

July 18, 2012

Attn: Climate Action Reserve

Subject: Comments on "Forest Offset Projects on Federal Lands" white paper prepared by Ecofar for the Climate Action Reserve

Dear Climate Action Reserve Staff,

The Placer County Air Pollution District (District) appreciates the opportunity to comment on this important proposal. We are in strong support for federal lands to participate in forest GHG offset projects.

The District has oversight and responsibility for air quality in Placer County, which includes management of the air pollution impacts of prescribed burning, open burning, and wildfires. Thus, we have a direct investment in forest management practices and policies. Over one half (500,000 acres) of our County is forested land located in the central Sierra Nevada Mountain range. The majority is federally managed, including portions of three U.S. National Forests -- the Tahoe, Tahoe Basin Management Unit, and Eldorado. The combination of wet winters and dry hot summers makes our forested lands some of the most productive in the world. However, after many decades of successful fire suppression efforts, an earlier focus on timber harvest, and a current lack of ability to complete hazard reduction on a sufficient number of acres, these productive forests have unnaturally high levels of biomass material (hazardous fuels). This situation is present throughout much of the Sierra Nevada range. As such, these semi-arid, mixed conifer forests are at significant risk for catastrophic wildfire, insect attack, and disease. In fact, over the last couple years, a number of severe wildfires have devastated over 60,000 acres of forested land in our County. The Robbers Fire is currently burning in the heart of Placer County and has consumed over 2,500 acres with only 30% containment.

Federal forests are in vital need of fuel hazard reduction to restore forest health, create a fire resilient condition, and protect carbon that is stored in trees. At the same time, federal appropriated funds available to conduct the thinning projects have declined, and the forest management infrastructure in the rural communities is being lost. For all of these reasons, it is critically important that federal agencies are able to take advantage of the forest offset project protocol which will assist in conducting the much needed forest management activities.

We disagree that management activities of forest thinning and hazardous fuel reduction "can not reduce net emissions by reducing emissions from wildfire." In fact, under the conditions of high fuel loads and high fire risk probability that currently exit through the semi-arid mixed conifer forests of the Sierra Nevada, certain thinning prescriptions are being shown to have important carbon benefits under on-going research being sponsored by the District. These research results will be supplied to you in the upcoming months when our work is completed.

We recommend that the forest offset project protocol be expanded to include a module which directly values the carbon benefits of thinning and fuel hazardous reduction projects – that occur through avoided wildfire emissions and reduced tree mortality by reducing fire intensity and size. We are in the process of finalizing a procedure to accurately quantify the carbon benefits accrued from thinning prescriptions. This will be included in the above mentioned report.

We recommend that there should be accounting for the carbon value of the commercial lumber products from such thinning activities in terms of their use in lieu of alternative products like steel and concrete that have a much higher carbon footprint. Lumber products are not only excellent carbon banks, but are renewable and highly sustainable. As opposed to steel (requires non-renewable iron ore) and cement (requires non-renewable minerals).

We recommend that the forest offset project protocol be expanded to include a module to value the carbon benefits from the use of excess waste biomass from forest thinning projects for renewable energy as an alternative to the common disposal practice of open burning. We have developed a comprehensive protocol for this type of project, which is included as an attachment to these comments. The protocol has been peer reviewed and supported by numerous public and private stakeholders, see letters attached.

We disagree that forest offset projects on federal lands cannot be definitively demonstrated to be real, additional, and permanent. Federal land management is guided by well-documented over-arching plans and each management project requires substantive environmental analysis that meets National Environmental Policy Act criteria.

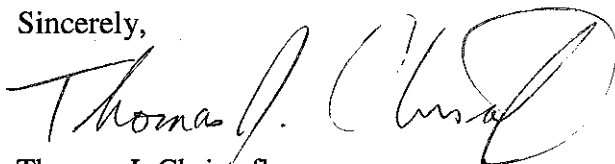
We disagree that the opportunity for forest offset projects on federal lands is “modest.” In fact, federally managed forest lands comprise a large fraction of total forested land in the U.S. As the report correctly describes, federal forested lands have “high carbon stocks”. Much of the forests have reached their biological limits to store carbon due to existing management practices that have facilitated overstocked forest conditions. However as such, the report ignores the extreme risk for loss through catastrophic wildfire, insect attack, and disease. There is critical need for active forest management to retain these stocks, utilize excess material for wood products and renewable energy, and stimulate and optimize future growth. The forest offset protocol must properly value these activities which act to preserve and protect on the ground carbon stocks. The detailed efforts to ensure forest offset projects are “permanent” entirely ignore the real threat to Sierra Nevada forests from wildfire and disease resulting from the severely high fuel load – which the protocol, as is, would further encourage. In addition, the level of management on national forest land that is funded by appropriated funds set by congress is well below that which is called for in existing documents that guide national forest management, so there is ample opportunity for “additionality” that can generate carbon credits.

We disagree that “burned areas regenerate in the absence of human intervention.” This may be true when fires burn at low and medium severity — as happened more often before existence of the current high levels of biomass. But many fires today burn at unnaturally high intensity and cover unnaturally large acreages. This significantly lessens the number of residual surviving trees that can provide seed for natural regeneration and increases the likelihood the fire areas will become brush fields — in many cases, particularly with the onset of effects of climate change, permanent brush fields, that do not sequester carbon at the rate of established forests. Further, intense wildfire events will “bake” soils with high clay content (much of Sierra Nevada has soils with high clay content), which result of hydrophobic conditions that significantly reduce the likelihood of natural forest regeneration. Another reason for lack of regeneration in fire areas is because post-fire rehabilitation/salvage is not possible because of factors including controversy, lack of feasible access, poor site productivity, and unsafe working conditions for planting crews (dead trees are a threat to crews whenever there is any wind). Without some reduction of the huge amount of dead wood/future fuels on the forest floor, permanence of reforestation is more difficult to ensure. In summary, the lack of opportunity for additional post-fire reforestation on federal land is not as much related to natural regeneration that is now occurring or to lack of funding for reforestation as it is to other factors. Some good, additional reforestation opportunities do exist on federal lands.

We believe the ability of local national forests to “accept the obligations that are required of offset project owners” is a technical issue that can be resolved with either administrative or legislative means. Given the real and potentially significant benefit from participating in carbon credit programs, there is adequate incentive to precipitate an administrative or legislative solution and the completion of such a solution would be sooner if the intent to include federal lands was overtly communicated. The Forest Service is actively pursuing the concept of “ecosystem services”, which include carbon, and this further indicates the likelihood for Forest Service interest in developing solutions to any technical barriers.

The health of California’s forests and watersheds (regardles of ownership) are at significant risk. While the comments provided here are relevant to federally managed lands, they also apply to privately owned lands. A well thought-out forest offset protocol that includes federal forest lands would be a significant step in the process required to restore California’s forested landscapes.

Sincerely,

A handwritten signature in black ink, appearing to read "Thomas J. Christofk", with a large, stylized circular flourish at the end.

Thomas J. Christofk

Air Pollution Control Officer, Placer County Air Pollution Control District

cc: Mary Nichols, Chair, California Air Resources Board

John Laird, Secretary, California Resources Agency  
Randy Moore, Regional Forester, Pacific Southwest Region, USFS  
Ken Pimlott, Director, California Dept of Forestry and Fire Protection

**Attachments:**

Biomass Waste for Energy Offset Protocol  
Letters endorsing the Biomass Waste for Energy Offset Protocol

# **Biomass Waste for Energy Project Reporting Protocol**

GHG Emission Reduction Accounting

**Version 4.0**

June 2011

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## **1. Introduction**

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

The protocol is for projects which process and transport biomass waste 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 waste would have otherwise been disposed of through: (1) open burning, (2) decay and decomposition in the field; or (3) landfill. The protocol is also limited to biomass waste that is the result of sustainable harvesting operations or urban biomass waste generation.

Biomass waste for energy projects reduce GHG emissions through: (1) avoiding methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) emissions that occur during disposal through open burning, decay and decomposition, and/or landfilling; and (2) producing renewable energy that displaces GHG emissions from fossil fuel combustion needed for an equivalent energy supply.

## **2. GHG Reduction Project – Biomass Waste for Energy**

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

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<sub>4</sub>) has a global warming potential characterization factor of 21 tons of CO<sub>2e</sub> per ton of methane.

Nitrous oxide (N<sub>2</sub>O) has a global warming potential characterization factor of 310 tons CO<sub>2e</sub> per ton N<sub>2</sub>O.

### 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 waste 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.
- Landfilled.

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 waste 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 control of a project participant, or an entity that has a contractual agreement or is an affiliate with the project developer.
- Produce energy that is valuable and utilized, and would not have otherwise been generated.

### 3.4 Energy Sales

Energy produced from the biomass wastes must be documented to not be claimed for use by other projects for GHG mitigation purposes.

### 3.5 Location

This protocol is applicable to biomass recovery project operations that are located in the United States.

### 3.6 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 waste 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 waste 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<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O.
- Decay and decomposition of biomass disposal in field. Includes quantification of CH<sub>4</sub> and N<sub>2</sub>O.
- Landfill. Includes quantification of CH<sub>4</sub>.

Biomass Waste for Energy Project

- Fossil fuel fired engines, at the site where the biomass waste 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<sub>2</sub>.
- Fossil fuel fired engines used to facilitate transport of excess biomass waste from the site of generation to the energy recovery facility. Includes quantification of CO<sub>2</sub>.
- Biomass usage at the energy recovery facility. For biomass combustion boilers, quantification of CO<sub>2</sub> is required. The quantification of CH<sub>4</sub> and N<sub>2</sub>O 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<sub>4</sub> and N<sub>2</sub>O.
- 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<sub>2</sub> emissions.
- Fossil fuel fired engines used for transportation of equipment and personal to the excess biomass processing site. Includes quantification of CO<sub>2</sub> emissions.
- Fossil fuel fired engines used at biomass waste for energy facility for operation of auxiliary equipment, such as conveyors and loaders. Includes quantification of CO<sub>2</sub> emissions.

## 5 GHG Reduction Calculation Methods

### 5.4 Biomass Waste for Energy Project

#### 5.4.1 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:

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

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.)

#### 5.4.2 Energy Produced from Biomass

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

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

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.). 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.

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

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

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<sub>e</sub> 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.

#### 5.4.3 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<sub>E</sub>, as:

$$\text{GHG}_E = E_{BM} * \text{EF}_E \quad (\text{Eq. 4})$$

where:

$\text{EF}_E$  Emission factor for CO<sub>2e</sub> from energy generation that is displaced by the biomass for energy project (tons CO<sub>2e</sub> / 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<sub>2e</sub> / MW – based on marginal electricity generation supplied by a combined cycle natural gas turbine plant.

#### 5.4.4 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<sub>AUX</sub>, as:

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

where:

$$\text{GHG}_{TRANS} = \text{VM} * \text{MPG} * \text{EF}_{FF} \quad (\text{Eq. 6})$$

GHG <sub>TRANS</sub>	CO <sub>2e</sub> 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 <sub>FF</sub>	Emission factor for CO <sub>2</sub> for fossil fuel combustion (lb CO <sub>2</sub> / gal fuel) - - for diesel, 22.23 lb CO <sub>2</sub> /gallon; for gasoline, 19.37 lb CO <sub>2</sub> /gal.

and

$$\text{GHG}_{\text{PROC}} = (\text{T}_{\text{FF}} * \text{R}_{\text{FF}}) * \text{EF}_{\text{FF}} \quad (\text{Eq. 7})$$

where:

T <sub>FF</sub>	Time equipment used to operate biomass processing equipment, including grinders, chippers, shredders, conveyors, and loaders, bulldozers, and excavators. (Reported in hours).
R <sub>FF</sub>	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<sub>2</sub> from biomass combustion, as:

$$\text{GHG}_{\text{BCOM}} = \text{BM}_{\text{T, D}} * \text{EF}_{\text{CO}_2 \text{ BM}}$$

where:

EF <sub>CO<sub>2</sub> BM</sub>	Emission factor for CO <sub>2</sub> from biomass combustion, recommended as 1.8 tons CO <sub>2</sub> / ton dry biomass.
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#### 5.4.5 GHG Emissions From Biomass for Energy Project

Determine the biomass for energy project GHG emissions, GHG<sub>PROJ</sub>, as:

$$\text{GHG}_{\text{PROJ}} = \text{GHG}_{\text{AUX}} - \text{GHG}_{\text{E}} + \text{GHG}_{\text{BCOM}} \quad (\text{Eq. 8})$$

## 5.5 Baseline

### 5.5.1 Baseline Biomass Disposal Practice

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

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

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

$$BM_{LF, D} = BM_{T, D} * X_{LF} \quad (\text{Eq. 11})$$

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.

$X_{LF}$  Fraction (dry weight %) of biomass that would have been landfilled.

### 5.5.2 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,  $GHG_{OB}$ , field decay and decomposition,  $GHG_{DD}$ , and landfilled,  $GHG_{LF}$ , as:

$$GHG_{BASE} = GHG_{OB} + GHG_{DD} + GHG_{LF} \quad (\text{Eq. 12})$$

where:

$GHG_{BASE}$  Total baseline greenhouse gas emissions, as CO<sub>2</sub> equivalent (tons CO<sub>2e</sub>)

$GHG_{OB}$  Greenhouse gas emissions from uncontrolled open burning, as CO<sub>2</sub> equivalent (tons CO<sub>2e</sub>)

$GHG_{DD}$  Greenhouse gas emissions from field decay and decomposition, as CO<sub>2</sub> equivalent (tons CO<sub>2e</sub>)

$GHG_{LF}$  Greenhouse gas emissions from landfilling, as CO<sub>2</sub> equivalent (tons CO<sub>2e</sub>)

and,

$$GHG_{OB} = (EF_{OB, CO_2} * BM_{OB, D} * BF) + (EF_{OB, CH_4} * BM_{OB, D} * BF * 21) + (EF_{OB, N_2O} * BM_{OB, D} * 310) \quad (Eq. 13)$$

$$GHG_{DD} = EF_{DD, CH_4} * BM_{DD} * 21 + EF_{DD, N_2O} * BM_{DD} * 310 \quad (Eq. 14)$$

$$GHG_{LF} = EF_{LF, CH_4} * BM_{DD} * 21 \quad (Eq. 15)$$

where:

$EF_{OB}$  Emission factor for CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O from uncontrolled open pile burning of biomass. Recommend the use of:

- CO<sub>2</sub> : 1.8 tons CO<sub>2</sub> / ton dry biomass
- CH<sub>4</sub> : 0.004 ton CH<sub>4</sub> / ton dry biomass
- N<sub>2</sub>O : 0.00015 ton N<sub>2</sub>O / tons dry biomass

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

$EF_{DD}$  Emission factor for CH<sub>4</sub> and N<sub>2</sub>O from in-field decay and decomposition of biomass. Recommend the use of 0.05 ton CH<sub>4</sub> / ton dry biomass. Recommend the use of 0 tons N<sub>2</sub>O / ton dry biomass.

$EF_{LF}$  Emission factor for CH<sub>4</sub> from landfilling of biomass. Recommend the emission factor be determined using the procedure contained in the Climate Action Reserve Landfill Protocol for GHG Offset Projects.

## 5.6 Net GHG Project Reduction

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

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

## **6      Monitoring**

Project data monitoring requirements are shown Form B.

## **7      Reporting and Recordkeeping**

### **7.4      Project Commencement**

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

### **7.5      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.

### **7.6      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.

**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, heat, fuels).

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

**Biomass waste 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<sub>2</sub>):** Greenhouse gas consisting of a single carbon atom and two oxygen atoms.

**CO<sub>2</sub> equivalent (CO<sub>2e</sub>):** The quantity of a given GHG multiplied by its total global warming potential.

**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).

**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<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulfur hexafluoride (SF<sub>6</sub>), 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 CO<sub>2</sub>

**kWh<sub>e</sub>:** Kilowatt-hour of electricity.

**Methane (CH<sub>4</sub>):** Greenhouse gas with a GWP of 21, consisting of a single carbon atom and four hydrogen atoms.

**MMBtu:** Million British Thermal Units.

**MWh<sub>e</sub>:** Megawatt-hour of electricity.

**Nitrous oxide (N<sub>2</sub>O):** Greenhouse gas 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," Atmos. 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 Laboratory, 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	CH <sub>4</sub> as reported by author	CH <sub>4</sub> 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, 7 <sup>th</sup> Conference on Fire and Forest Meteorology, Fort 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 of 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, Atmos. Chem. Phys. Discuss., Vol. 5, pp. 10455-10516, 2005.

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

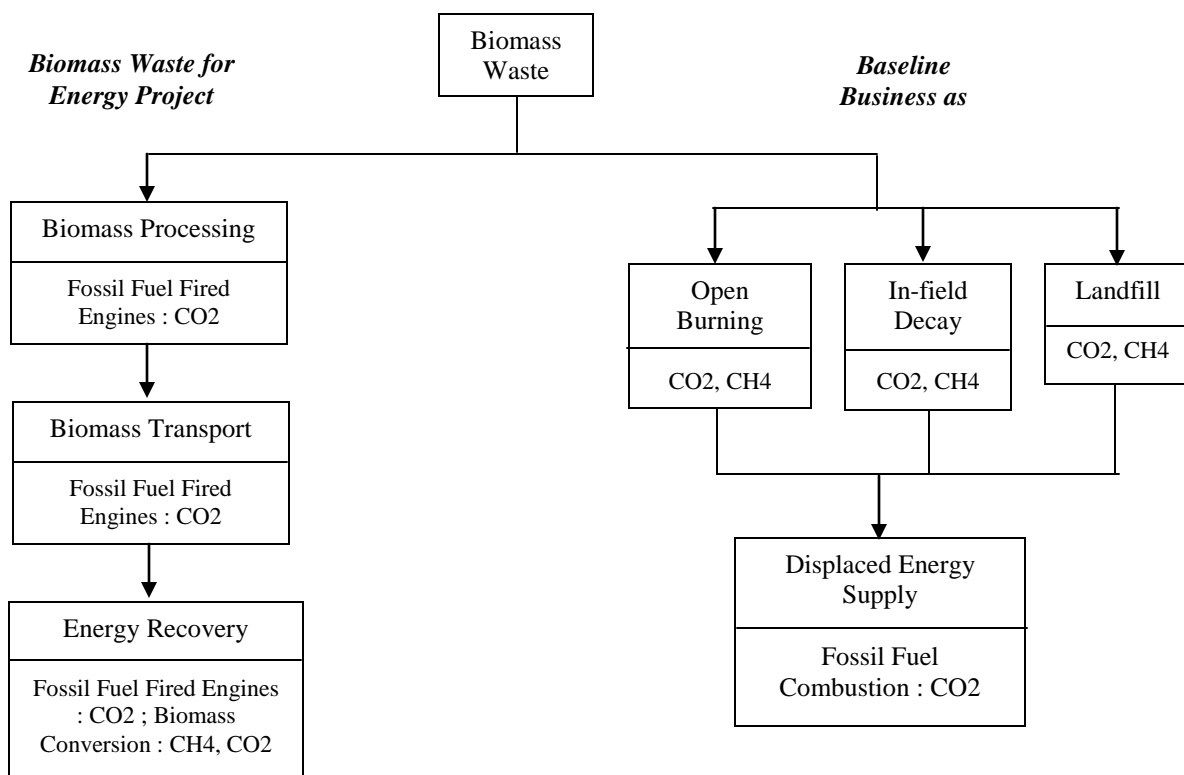
Assumes 9% carbon in biomass is converted to carbon in methane. Biomass has a molecular formula of  $C_6H_{10}O_6$ .

Nitrous Oxide Emission Factors for Decay and Decomposition of Biomass

Engineering judgment. At temperatures of in-field decay and decomposition,  $\text{N}_2\text{O}$  is expected to be negligible. Nitrogen in fuel will go to  $\text{NH}_3$ . 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
<b>Baseline</b>		
Open Uncontrolled Pile Burning	CO <sub>2</sub>	Included
	CH <sub>4</sub>	Included
	N <sub>2</sub> O	Included
In-field Decay and Decomposition	CO <sub>2</sub>	Included
	CH <sub>4</sub>	Included
	N <sub>2</sub> O	Included
Landfill	CO <sub>2</sub>	Included
	CH <sub>4</sub>	Included
<b>Biomass for Energy Project</b>		
Transportation -- engine combustion of fossil fuels	CO <sub>2</sub>	Included
	CH <sub>4</sub>	Not included; negligible
	N <sub>2</sub> O	Not included; negligible
Processing and Handling at Generation Site -- engine combustion of fossil fuels	CO <sub>2</sub>	Included
	CH <sub>4</sub>	Not included; negligible
	N <sub>2</sub> O	Not included; negligible
Energy Recovery Facility	CH <sub>4</sub>	Not included for combustors; may need to be included for other energy processing types
	CO <sub>2</sub>	Included
	N <sub>2</sub> O	Not included; negligible
Processing and Handling at Energy Recovery Facility -- engine combustion of fossil fuels	CO <sub>2</sub>	Included
	CH <sub>4</sub>	Not included; negligible
	N <sub>2</sub> O	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:	
<b>Biomass Generation &amp; Disposal Information</b>	
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)	
<b>Biomass Energy Recovery Information</b>	
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 <sub>T, w</sub>	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 <sub>BM</sub>	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	
$X_{LF}$	Fraction of biomass that would have been landfilled	%, wet biomass waste	Determined based on current economics and operating practices	Start of program, and updated as needed	

**Form C. Reporting**

<b>Date:</b>	
<b>Project Title:</b>	
<b>Project Developer:</b>	
<b>Reporting Period:</b>	

Parameter	Description	Data Unit	Reported Value
BM <sub>DD, D</sub>	Biomass left in field to decay	bone dry tons	
BM <sub>OB, D</sub>	Biomass open burned	bone dry tons	
BM <sub>LF, D</sub>	Biomass landfilled	Bone dry tons	
BM <sub>T, D</sub>	Biomass delivered to energy recovery facility, adjusted for moisture	bone dry tons / delivery	
BM <sub>T, W</sub>	Biomass delivered to energy recovery facility	wet tons / delivery	
E <sub>BM</sub>	Energy produced from energy recovery facility	kWh	
EF <sub>DD, CH4</sub>	Emission factor for in-field decay and decomposition	tons CH <sub>4</sub> /ton dry biomass	
EF <sub>DD, N2O</sub>	Emission factor for nitrous oxide from in-field decay and decomposition	tons N <sub>2</sub> O/ton dry biomass	
EF <sub>E</sub>	Emission factor for CO <sub>2</sub> e for existing electricity generation	tons CO <sub>2</sub> e/unit energy	
EF <sub>FF</sub>	Emission factor for fossil fuel combustion	lb CO <sub>2</sub> /gallon fuel	
EF <sub>OB, CH4</sub>	Emission factor for methane from open pile burning	tons CH <sub>4</sub> /ton dry biomass	
EF <sub>OB, N2O</sub>	Emission factor for nitrous oxide from open pile burning	tons N <sub>2</sub> O/ton dry biomass	
EF <sub>LF, CH4</sub>	Emission factor for methane from landfill	tons CH <sub>4</sub> /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 <sub>AUX</sub>	GHG resulting from ancillary biomass handling, processing, and transport	tons CO <sub>2</sub> e	
GHG <sub>BASE</sub>	GHG resulting from baseline disposal practices	tons CO <sub>2</sub> e	
GHG <sub>DD</sub>	GHG resulting from decay and decomposition	tons CO <sub>2</sub> e	
GHG <sub>E</sub>	GHG displaced from energy production from biomass	tons CO <sub>2</sub> e	
GHG <sub>NET</sub>	Net GHG reductions from	tons CO <sub>2</sub> e	
GHG <sub>OB</sub>	GHG resulting from open burning activities	tons CO <sub>2</sub> e	
GHG <sub>LF</sub>	GHG resulting from landfilling activities	tons CO <sub>2</sub> e	
GHG <sub>PROC</sub>	GHG resulting from ancillary biomass handling and processing	tons CO <sub>2</sub> e	
GHG <sub>PROJ</sub>	GHG resulting from the biomass waste to energy project	tons CO <sub>2</sub> e	
GHG <sub>TRANS</sub>	GHG resulting from transport operations	tons CO <sub>2</sub> e	
HHV <sub>BM</sub>	Higher heating value of biomass	Btu/lb, dry	
M	Moisture content of biomass	moisture, wt. %	
MPG	Transport vehicle gas mileage	miles / gallon	
Q <sub>BM</sub>	Heat content per delivery of biomass at facility	MMBtu	
R <sub>FF</sub>	Average volumetric fuel use rate for processing equipment	gallons/hour	
T <sub>FF</sub>	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	
$X_{LF}$	Fraction of biomass that would have been landfilled	%, wet biomass	

CHRISTOPHER D. BROWN, AICP  
Air Pollution Control Officer

DONNA ROBERTS NASH  
Program Coordinator



306 East Gobbi Street  
Ukiah, California 95482  
(707) 463-4354 Fax: 463-5707  
mcaqmd@co.mendocino.ca.us  
www.mendoair.org

**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*



**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

Support for the Placer County APCD Biomass For Energy Greenhouse Gas Offset  
Protocol  
Page 2

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.

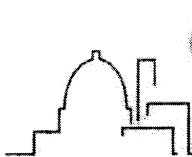
Sincerely,



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  
The Power To Do More.™

---

*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.

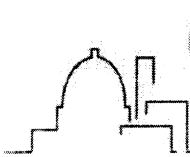
Sacramento and other parts of California's Central Valley are severely impacted by air quality issues which are projected to worsen as a result of climate change. Forest fires have a significant impact on local air quality, release large amounts of CO<sub>2</sub>, and are projected to worsen as a result 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.

---

DISTRICT HEADQUARTERS

6201 S Street, Sacramento CA 95817-1899

**SMUD****SACRAMENTO MUNICIPAL UTILITY DISTRICT**  
The Power To Do More.™

*P.O. Box 15830, Sacramento, CA 95852-1830; 1-888-742-SMUD (7683)*

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](mailto:mdeange@smud.org)  
Telephone: (916) 732-6589  
Fax: (916) 732-6423

**BOARD OF FORESTRY AND FIRE PROTECTION**

P.O. Box 944246  
SACRAMENTO, CA 94244-2460  
Website: [www.bof.fire.ca.gov](http://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.

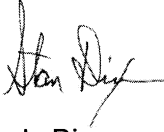
The Board resolution recognizes that removal of excess woody biomass from forested landscapes in California is regulated through state and federal policies. Unfortunately, much of this material is currently disposed of through open pile burning or is shredded and left to decay in the forest. The alternative 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](mailto:george.gentry@fire.ca.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Stan Dixon", with a stylized flourish at the end.

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:**



**Stan L. Dixon  
Chairman**

**ATTEST:**



**George D. Gentry  
Executive Officer**

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

**2009**



United States  
Department of  
Agriculture

Forest  
Service

Pacific  
Southwest  
Region

Regional Office, R5  
1323 Club Drive  
Vallejo, CA 94592  
(707) 562-8737 Voice  
(707) 562-9240 Text (TDD)

---

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





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<sub>2</sub>, 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<sub>2</sub> they sequestered) or die in wildfires (releasing CO<sub>2</sub> 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<sub>2</sub> as it decomposes. The amount of CO<sub>2</sub> 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<sub>2</sub> 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,

A handwritten signature in black ink that reads "William Stewart". The script is fluid and cursive, with a long horizontal stroke at the end of the word "Stewart".

William Stewart  
Forestry Specialist

**DEPARTMENT OF FORESTRY AND FIRE PROTECTION**

P.O. Box 944246  
SACRAMENTO, CA 94244-2460  
(916) 653-5802  
Website: [www.fire.ca.gov](http://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.

CONSERVATION IS WISE-KEEP CALIFORNIA GREEN AND GOLDEN

PLEASE REMEMBER TO CONSERVE ENERGY. FOR TIPS AND INFORMATION, VISIT "FLEX YOUR POWER" AT [WWW.CA.GOV](http://WWW.CA.GOV).

Stan Dixon, Chairman  
October 5, 2009  
Page Two

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,

A handwritten signature in black ink, appearing to read 'Crawford Tuttle', with a long horizontal line extending to the right.

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 Safe 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,

A handwritten signature in black ink, appearing to read "George Alves".

George Alves  
Chair, Placer County Fire Safe Alliance

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



PLACER COUNTY WATER AGENCY  
SINCE 1957

BOARD OF DIRECTORS	BUSINESS CENTER
Gray Allen, District 1	144 Ferguson Road
Alex Ferreira, District 2	MAIL
Lowell Jarvis, District 3	P.O. Box 6570
Mike Lee, District 4	Auburn, CA 95604
Ben Mavy, District 5	PHONE
	530.823.4850
David Breninger, General Manager	800.464.0030
Ed Tiedemann, General Counsel	WWW.PCWA.NET

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.

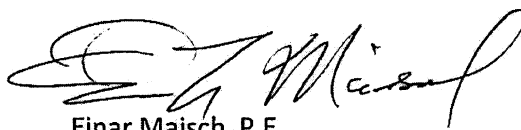
Biomass is gaining positive visibility nationally as an important alternative energy source. California's productive forest lands already contain unnaturally high volumes of biomass and are accumulating more each day. High biomass volume can contribute to increased wildfire size and intensity; a situation 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

A handwritten signature in black ink, appearing to read 'E. Maisch', with a stylized flourish at the end.

Einar Maisch, P.E.  
Director of Strategic Affairs

ELM:bb

Sept 2009



# El Dorado County Fire Safe Council

P.O. Box 1237

Pollock Pines, CA 95726

Phone/Fax: (530) 647-1098

Website: [edcfiresafe.org](http://edcfiresafe.org) Email: [EDCFiresafe@comcast.net](mailto:EDCFiresafe@comcast.net)

"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 CO<sub>2</sub>, 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.

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

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[www.edcfiresafe.org](http://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.

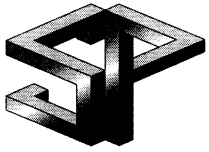
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Sincerely,

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

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1



# Sierra Pacific Industries

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

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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,

A handwritten signature in cursive script, reading "Mark Pawlicki".

Mark Pawlicki  
Director, Government Affairs