been disposed of through open burning, or left to decay and decompose in the field.

The project developer must provide information defining the project operations, including:

- Location where the biomass is generated.
- Operation for which the biomass is a byproduct, i.e. how is the biomass generated.
- Generation (rate and timing) of the biomass.
- Composition of the biomass.
- Historical, current, and anticipated future, disposal practice for the biomass in the absence of the proposed biomass to energy project.
- Biomass processing operations prior to transport, such as conveyors, grinders, and loaders.
- Biomass transportation method.
- Location of energy recovery facility.
- Type of energy produced (e.g. electricity, heat, fuels).

- Estimated cost of processing and transporting biomass to the energy recovery facility.
- Generation rate of energy from biomass.
- User(s) / purchaser(s) of energy generated from biomass.
- Permitting status of the energy recovery facility.
- Documentation of environmental assessments required as part of the biomass generating activities, such as those for the National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), California Forest Practices Rules and Regulations, Timber Harvest Plans, and Best Management Practices assessments.

This information must be provided in Form A, included as an attachment to the protocol.

2.2. Project Developer

Project developers can include biomass generators, biomass waste energy recovery operators, and/or third party aggregators. Ownership of the GHG reductions must be established by clear and explicit title, where ownership is determined through agreement between project developers. This is important to avoid double counting of reductions by the energy recovery operator, biomass processor, biomass owner (landowner), or third party investor.

2.3. Methane and Nitrous Oxide Global Warming Potential Characterization Factors

Methane (CH_4) is a GHG that maintains a global warming potential characterization factor of 21, equivalent global warming potential of 21 tons of CO_{2e} per ton of methane.

Nitrous oxide (N_2O) is recognized to have a global warming potential of 310 tons CO_{2e} per ton N_2O.

3. Eligibility

Projects must meet the following requirements to be eligible for GHG offset credits under this protocol.

3.1. Biomass from Qualified Operations

The biomass material used for energy recovery must be characterized as:

- "Biomass" – The material must be non-fossilized and biodegradable organic material.
- "Excess waste" – The material must be an excess waste byproduct that, in the absence of the project, would be disposed of through open burning, or deposited in the field.
- "Sustainable" – The material must be a byproduct of operations which:

  -- Protect or enhance long-term productivity of the site by maintaining or improving soil productivity, water quality, wildlife habitat, and biodiversity.

  -- Meet all local, state, and federal environmental regulations, including National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), California Forest Practices Rules and Regulations, Timber Harvest Plans, and Best Management Practices.

3.2. Additionality

Project GHG emission reductions must be "additional" to what would have otherwise occurred.

It must be demonstrated that the existing disposal practice of the excess biomass waste residues at the beginning date of the project is through either:

- Open burning in the vicinity of the production site.
- Decay and decomposition in the vicinity of the production site, with no commercial value derived from the end-product.

The project developer must demonstrate there are no alternative uses for the biomass waste. It must not be currently economical within the local market to sell biomass waste as a product or process feedstock. This requires providing documentation of previous historical disposal practices, current disposal practices (in the absence of the proposed project), and future planned/anticipated disposal practices.

3.3. Energy Recovery

The biomass must be used in an energy recovery facility. The energy recovery facility must:

- Meet all Federal, State, and local environmental regulations, including (but not limited to) air quality, water discharge, and solid waste.

- Produce energy (e.g. electricity, heat, fuel) that is under direct control of, the project developer or under the direct control of an entity that has a contractual agreement with the project developer (or an affiliate of the project developer) to produce energy.

- Produce energy that is valuable and utilized, and would not have otherwise been generated.

3.4. Location

This protocol is applicable to biomass recovery project operations that are located in California.

3.5. Project Start Date

Projects are eligible which begin after the date of approval of the protocol, and after the necessary project initiation forms have been completed and approved.

4. GHG Assessment Boundary

The biomass for energy project boundary is defined to include all GHG emissions from operations that are the result of the biomass for energy project. The physical boundary of the biomass for energy project is shown in Figure 1. GHG emissions must be accounted for operations, as detailed in Table 1, including:

Baseline, Business as Usual

- Open biomass burning. Includes quantification of CO_2, CH_4, and N_2O.

- Decay and decomposition of biomass disposal in field. Includes quantification of CH_4 and N_2O.

Biomass for Energy Project

- Fossil fuel fired engines, at the site where the biomass is generated, that would not have been used had the biomass been disposed of through open burning or left to decay. This includes engines that power biomass processing equipment used at the site of waste generation – including chippers, grinders, shredders, loaders, excavators, conveyors, etc. Includes quantification of CO_2.

- Fossil fuel fired engines used to facilitate transport of excess biomass from the site of generation to the energy recovery facility. Includes quantification of CO_2.

- Biomass usage at the energy recovery facility. For biomass combustion boilers, quantification of CO_2 is required. The quantification of CH_4 and N_2O is not required as it is considered negligible for a combustor that meets state and local air quality regulations. Other types of energy recovery units may require quantification of CH_4 and N_2O.

- Fossil fuel fired engines, at the energy recovery site, that are associated with the biomass usage that would not have been used otherwise used in the absence of the project. Includes quantification of CO_2 emissions.

- Fossil fuel fired engines used for transportation of equipment and personal to the excess biomass processing site. Includes quantification of CO_2 emissions.

- Fossil fuel fired engines used at biomass for energy facility for operation of auxiliary equipment, such as conveyors and loaders. Includes quantification of CO_2 emissions.

5. GHG Reduction Calculation Methods

5.1. Biomass for Energy Project

5.1.1. Biomass Processing Rate

Determine the quantity of biomass (total wet weight), BM_W , meeting the above eligibility criteria, which is delivered to the energy recovery facility:

$BM_{T, W}$ — Quantity of wet (green) biomass utilized at energy recovery facility (wet tons). Determined from the summation of direct weight measurement of every separate biomass delivery received at the energy recovery facility.

Determine the quantity of biomass (total bone dry weight), $BM_{T, D}$, as.

$$BM_{T, D} = BM_{T, W} * (1 - M) \qquad \text{(Eq. 1)}$$

where:

M — Moisture content of biomass (%). Determined through sampling and analysis of the biomass delivered to the energy recovery facility. (Sampling and measurement will be based on ASTM E870-82, ASTM D 3173, or equivalent. Sampling will occur at biomass energy recovery facility.)

5.1.2. Energy Produced from Biomass

Determine the energy content of biomass delivered to the biomass energy recovery facility, Q_{BM}, (MMBtu) as:

$$Q_{BM} = BM_{T, D} * HHV_{BM} \qquad \text{(Eq. 2)}$$

where:

HHV_{BM} — Higher Heating Value of biomass waste (MMBtu/dry ton). Determined by periodic or most current sampling and analysis of biomass. (Measurement of HHV will be based on ASTM E870-82, ASTM D 5865, or equivalent.)[1]

Next, determine the energy produced from the biomass at the energy recovery facility, E_{BM}, as:

$$E_{BM} = Q_{BM} * f \qquad \text{(Eq. 3)}$$

[1] HHV is utilized within this protocol instead of LHV because it is more prominently used in the biomass energy recovery industry. If LHV is utilized, appropriate conversion factors must be used to calculate an equivalent HHV.

where:

f — Energy production generation efficiency. Determined as the ratio of net useful energy produced by the facility (gross energy produced minus parasitic plant energy requirements) to the total fuel heat input rate. This parameter must be determined on a basis of HHV.

For the production of electricity, this is referred to as the facility heat rate (determined as the kWh_e new electricity / MMBtu fuel input).

The efficiency will be based on measurements of facility operations using the biomass waste based on an annual facility average efficiency.

5.1.3. GHG Displaced by Energy Produced from Biomass

Determine the GHG emissions from fossil fuel combustion that are displaced by the energy produced from the biomass, GHG_E, as:

$$GHG_E = E_{BM} * EF_E \quad \text{(Eq. 4)}$$

where:

EF_E — Emission factor for CO_{2e} from energy generation that is displaced by the biomass for energy project (tons CO_{2e} / unit of energy supplied by the excess biomass for energy facility).

It is recommended that for displaced electricity, the use of a factor of 800 lb CO_{2e} / MW – based on marginal electricity generation supplied by a combined cycle natural gas turbine plant.

5.1.4. GHG Emissions from Ancillary Biomass Handling, Processing, and Transportation Operations

Determine the amount of GHG resulting from ancillary biomass handling, processing, and transport operations, GHG_{AUX} , as:

$$GHG_{AUX} = GHG_{TRANS} + GHG_{PROC} \quad \text{(Eq. 5)}$$

where:

$$GHG_{TRANS} = VM * MPG * EF_{FF} \quad \text{(Eq. 6)}$$

GHG_{TRANS} CO_{2e} emissions from vehicles used to transport biomass to the energy recovery facility; and vehicles used to transport workers to the biomass processing site.

VM Vehicle miles driven for biomass transport (round trip); and miles driven to transport workers to the biomass processing site. In reporting period.

MPG Vehicle mileage achieved by transport vehicles (miles/gallon).

EF_{FF} Emission factor for CO_2 for fossil fuel combustion (lb CO_2 / gal fuel) -- for diesel, 22.23 lb CO_2/gallon; for gasoline, 19.37 lb CO_2/gal.

and

$$GHG_{PROC} = (T_{FF} * R_{FF}) * EF_{FF} \quad \text{(Eq. 7)}$$

where:

T_{FF} Time equipment used to operate biomass processing equipment, including grinders, chippers, shredders, conveyors, and loaders, bulldozers, and excavators. (Reported in hours).

R_{FF} Average volumetric fuel use rate (gallons per hour) for equipment used to operate biomass processing equipment, including grinders, chippers, shredders, conveyors, and loaders, bulldozers, and excavators. (Reported in hours).

5.1.4 *GHG Emissions From Biomass Combustion*

Determine CO_2 from biomass combustion, as:

$$GHG_{BCOM} = BM_{T,D} * EF_{CO2\ BM}$$

where:

$EF_{CO2\ BM}$ Emission factor for CO_2 from biomass combustion, recommended as 1.8 tons CO_2 / ton dry biomass.

5.1.5. *GHG Emissions From Biomass for Energy Project*

Determine the biomass for energy project GHG emissions, GHG_{PROJ}, as:

$$GHG_{PROJ} = GHG_{AUX} - GHG_E + GHG_{BCOM} \quad \text{(Eq. 8)}$$

5.2. Baseline

5.2.1. Baseline Biomass Disposal Practice

Determine the quantity (dry tons) of biomass that would have been uncontrolled open burned, $BM_{OB, D}$, and the quantity of biomass that would have been left to decay in the field, $BM_{DD, D}$, as

$$BM_{OB, D} = BM_{T, D} * X_{OB} \qquad \text{(Eq. 9)}$$

$$BM_{DD, D} = BM_{T, D} * X_{DD} \qquad \text{(Eq. 10)}$$

where:

X_{OB} Fraction (dry weight %) of biomass that would have been uncontrolled open burned. Based on historical, current, and future projected practices.

X_{DD} Fraction (dry weight %) of biomass that would have been left to decay in the field. Based on historical, current, and future projected practices.

5.2.2. GHG Emissions from Baseline Disposal

Determine GHG emissions that would have resulted from the baseline disposal practices, GHG_{BASE}, as the sum of emissions from uncontrolled open burning, GHG_{OB}, and field decay and decomposition, GHG_{DD} , as:

$$GHG_{BASE} = GHG_{OB} + GHG_{DD} \qquad \text{(Eq. 11)}$$

where:

GHG_{BASE} Total baseline greenhouse gas emissions, as CO_2 equivalent (tons CO_{2e})

GHG_{OB} Greenhouse gas emissions from uncontrolled open burning, as CO_2 equivalent (tons CO_{2e})

GHG_{DD} Greenhouse gas emissions from field decay and decomposition, as CO_2 equivalent (tons CO_{2e})

and,

$$GHG_{OB} = (EF_{OB, CO2} * BM_{OB, D} * BF) + (EF_{OB, CH4} * BM_{OB, D} * BF * 21) + (EF_{OB, N2O} * BM_{OB, D} * 310) \qquad \text{(Eq. 12)}$$

$$GHG_{DD} = EF_{DD, CH4} * BM_{DD} * 21 + EF_{DD, N2O} * BM_{DD} * 310 \quad \text{(Eq. 13)}$$

where:

EF_{OB} — Emission factor for CO2, CH_4 and N_2O from uncontrolled open pile burning of biomass. Recommend the use of:

- CO_2 : 1.8 tons CO_2 / ton dry biomass
- CH_4 : 0.004 ton CH_4 / ton dry biomass
- N_2O : 0.00015 ton N_2O / tons dry biomass

BF — Biomass burn out efficiency of the open pile burn. Recommend the use of 95%.

EF_{DD} — Emission factor for CH_4 and N_2O from in-field decay and decomposition of biomass. Recommend the use of 0.05 ton CH_4 / ton dry biomass. Recommend the use of 0 tons N_2O / ton dry biomass.

5.3. Net GHG Project Reduction

Determine GHG reductions from biomass waste to energy recovery project, GHG_{NET}, as:

$$GHG_{NET} = GHG_{BASE} – GHG_{PROJ} \quad \text{(Eq. 14)}$$

6. Monitoring

Project data monitoring requirements are shown Form B.

7. Reporting and Recordkeeping

7.1. Project Commencement

Form A must be completed, submitted, and approved prior to project commencement, as discussed in Section 2 and 3.

7.2. Recordkeeping

Form B can be used to collect, maintain, and document the required information. Information is to be kept for a period of 10 years after it is generated, or 7 years after the last verification.

7.3. Reporting

Form C can be used to report on project emission reductions. Reporting must be made on a monthly basis.

Project developers must report GHG emission reductions on an annual (12-month) basis.

8. Glossary of Terms

Additionality: Biomass residue management practices that are above and beyond business as usual operation, exceed the baseline characterization, and are not mandated by regulation.

Biogenic CO_2 Emissions: CO_2 emissions resulting from the combustion and/or aerobic decomposition of organic matter. Biogenic emissions are considered to be a natural part of the Carbon Cycle, and are not part of the baseline or project emissions characterization/calculation.

Biomass energy recovery operator: Entity that owns and/or operates a facility that processes and utilizes biomass waste as a feedstock to generate useful energy (electricity).

Biomass generator: Landowner or independent contractor that conducts operations that result in the generation of biomass residuals.

Biomass residue: Non-fossilized and biodegradable organic material originating from plant material, which due to economic considerations are disposed of through open burning or deposited at the site of generation and left to decay and decompose or are transported to a landfill.

Carbon dioxide (CO_2): The most common of the six primary greenhouse gases, consisting of a single carbon atom and two oxygen atoms.

CO2 equivalent (CO_{2e}): The quantity of a given GHG multiplied by its total global warming potential. This is the standard unit for comparing the degree of warming which can be caused by difference GHGs.

Emission Factor (EF): A value for determining an amount of a greenhouse gas emitted for a given quantity of activity data (e.g. short tons of methane emitted per dry ton of biomass combusted).

Existing biomass for energy project: A project that generates biomass material that meets all qualification requirements of this protocol that diverts less than 100% of biomass waste material generated to a biomass energy recovery facility.

Flaring: Use of a combustion device that uses an open flame to burn combustible gases with combustion air provided by uncontrolled ambient air around the flame.

Fossil fuel: A fuel, such as coal, oil, and natural gas, produced by the decomposition of ancient (fossilized) plants and animals.

Greenhouse gas (GHG): Includes carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs).

Global Warming Potential (GWP): The ratio of radiative forcing (degree to warming to the atmosphere) that would result from the emission of one unit of a given GHG compared to one unit of CO2)

kWh_e: Kilowatt-hour of electricity.

Methane (CH_4): A GHG with a GWP of 21, consisting of a single carbon atom and four hydrogen atoms.

MMBtu: Million British thermal units.

MWh_e: Megawatt-hour of electricity.

Nitrous oxide (N_2O): A GHG with a GWP of 310, consisting of two nitrogen atoms and a single oxygen atom.

Open Burning: The intentional combustion of biomass material without processing or energy recovery operations.

Project Developer(s): An entity (or multiple entities) that undertakes a project activity, as defined in the Biomass for Energy Protocol. Project developers include, but are not limited to biomass waste generators, biomass waste energy recovery operators, and/or third party aggregators.

Syngas: Synthetic gas produced through industrial processing of biomass material into gaseous (i.e. methane) or further refined into liquid fuels (biofuels).

Third Party Aggregator: An entity that facilitates the project as is not the landowner, biomass waste generator, or biomass waste energy recovery operator for the purpose of generating GHG emission offset credits.

9. References

California Air Resources Board (CARB), Greenhouse Gas Inventory, 1990-2004, Nov. 17, 2007.

Delmas, R., J.P. Lacaux, and D. Brocard, "Determination of Biomass Burning Emission Factors: Methods and Results," Journal of Environmental Monitoring and Assessment, Vol. 38, pp. 181-204, 1995.

Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report, Changes in Atmospheric Constituents and in Radiative Forcing, Chapter 2, pp. 211-216, 2007.

Jenkins, B., et al., Atmospheric Pollutant Emission Factors from Open Burning of Agricultural and Forest Biomass by Wind Tunnel Simulations, CARB Report No. A932-196, April 1996.

Kopmann, R., K. Von Czapiewski, and J.S. Reid, "A review of biomass burning emissions, part I; gaseous emission of carbon monoxide, methane, volatile organic compounds, and nitrogen containing compounds," Amos. Chem. Phys. Discuss., Vol. 5, pp. 10455-10516, 2005.

Mann, M. and P. Spath, "Life Cycle Assessment Comparisons of Electricity from Biomass, Coal, and Natural Gas," 2002 Annual Meeting of the American Institute of Chemical Engineers, National Renewable Energy Labratory, Golden, Colorado, 2002.

U.S. EPA, Compilation of Air Pollutant Emission Factors, AP-42, Section 2.5, Open Burning, October 1992.

U.S. EPA, Compilation of Air Pollutant Emission Factors, AP-42, Section 13.1, Prescribed Burning, October 1996.

U.S. EPA, "Emission Facts – Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel," EPA420-F-05-001, February 2005.

10. Emission Factors

Methane Emission Factors for Open Burning of Biomass

Reference	CH4 as reported by author	CH4 lb/dry ton fuel consumed
U.S. EPA, Compilation of Air Pollutant Emission Factors, AP-42, Section 13.1, Prescribed Burning, October 1996, Table 13.1-3. (Based on data from C.C. Hardy and D.E. Ward, Emission factors for particulate matter by phase of combustion from prescribed burning, Annual Meeting of Air Pollution Control Association Pacific Northwest International Section, Eugene, OR, November 19-21, 1986; and D.V. Sandberg and R.D. Ottmar, Slash burning and fuel consumption in the douglas fir subregion, 7th Conference on Fire and Forest Meteorology, For Collins, CO, April 1983).		
Broadcast Logging Slash		
Hardwood (fire)	6.1 g/kg fuel consumed	12.2
Conifer short needle (fire)	5.6 g/kg fuel consumed	11.2
Conifer long needle (fire)	5.7 g/kg fuel consumed	11.4
Logging slash debris dozer piled conifer (fire)	1.8 g/kg fuel consumed	3.6
D.E. Ward, C.C. Hardy, D.V. Sandberg, and T.E. Reinhardt, Mitigation of prescribed fire atmospheric pollution through increased utilization or hardwoods, pile residues, and long-needled conifers, Part III, Report IAG DE-AI179-85BP18509 (PNW-85-423), USDA Forest Service, Pacific Northwest Station, 1989.		
Broadcast Burned Slash		
Douglas fir	11.0 lb/ton fuel consumed	11.0
Ponderosa pine	8.2 lb/ton fuel consumed	8.2
Mixed conifer	12.8 lb/ton fuel consumed	12.8
Pile and Burn Slash		
Tractor piled	11.4 lb/ton fuel consumed	11.4
Crane piled	21.7 lb/ton fuel consumed	21.7
U.S. EPA, Compilation of Air Pollutant Emission Factors, AP-42, Section 2.5, Open Burning, October 1992, Table 2.5-5. (Based on G. Yamate et al., 1975; L. Fritschen, et al., 1970; and D. Sandberg et al., 1975).		
Unspecified	5.7 lb/ton material burned	10.4
Hemlock, Douglas fir, cedar	1.2 lb/ton material burned	2.4
Ponderosa pine	3.3 lb/ton material burned	6.6
W. Battye and R. Battye, Development of Emissions Inventory Methods for Wildland Fire, prepared under Contract EPA No. 68-D-98-046, Work Assignment No. 5-03, February 2002. (Based on data from D.E. Ward and C.C. Hardy, Smoke emissions from wildland fires, Environment International, Vol. 17, pp. 117-134, 1991.)		
90% combustion efficiency	3.8 g/kg fuel consumed	7.6
B. Jenkins, et al., Atmospheric Pollutant Emission Factors from Open Burning of Agricultural		

and Forest Biomass by Wind Tunnel Simulations, CARB Report No. A932-196, April 1996.

Ponderosa pine pile burn	1.3 g/kg dry fuel	1.7
Almond pruning pile burn	1.2 g/kg dry fuel	2.6
Douglas fire pile burn	1.9 g/kg dry fuel	3.0
Walnut pruning pile burn	2.0 g/kg dry fuel	4.0

R. Kopmann, K. von Czapiewski, and J.S. Reid, A review of biomass burning emissions, part I; gaseous emission of carbon monoxide, methane, volatile organic compounds, and nitrogen containing compounds, Amos. Chem. Phys. Discuss., Vol. 5, pp. 10455-10516, 2005.

Literature search on biomass open burning	1 - 20 g/kg dry fuel	10.0

Nitrous Oxide Emission Factors for Open Burning of Biomass

Delmas, R., Lacaux, J.P., Brocard, D. "Determination of biomass burning emission factors: methods and results," Journal of Environmental Monitoring and Assessment, Vol. 38, 181-204, 1995.	0.00015 ton / ton dry

Methane Emission Factors for Decay and Decomposition of Biomass

Mann, M. K., and P. L. Spath, "Life Cycle Assessment Comparisons of Electricity from Biomass, Coal, and Natural Gas," 2002 Annual Meeting of the American Institute of Chemical Engineers. Golden, Colorado, National Renewable Energy Laboratory, 2002.	0.05 ton / ton dry
Assumes 9% carbon in biomass is converted to carbon in methane. Biomass has a molecular formula of $C_6H_{10}O_6$.	

Nitrous Oxide Emission Factors for Decay and Decomposition of Biomass

Engineering judgment. At temperatures of in-field decay and decomposition, N_2O is expected to be negligible. Nitrogen in fuel will go to NH_3.	0 ton /ton dry

11. Attachments

Table 1. Biomass for Energy Project -- Source Categories, GHG Sources, and GHG Emissions

Source	Associated GHGs	Included in GHG assessment boundary
Baseline		
Open Uncontrolled Pile Burning	CO_2	Included
	CH_4	Included
	N_2O	Included
In-field Decay and Decomposition	CO_2	Included
	CH_4	Included
	N_2O	Included
Biomass for Energy Project		
Transportation -- engine combustion of fossil fuels	CO_2	Included
	CH_4	Not included; negligible
	N_2O	Not included; negligible
Processing and Handling at Generation Site -- engine combustion of fossil fuels	CO_2	Included
	CH_4	Not included; negligible
	N_2O	Not included; negligible
Energy Recovery Facility	CH_4	Not included for combustors; may need to be included for other energy processing types
	CO_2	Included
	N_2O	Not included; negligible
Processing and Handling at Energy Recovery Facility – engine combustion of fossil fuels	CO_2	Included
	CH_4	Not included; negligible
	N_2O	Not included; negligible
GHGs from conventional energy production displaced by energy from biomass waste	Dependent on conventional energy source	Included

Figure 1. System Boundary Definition

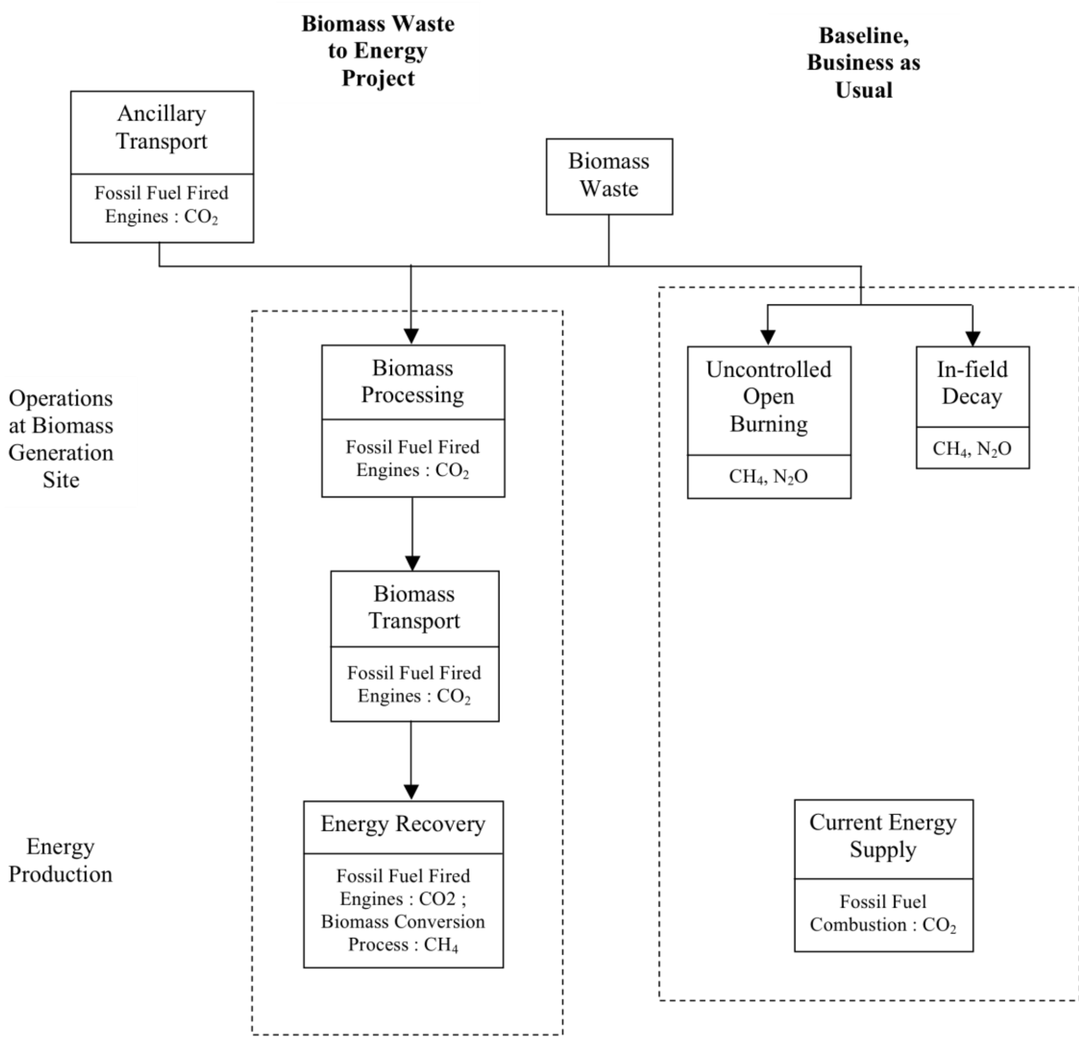

Figure 2. Example Calculation, Reporting and Monitoring forms submittal

Form A. Project Definition

Date:				
Project Title:				
Project Developer:				
Project Address:				
Permitting Status:				
Biomass Generation & Disposal Information				
Composition of Biomass (including moisture content)				
Historic, Current, and Anticipated Disposal Practice				
Biomass Generation Rate (green tons/day)				
Cost of Biomass Processing and Transport ($/green ton)				
Biomass Energy Recovery Information				
Type of Energy Produced	Electricity	Heat	Fuels	Other
Name & Location of Energy Recovery Facility				
Generation Rate of Recovered Energy (MMBtu/day)				
Users/Purchasers of Recovered Energy				

Form B. Monitoring and Recordkeeping

Date:			
Project Title:			
Project Developer:			
Start Date of Monitoring Period:		**End Date of Monitoring Period:**	

Monitoring and Parameter Measurements

Parameter	Description	Data Unit	How Measured	Measurement Frequency	Reported Measurement
$BM_{T,W}$	Biomass delivered to energy recovery facility	wet tons / delivery	Transport vehicle weight scale	Every separate delivered load	
M	Moisture content of biomass	moisture, wt. %	Sampling and analysis of biomass wastes	Every separate delivered load	
HHV_{BM}	Higher heating value of biomass waste	Btu/lb, dry	Sampling and analysis of biomass wastes	Periodic – at least once per month	
f	Energy production efficiency of energy recovery facility	net useful energy / biomass heat input	Measurement of boiler output and waste fuel input. Alternatively, based on manufacturer design specifications	Start of program; and updated as needed	
VM	Vehicle miles traveled for biomass transport	miles	Vehicle odometer	Periodically (at least weekly)	
MPG	Transport vehicle gas mileage	miles / gallon	Measurement of vehicle miles traveled and gas usage	Start of program, and updated as needed	

Parameter	Description	Data Unit	How Measured	Measurement Frequency	Reported Measurement
V_{FF}	Volume of fossil fuels used to power biomass processing equipment, e.g. shredders, chipper, grinders, conveyors, loaders, excavators, bulldozers	gallons	Measurement of diesel fuel usage and/or equipment operating hours	Periodically (at least weekly)	
X_{OB}	Fraction of biomass that would have been open burned	%, wet biomass	Determined based on current economics and operating practices	Start of program, and updated as needed	
X_{DD}	Fraction of biomass that would have been left in field to decay and decompose	%, wet biomass waste	Determined based on current economics and operating practices	Start of program, and updated as needed	

Form C. Reporting

Date:	
Project Title:	
Project Developer:	
Reporting Period:	

Parameter	Description	Data Unit	Reported Value
$BM_{DD, D}$	Biomass left in field to decay	bone dry tons	
$BM_{OB, D}$	Biomass open burned	bone dry tons	
$BM_{T, D}$	Biomass delivered to energy recovery facility, adjusted for moisture	bone dry tons / delivery	
$BM_{T, W}$	Biomass delivered to energy recovery facility	wet tons / delivery	
E_{BM}	Energy produced from energy recovery facility	kWh	
$EF_{DD, CH4}$	Emission factor for in-field decay and decomposition	tons CH_4/ton dry biomass	
$EF_{DD, N2O}$	Emission factor for nitrous oxide from in-field decay and decomposition	tons N_2O/ton dry biomass	
EF_E	Emission factor for CO_2e for existing electricity generation	tons CO_2e/unit energy	
EF_{FF}	Emission factor for fossil fuel combustion	lb CO_2/gallon fuel	
$EF_{OB, CH4}$	Emission factor for methane from open pile burning	tons CH_4/ton dry biomass	
$EF_{OB, N2O}$	Emission factor for nitrous oxide from open pile burning	tons N_2O/ton dry biomass	
f	Energy production efficiency of energy recovery facility	net useful energy / biomass waste heat input	

Parameter	Description	Data Unit	Reported Value
GHG_{AUX}	GHG resulting from ancillary biomass handling, processing, and transport	tons CO_2e	
GHG_{BASE}	GHG resulting from baseline disposal practices	tons CO_2e	
GHG_{DD}	GHG resulting from decay and decomposition	tons CO_2e	
GHG_E	GHG displaced from energy production from biomass	tons CO_2e	
GHG_{NET}	Net GHG reductions from	tons CO_2e	
GHG_{OB}	GHG resulting from open burning activities	tons CO_2e	
GHG_{PROC}	GHG resulting from ancillary biomass handling and processing	tons CO_2e	
GHG_{PROJ}	GHG resulting from the biomass waste to energy project	tons CO_2e	
GHG_{TRANS}	GHG resulting from transport operations	tons CO_2e	
HHV_{BM}	Higher heating value of biomass	Btu/lb, dry	
M	Moisture content of biomass	moisture, wt. %	
MPG	Transport vehicle gas mileage	miles / gallon	
Q_{BM}	Heat content per delivery of biomass at facility	MMBtu	
R_{FF}	Average volumetric fuel use rate for processing equipment	gallons/hour	
T_{FF}	Time equipment used for processing operations	hours	

Parameter	Description	Data Unit	Reported Value
V_{FF}	Volume of fossil fuels used to power biomass processing equipment, e.g. shredders, chipper, grinders, conveyors, loaders, excavators, bulldozers	gallons	
VM	Vehicle miles traveled for biomass waste transport	miles	
X_{DD}	Fraction of biomass that would have been left in field to decay and decompose	%, wet biomass	
X_{OB}	Fraction of biomass that would have been open burned	%, wet biomass	

CHRISTOPHER D. BROWN, AICP
Air Pollution Control Officer

DONNA ROBERTS NASH
Program Coordinator

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MENDOCINO COUNTY
AIR QUALITY MANAGEMENT DISTRICT

December 1, 2009

Mary Nichols, Board Chair
California Air Resources Board
1001 "I" Street
P.O. Box 2815
Sacramento, CA 95812

Subject: Biomass for Energy Greenhouse Gas Offset Protocol

Dear Chair Nichols:

I urge the California Air Resources Board to support the Biomass for Energy Greenhouse Gas Offset Protocol. This Protocol will encourage the beneficial use of excess woody biomass, including agriculture related biomass, to produce renewable energy. The excess biomass addressed in this protocol is otherwise subject to open-burning, with significant local air quality impacts or decay and release of greenhouse gas.

While this Protocol applies to all types of excess biomass, forest biomass is the largest and most important focus. The California Board of Forestry recognized this and at their October 7, 2009 meeting unanimously endorsed the Protocol and recommended its timely adoption and implementation by the Air Resources Board.

Biomass is gaining much visibility nationally as an important alternative energy source. California's productive forests already contain unnaturally high amounts of biomass and are accumulating more each day. This biomass is contributing to increased wildfire size and intensity – something Mendocino County residents are well aware of following the recent firestorm in 2008. The fire situation is predicted to worsen due to climate change effects. The Biomass for Energy Protocol will make California a leader in effectively utilizing excess biomass in an appropriate, sustainable manner.

There are clear and significant benefits to air quality, energy production, high wage rural job creation and the reduction of greenhouse gases when excess biomass is transported to a facility that uses it to produce energy that displaces fossil fuels. Currently forest management projects designed to reduce the effects of wildfire do not have sufficient economic flexibility to process and transport excess biomass to an energy facility. The Biomass for Energy Protocol can help provide the funding needed to produce an economically, socially and ecologically sustainable and beneficial biomass-to-energy program.

I encourage the Air Resources Board to act quickly on this issue. Please contact the District at (707) 463-4354 with any questions. Thank you.

Sincerely,

Christopher D. Brown AICP
Air Pollution Control Officer

MAUREEN KIRK, CHAIR
Supervisor, District 3

JAMES JOHANSSON, VICE CHAIR
Vice Mayor, Oroville

BILL CONNELLY
Supervisor, District #1

JANE DOLAN
Supervisor, District #2

STEVE LAMBERT
Supervisor, District #4

KIM YAMAGUCHI
Supervisor, District #5

ANGELA THOMPSON
Councilmember, Biggs

SCOTT GRUENDL
Councilmember, Chico

JERRY ANN FICHTER
Mayor, Gridley

ALAN WHITE
Councilmember, Paradise

Butte County Air Quality Management District

W. James Wagoner
Air Pollution Control Officer

(530) 891-2882
(530) 891-2878 Fax

February 25, 2010

California Air Resources Board
Attn: Mary Nichols, Board Chairman
1001 "I" Street
P.O. Box 2815
Sacramento, CA 95812

RE: Support for the Placer County APCD Biomass For Energy Greenhouse Gas Offset Protocol

Dear Chair Nichols:

The Governing Board of the Butte County Air Quality Management District requests the California Air Resources Board endorse and support the Biomass For Energy Greenhouse Gas Offset Protocol that has been developed by the Placer County Air Pollution Control District. This protocol will encourage the beneficial use of excess woody biomass, including agriculture related biomass, to produce renewable energy. The excess biomass addressed in this protocol is otherwise generally subject to open-burning, including catastrophic wildfires, or decay. Both of these approaches produce significant greenhouse gases and criteria and hazardous air pollutants and do not provide the positive benefit of renewable energy production.

While this protocol applies to all types of excess biomass, forest biomass is the largest and most important focus, and we understand the California Board of Forestry recognized this and at their October 7, 2009 meeting unanimously endorsed use of the protocol and recommended its timely adoption and implementation by the California Air Resources Board.

Biomass is gaining much visibility nationally as an important alternative energy source. California's productive forests already contain unnaturally high amounts of biomass and are accumulating more each day. This biomass is contributing to increased wildfire size and intensity, a situation that many experts expect to worsen due to climate change effects. Because of existing legislation and efforts like the Biomass For Energy protocol, California is well-positioned to claim a leadership role in developing the technology and processes for effectively utilizing excess biomass in an appropriate, sustainable manner.

There are clear and significant benefits to air quality, energy production and the reduction of greenhouse gases when excess biomass is transported to a facility that uses it to produce energy that displaces fossil fuels. Currently forest management projects designed to reduce the effects of wildfire do not have sufficient economic flexibility to process and transport excess biomass to an energy facility. The Biomass For Energy protocol can help provide the funding needed to produce an economically, socially and ecologically sustainable and beneficial biomass-to-energy program.

Our Board respectfully requests the California Air Resources Board's expedited action on the Placer County APCD Biomass For Energy Greenhouse Gas Offset Protocol.

Sincerely,

Maureen a Kirk

Supervisor Maureen Kirk, Chair
Butte County Air Quality Management District Governing Board

cc: Supervisor Robert Weygandt, Chair, Placer County Air Pollution Control District Governing Board
Tom Christofk, APCO, Placer County Air Pollution Control District

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT
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P.O. Box 15830, Sacramento, CA 95852-1830; 1-888-742-SMUD (7683)

March 10, 2010

Ms. Mary D. Nichols, Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Subject: Biomass for Energy Greenhouse Gas Offset Accounting Protocol

Dear Chair Nichols,

The Sacramento Municipal Utility District (SMUD) has been approached by the Placer County Air Pollution Control District (PCAPCD) to support their proposed "Biomass for Energy Greenhouse Gas Offset Accounting Protocol." SMUD strongly supports the need expressed in the draft protocol to reduce the risk of forest fires and make the best use of biomass wastes that may negatively impact the state's air and water quality, as evidenced by SMUD's Problem Wastes to Green Electricity program. We see a great opportunity here for the ARB to work with PCAPCD to develop a framework for funding projects which can create additional renewable electricity from slash piles and use forest thinning for both forest fire prevention and renewable energy generation. We see the protocol developed by PCAPCD as a strong step in the right direction towards a methodology for prioritizing funding of these types of projects.

Sacramento and other parts of California's Central Valley are severely impacted by air quality issues which are projected to worsen as a result of climate change. Forest fires have a significant impact on local air quality, release large amounts of CO_2, and are projected to worsen as a result of climate change. SMUD, like PCAPCD, sees a strong opportunity to leverage the carbon market to reduce forest fires, reduce air quality impacts, and help the state meet its RPS goals with in-state biomass resources that would otherwise be wasted.

The PCAPCD Biomass for Energy Greenhouse Gas Offset Accounting Protocol represents a potential framework for creating an additional value stream to help enable projects to make use of forest waste to generate renewable energy. SMUD also recognizes the desire of local air agencies to identify greenhouse gas reductions with air quality co-benefits, which is a strong driver for the creation of such a protocol. PCAPCD has come up with a number of potential ways that such a protocol could be used to leverage funding from uncapped sources to make these projects happen using a CEQA carbon offset framework.

SMUD encourages the ARB to consider these approaches, along with other approaches using auction revenue to enable these projects. Projects that can both help the state mitigate and adapt to climate change impacts such as these are certainly worthy of consideration as the ARB makes decisions about how to dedicate funding from a cap and trade program. ARB endorsement of the protocol and funding of such mitigation/adaptation related projects with general allowance auction proceeds would contribute significant ancillary environmental and economic benefits for all Californians.

Sincerely,

Michael DeAngelis
Manager, AR&DGT Program
Sacramento Municipal Utility District
6201 S Street, MS B257
Sacramento, CA 95817
Email: mdeange@smud.org
Telephone: (916) 732-6589
Fax: (916) 732-6423

STATE OF CALIFORNIA—THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, *Governor*

BOARD OF FORESTRY AND FIRE PROTECTION

P.O. Box 944246
SACRAMENTO, CA 94244-2460
Website: www.bof.fire.ca.gov
(916) 653-8007

October 28, 2009

Ms. Mary D. Nichols, Chair
California Air Resources Board
1001 I Street
Sacramento, California 95814

Dear Chair Nichols:

Enclosed is a copy of the Board's resolution in support of the Placer County Air Pollution Control District's proposed *Biomass for Energy Greenhouse Gas Offset Accounting Protocol*. This resolution was adopted by unanimous vote of the Board during its meeting of October 7, 2009.

As you are aware, Governor Schwarzenegger has issued an executive order (S-06-06) directing that twenty percent of California's renewable energy resources be derived through utilization of biomass material. Biomass power generation currently supplies 2% of California's total electrical demand, although significant additional resources exist. The attendant societal benefits of biomass energy production from facilities that are sized appropriately to ecosystem needs, particularly reduction of greenhouse gas emissions and treatment of hazardous forest fuels, are well established. It is clearly an underutilized resource for energy generation in California.

The Board resolution recognizes that removal of excess woody biomass from forested landscapes in California is regulated through state and federal policies. Unfortunately, much of this material is currently disposed of through open pile burning or is shredded and left to decay in the forest. The alternative utilization of this excess biomass for the production of renewable energy will provide significant reductions in greenhouse gas emissions and support emissions reduction goals outlined in the California Climate Change Scoping Plan. Such reductions would be achieved through the elimination of methane emissions from open pile burning or shredding and displacement of fossil fuel combustion for equivalent electrical generation.

In addition to the direct societal benefits associated with biomass energy production, the resolution recognizes that there are complementary benefits achieved through utilization of excess biomass. These benefits include reduction in criteria air pollutant emissions, additional watershed protection, and critical economic support for local communities and forest management infrastructure.

In adopting the resolution, the Board found that the Placer County Air Pollution Control District's innovative leadership in promoting ecosystem services, renewable energy generation from underutilized biomass resources, and greenhouse gas emission reduction was commendable.

The Board therefore strongly urges the California Air Resources Board to likewise endorse the use of this proposed protocol. Questions may be directed to the Board's Executive Officer, George Gentry, at 916-653-8007 or by email to george.gentry@fire.ca.gov.

Sincerely,

Stan L. Dixon
Chairman

Enclosure

cc: Arnold Schwarzenegger, Governor
Jim Boyd, Commissioner, California Energy Commission
Tony Brunello, Deputy Secretary, Resources Agency
Terry Dressler, President, California Air Pollution Control Officers Association
Gary Gero, President, California Climate Action Registry
Randy Moore, Region 5 Forester, USDA Forest Service
Robert Weygandt, Chair, Placer County Air Pollution Control District

STATE OF CALIFORNIA
BOARD OF FORESTRY AND FIRE PROTECTION
RESOLUTION

In Support of the Biomass for Energy Greenhouse Gas Offset Accounting Protocol

Whereas, the Board of Forestry and Fire Protection (Board) recognizes that excess biomass is generated from existing forest management operations, including thinning for wildfire hazard reduction, defensible space clearing, and commercial timber harvest, where such forest management operations are conducted under State Forest Practice Rules and Regulations, or Federal National Environmental Policy Act requirements.

Whereas, the Board recognizes that while some recoverable biomass generated from forest management operations should remain on-site to provide environmental benefits, most of such generated biomass is excess to on-site needs and is disposed of through either in-field open pile burning or is masticated, to reduce fire hazard.

Whereas, the Board recognizes that utilization of excess biomass for the production of renewable energy, as an alternative to open pile burning or mastication, can provide significant reductions in greenhouse gas emissions through: (1) elimination of methane emissions from open pile burning or mastication; and (2) displacement of fossil fuel combustion for equivalent energy.

Whereas, the Board recognizes that utilization of excess biomass for energy provides additional co-benefits including but not limited to: reduction of criteria air pollutant emissions, protection of watersheds, economic support for local communities, and critical infrastructure necessary for effective forest management.

Whereas, the Board recognizes that renewable energy generation from excess biomass supports the mandate to provide twenty percent of California's renewable energy resources from biomass material, as directed by Governor Schwarzenegger on April 25, 2006 in Executive Order S-06-06.

Whereas, the Board recognizes the need for the *Biomass for Energy Greenhouse Gas Offset Accounting Protocol* to provide a quality accounting methodology to quantify greenhouse gas reductions from excess biomass for energy production projects.

Now Therefore Be It Resolved, that the Board supports the *Biomass for Energy Greenhouse Gas Offset Accounting Protocol*, as proposed by the Placer County

Air Pollution Control District, and recommends its timely adoption and implementation by the California Air Resources Board.

APPROVED: **ATTEST:**

Stan L. Dixon
Chairman

George D. Gentry
Executive Officer

Dated at Sacramento, California this 7th Day of October 2009

USDA United States Department of Agriculture | Forest Service | Pacific Southwest Region

Regional Office, R5
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File Code: 2400/3000/5100
Date: September 23, 2009

Mr. Stan Dixon, Chairman
California Board of Forestry
P.O. Box 944246
Sacramento, CA 94244-2460

Dear Stan,

I am writing this letter to encourage the Board of Forestry to support the Biomass for Energy Greenhouse Gas Offset Protocol developed here in California by Placer County air quality management district staff. This protocol quantifies the greenhouse gas reduction benefits of converting excess biomass to renewable energy rather than disposal by burning or other means, and has the potential to trigger market mechanisms to invest in and reward beneficial conversion of these materials. If the protocol is integrated into forest and energy policies and programs here in California it will result in significant reductions of greenhouse gasses and hazardous air pollutants and facilitate the removal of excess biomass into beneficial uses.

While this protocol applies to all types of excess biomass, forest biomass is the largest and most important focus. California's productive forests already contain unnaturally high amounts of biomass that are accumulating more each day. This biomass is contributing to increased wildfire size and intensity, a situation that is predicted to worsen due to climate change effects. Currently, forest management projects designed to reduce the effects of wildfire do not have sufficient economic flexibility to process and transport excess biomass to an energy facility. The Biomass for Energy Greenhouse Gas Offset protocol can help provide the funding needed to transport excess biomass to produce ecologically beneficial renewable energy.

California is well-positioned to claim a leadership role in developing the processes and policy framework for effectively utilizing excess biomass in an appropriate, environmentally beneficial and sustainable manner. The State's Renewable Energy Portfolio Standard and greenhouse gas reduction goals under Assembly Bill 32 provide the perfect platform for integration of the Biomass for Energy Greenhouse Gas Offset protocol into developing policies and programs. There are clear and significant benefits to air quality, energy production, and the reduction of greenhouse gases when excess biomass is transported to a facility that uses it to produce energy that displaces fossil fuels. I encourage your support for this creative tool.

Sincerely,

/s/ James M. Peña (for)
RANDY MOORE
Regional Forester

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COLLEGE OF NATURAL RESOURCES
DEPARTMENT OF ENVIRONMENTAL SCIENCE, POLICY & MANAGEMENT
DIVISION OF ECOSYSTEM SCIENCE
137 MULFORD HALL MC 3114

BERKELEY, CALIFORNIA 94720
(510) 643-3130
FAX (510) 643-3490

September 25, 2009

California Board of Forestry and Fire Protection
P.O. Box 944246
Sacramento, CA 94244-2460

Dear Board of Forestry:

The biomass to energy protocols proposed by the Placer County Air Pollution Control District (PCAPCD) focus on reducing CO_2, methane, nitrous oxide, and smoke emissions by providing a cost-effective and climate benefitting emission offset program for parties that must apply for permits from the PCAPCD. This is a well written set of protocols that address air pollution topics that are directly in the arena of the air quality districts and boards.

It is a biological reality that trees do not live forever. When many young trees grow together in competition, the stronger trees eventually overshadow and outcompete the shorter trees. Left unmanaged these shorter trees eventually die and decompose (releasing any CO_2 they sequestered) or die in wildfires (releasing CO_2 and smoke). Conversely, these trees can be proactively removed to reduce the risk of catastrophic wildfires, attacks from insects and disease that prey on over-crowded forest stands, or drought-induced mortality.

Natural competition and self thinning of trees results in considerable quantities of dead vegetation in the forest that is slowly releasing CO_2 as it decomposes. The amount of CO_2 and smoke released in wildfires or prescribed fires is a function of how much biomass is burned. Collecting and removing small trees is expensive and time consuming and as a result much waste wood is left in the forest to decompose or burn in a fire, rather than be sent to a biomass powerplant for electricity generation.

The PCAPCD protocol focus on 'excess biomass' addresses a clear problem of reducing air pollution while not getting overly prescriptive on the larger and more complex issues of quantifying net climate benefits from overall forest management and wood product utilization strategies. Since California imports the vast majority of the wood products we use, it makes sense for the air districts and board to focus on discrete issues that do not involve cross-border accounting. The focused nature of these protocols provides a clean vehicle to direct investment towards CO_2 reductions that will also have complementary benefits in terms of reducing smoke emissions from future wildfires. Recent research from Dr. Anthony Westerling and others at UC Merced suggest that the risk of wildfires will increase under most projected climate scenarios. This implies that the atmospheric costs of doing nothing with these old piles will increase over time. These protocols are a clear example of years of thorough work to produce a cost-effective solution for reducing both air pollution and wildfire risks.

Sincerely,

William Stewart

William Stewart
Forestry Specialist

DEPARTMENT OF FORESTRY AND FIRE PROTECTION
P.O. Box 944246
SACRAMENTO, CA 94244-2460
(916) 653-5602
Website: www.fire.ca.gov

R4

October 5, 2009

Mr. Stan Dixon, Chairman
California Board of Forestry and Fire Protection
P.O. Box 944246
Sacramento, CA 94244-2460

Dear Chairman Dixon:

The Placer County Air Pollution Control District (APCD) has developed a proposed Biomass Waste for Energy Greenhouse Gas (GHG) Offset Accounting Protocol that will measure GHG reductions as a result of using excess forest biomass for energy production. The Department of Forestry and Fire Protection (CAL FIRE) understands that Placer County has requested that the Board of Forestry and Fire Protection (Board) consider a resolution supporting the adoption of the draft protocol by the Air Resources Board (ARB). The resolution supports the request that the ARB adopt this protocol as a qualified voluntary GHG emission reduction protocol under AB 32, the California Global Warming Solutions Act of 2006.

The protocol quantifies the GHG reduction benefits of converting excess biomass to renewable energy rather than disposal by burning or other means, and has the potential to trigger market mechanisms to invest in and reward beneficial conversion of these materials. If a final protocol is integrated into forest and energy policies and programs here in California, it has the potential to significantly reduce GHG and hazardous air pollutant emissions from both controlled and uncontrolled wildland fires.

Currently, the majority of the fuel hazard reduction projects being implemented in California are accomplished with public funds (state and federal). The biomass waste materials created during project implementation has little economic value and is either chipped and scattered in the wildland or removed through open burning. These are not climate friendly actions as there is now either direct emission from open burning that includes not only GHG emission but criteria pollutants or GHG emissions through accelerated decay of vegetation chipped and scattered on the project area.

The implementation of such a protocol has the potential to provide added value to material removed during fuel hazard reduction treatments and thus provide market support for this activity. The co-benefit of creating such a market is three fold: 1) significant reduction criteria pollutants, 2) GHG benefit through reduced use of fossil fuel for energy production, and 3) an ability to treat more acres for wildfire risk reduction with the same level of public funding.

There are clear and meaningful benefits to air quality, energy production, and the reduction of greenhouse gases when excess biomass is transported to a facility that uses it to produce energy that displaces fossil fuels. CAL FIRE encourages the Board to support a resolution that urges the ARB to consider adopting this protocol developed by the Placer County APCD.

Sincerely,

CRAWFORD TUTTLE
Chief Deputy Director

Placer County Fire Safe Alliance

Board of Forestry

September 24, 2009

RE: Support Letter for Biomass Waste Energy Greenhouse Gas Offset Accounting Protocol

Dear Board of Forestry

The Placer County Fire Save Alliance urges the California Board of Forestry to support the Biomass Waste Energy Greenhouse Gas Offset Accounting Protocol. With over 50% of Placer County covered by forested land, a significant amount of biomass material is produced through shaded fuel break and defensible space activities. Placer County Fire Safe Councils have identified 35 necessary projects covering 3,245 acres in the current Community Wildfire Protection Plan (CWPP) for the Western Slope of the Sierra Nevada in Placer County. These projects alone will develop a significant source of biomass material that will otherwise be burned or decay.

There are currently no economically feasible methods to process and transport the large quantity of biomass material produced by CWPP and Shaded Fuel Break projects to energy facilities. The Biomass Waste Energy Greenhouse Gas Offset Accounting Protocol could help provide the funding needed to produce an economical and sustainable biomass to energy program.

The Placer County Fire Safe Alliance membership includes Cal Fire, USFS, and BLM. We believe that great gains can be made in the reduction of greenhouse gases through the movement of material to facilities that use this material to produce energy that displaces fossil fuel usage.

It is the hope of our organizations that this protocol is approved.

Regards,

George Alves
Chair, Placer County Fire Safe Alliance

placerfireallinace@earthlink.net
www.placerfirealliance.org
(530) 886-5319

PCWA
water • energy • stewardship

PLACER COUNTY WATER AGENCY
SINCE 1957

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September 22, 2009
File No.

California Board of Forestry
P.O. Box 944246
Sacramento, CA 94244-2460

SUBJECT: Support of Biomass for Energy Greenhouse Gas Offset Protocol

Dear Board of Forestry:

The Placer County Water Agency (PCWA) urges the California Board of Forestry to support the Biomass for Energy Greenhouse Gas Offset Protocol. This protocol will encourage the beneficial use of excess woody biomass to produce renewable energy. The excess biomass addressed in this protocol is otherwise subject to open-burning or decay. Both of these approaches produce significant greenhouse gas emissions and hazardous air pollutants and do not provide the positive societal benefits of renewable energy production.

While this protocol applies to all types of excess biomass, forest biomass is the largest and most important focus, so it is appropriate for the Board of Forestry to provide a leadership role by supporting adoption of the protocol.

Biomass is gaining positive visibility nationally as an important alternative energy source. California's productive forest lands already contain unnaturally high volumes of biomass and are accumulating more each day. High biomass volume can contribute to increased wildfire size and intensity; a situation that could worsen if current predictions regarding the effects of climate change prove accurate. Because of existing legislation and efforts like the Biomass for Energy protocol, California is well-positioned to claim a leadership role in developing the technology and processes for effectively utilizing excess biomass in an appropriate, sustainable manner.

There are clear and significant benefits to air quality, energy production and the reduction of greenhouse gases when excess biomass is transported to a facility that uses it to produce energy that displaces fossil fuels. Currently, forest management projects designed to mitigate catastrophic wildfire do not have sufficient economic flexibility to process and transport excess biomass to an energy facility. The Biomass for Energy protocol can help provide the funding needed to produce an economically, socially and ecologically sustainable and beneficial biomass-to-energy program.

PCWA asks that the California State Board of Forestry strongly support the Biomass for Energy Greenhouse Gas Offset Protocol.

Sincerely,
PLACER COUNTY WATER AGENCY

Einar Maisch, P.E.
Director of Strategic Affairs

ELM:bb

El Dorado County Fire Safe Council

P.O. Box 1237
Pollock Pines, CA 95726
Phone/Fax: (530) 647-1098
Website: edcfiresafe.org Email: EDCFiresafe@comcast.net

FireSafe COUNCIL "Public and Private Partners Working Together to Protect People, Homes, and Natural Resources"

September 30, 2009

California Board of Forestry and Fire Protection
P.O. Box 944246
Sacramento, CA 94244-2460

Dear Board of Forestry,

The El Dorado County Fire Safe Council (EDCFSC) has been proactively pursuing finding solutions to the exponentially increasing woody biomass on our forests, both private and public. We work very closely with all of our stakeholders, the Eldorado National Forest, the California Department of Forestry and Fire Protection (CalFire), Sierra Pacific Industries, as well as other private timber related businesses. Our options with the recent closure of the SPI mill in Camino have been drastically reduced on all levels including on-going fuels reduction projects as well as those that have been approved for this coming fiscal year. The problem is huge in that there is no market for our timber that will cover the costs of transporting not only the timber but the woody biomass resulting from these projects.

It is for this reason that I am writing to you to show our strong support of the Biomass to Energy protocols proposed by the Placer County Air Pollution Control District (PCAPCD) that focus on reducing CO2, methane, nitrous oxide, and particulate matter. All of this is accomplished while providing economic incentives for all of us who are involved in addressing the complex issues of hazardous fuels reduction. National forests in California are approaching a critical state and we must put aside our differences (philosophical and political) and work collaboratively to solve these problems.

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In 2008 the EDCFSC commissioned a Preliminary Biomass Fuel Availability and Feasibility Review for Siting Biomass Power Facilities in El Dorado County California. TSS Consultants of Rancho Cordova did an excellent job of this initial assessment and a copy of this study can be obtained by contacting the EDCFSC at www.edcfiresafe.org. While the study determined that El Dorado County does have the necessary woody biomass fuel resources, we continue to have the basic challenge of getting commitments from the Forest Service and other stakeholders for the on-going supply of these resources to sustain any kind of biomass facility in our County. Litigation, uncertain federal budgets and few ready markets for sawlogs removed as a result of fuels reduction projects, have a huge impact on our ability to plan and promote any realistic commercial scale biomass utilization facility.

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I am a member of a multi-county, central Sierra group, the Sustainable Forestry Action Coalition (SFAC), made up of County Supervisors, Chambers of Commerce, and timber industry representatives. We are actively working on bringing these issues to key policy-makers both at the national and state level. The mission of the EDCFSC is primarily one of educating and motivating our residents to take responsibility for protecting their homes, property and communities from catastrophic wildland fires. We also work collaboratively with our public agency partners to obtain funding for fuels reduction projects. However, there are few alternatives to burning the slash in the forest or sending the woody bi-products of residential clearing "down the hill" to biomass facilities. The first option creates a huge impact on air pollution to say nothing of the negative impact the resulting smoke has on our residents. Transporting our green waste to Sacramento is expensive and the resulting vehicle emissions are significant.

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The focused nature of the protocols proposed by the PCAPCD provides a clean vehicle to direct investment towards greenhouse gas reductions that will also have complementary benefits in terms of reducing smoke emissions from future wildfires. These protocols are a clear example of years of thorough work to produce a cost-effective solution for reducing both air pollution and wildfire risks. I strongly urge your endorsement of their proposal and look forward to the ensuing dialog between all those committed to working together for solutions.

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Sincerely,

Vicki D. Yorty
Executive Coordinator
El Dorado County Fire Safe Council

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Sierra Pacific Industries

P.O. Box 496028 • Redding, CA 96049-6028 • (530) 378-8000

October 3, 2009

Mr. Stan Dixon, Chairman
California Board of Forestry
P.O. Box 944246
Sacramento, CA 94244-2460

Dear Stan,

We are writing in support of the Biomass for Energy Greenhouse Gas Offset Protocol developed by the Placer County Air Quality Management District. We urge the Board of Forestry and Fire Protection to adopt the resolution offered to the Board by Placer County. The resolution supports the request that the Air Resources Board adopt this protocol as a qualified voluntary Greenhouse Gas (GHG) emission reduction protocol under Assembly Bill 32.

Sierra Pacific Industries is the largest producer of biomass electricity in California. Our sawmills and in-forest projects generate wood byproducts that are the primary source of fuel for these plants. In addition to producing renewable energy, these plants offer a means to reduce the threat of wildfires in California's forests. In that regard, the Placer County protocol quantifies the greenhouse gas reduction benefits of converting excess biomass to renewable energy rather than disposal by natural decay or burning in the forest. It also has the potential to trigger market mechanisms to increase the productive use of these materials.

Much of California's forest land base contains excessively high levels of vegetation compared to historic standards. Ongoing forest management activities are the best mechanism for reducing this vegetation and the threat of wildfires and GHG production. However, forest management projects designed to reduce the effects of wildfire often do not have sufficient economic value to process and transport biomass to our plants. Thus, much of the material that can and should be removed from the forests is being left behind. The Biomass for Energy Greenhouse Gas Offset protocol can help provide the economic incentives necessary to transport biomass to electric generation facilities.

As you know, well-managed, healthy forests are a key component of greenhouse gas reduction efforts. We believe that it is essential to remove more biomass from California's forests in order to help create these conditions. Approval of the biomass protocol would be a significant step in that direction.

Sincerely,

Mark Pawlicki

Mark Pawlicki
Director, Government Affairs