Placer County Biomass Program

An Overview of the Initiatives
Challenges and Opportunities

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Placer County Air Pollution Control District

Presented at
6th Annual Forum of the California Biomass Collective

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Placer County
Air Pollution Control District

- Special District (9 member governing board)
- Located within 3 separate Air Basins
- Programs include:
  - Permitting and inspections of stationary sources
  - Enforcement of Air Pollution Control Laws and Regulations
  - Air Monitoring
  - Air Quality Planning – CEQA/NEPA & Attainment/Transport
  - Clean Air Grants and Incentive Programs
  - Public Outreach
  - Air Toxics
  - Implement Special Projects to reduce Air Pollutants
  - Manage Open Burning such as Agricultural/Forestry
Placer County Statistics

- Sacramento Valley to Lake Tahoe
  - Valley, foothills, mountains
- Exploding population, rapid development
- 550,000 acres of forested land (> 50% of total county land)
- Three National Forests
  - Lake Tahoe Basin Management Unit
  - Tahoe National Forest
  - Eldorado National Forest
- High property values, many wildland urban interface
- Recent major wildfires
  - Gap, Ponderosa, Star, Ralston, American River Complex
- Population: 330,000
Air Quality Comparison

(Relative emissions)

Note: Other emissions not included are: Transport and firefighting related; localized emissions impact from fuel processing plant; fugitive dust after burns; emissions from forest decay.
Placer County’s Biomass Program

**Existing Drivers**
Policy
- Calif Bioenergy Plan
- USFS Stewardships
- Renewable energy credits
- Fire suppression vs fire prevention

Laws & Regulations
- AB32
- SB97
- Clean Air Act
- CEQA / NEPA

Market/Economic Factors
- Carbon credits
- Forest management
- Biomass fuel cost
- Fossil fuel cost
- Fire suppression

**Forest Sector Non-Subsidized Solutions**
(Environmental & Public Health Improvements)
- GHG Reductions
- Public Health Research Air Quality Impacts
- Monetize Benefits
- Watershed Ecosystem
- Fire fighting
- Public health
- Recreation
- Air quality
- Avoided fires

- Renewable Energy from Biomass
- Forest Health Improvements
- Air Quality Enhancement
- Forest Fuel Treatment Economic & Emission Analysis
- Land Development (CEQA) / Carbon Offsets

- Bio Energy Facility Development
- Wildfire Risk Reduction
- Regional Biomass Material Collection and Processing
- Fire as a Resource Management Tool (Prescribed burning & Smoke management)
- Wildfire Mitigation (CWPP, Defensible space creation by mechanical means)
Placer County’s Biomass Program

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**Placer County’s Biomass Programs**
- Forest Fuel Treatment
- Economic & Emission Analysis
- Land Development (CEQA) / Carbon Offsets
- GHG Reductions
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Forest Fuel Treatment
Economic and Emission Analysis

Case Study Demonstration Project:
- Post-harvest Slash Piles, Tahoe National Forest (Foresthill, CA)
- Chipping and transport to biomass to energy facility (Lincoln, CA), 60 miles
  - 10,000 green tons (5,000 BDT)
  - Excellent fuel quality – 9,000 Btu/lb, 40% moisture
  - 5,800 MW electricity produced

Economics:
- $55/BDT ($3.25/MMBtu), working to increase operating efficiency
Forest Fuel Treatment

Criteria Air Pollution Emission Reductions

4,200 BDT forest slash

* Emissions from pile burning of Sierra Nevada tree species – data sources including CARB and EPA AP-42 compilations, and recent pilot scale studies and literature review.
Forest Fuel Treatment

Greenhouse Gas Emission Reductions

4,200 BDT forest slash

Baseline
Open Burning

Biomass to Energy

CO2e Reduction: 2,205 tons

- Grid electricity (unrealized)
- Open pile burning (CH4)
- Open pile burning (CO2)*
- Transport
- Chipping
- Biomass power plant (CH4)
- Biomass power plant (CO2)*

* Biogenic CO2 not included in CCAR offset protocol accounting

Fossil fuel for 4,652 MW
Forest Fuel Treatment

CO$_2$ Cost Effectiveness

Biomass fuel value at biomass to energy plant ($/BDT)

- **30**
- **40**

Biomass Processing and Transport Cost ($/BDT biomass)
Forest Fuel Treatment

Benefits to the Watershed

- USFS rehabilitation & planting of genetically superior seedlings
- Net increase in water yield
- Forest more fire resilient
- Less erosion
Placer County’s Biomass Program

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Renewable Energy from Biomass

Wildfire Risk Reduction

Regional Biomass Material Collection and Processing

Bio Energy Facility Development

Forest Fuel Treatment Economic & Emission Analysis

Land Development (CEQA) / Carbon Offsets

Forest Sector Non-Subsidized Solutions
(Environmental & Public Health Improvements)

Renewable Energy

Forest Health Improvements

Air Quality Enhancement

Wildfire Mitigation
(CWPP, Defensible space creation by mechanical means)

Fire as a Resource Management Tool
(Prescribed burning & Smoke management)

Public Health
Research
Air Quality Impacts

Monetize Benefits
Watershed Ecosystem
Fire fighting
Public health
Recreation
Air quality
Avoided fires

GHG Reductions

GHG Protocols for Forest Management and Biomass

Placer County's Biomass Programs

Biomass Program

GHG Protocols for Forest Management and Biomass

Monetize Benefits
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GHG Protocols for Biomass and Forest Management

Protocol Status

- **Reforestation and Conservation**
  - CCAR* Protocols – adopted, currently in process of revision

- **Urban Forestry**

- **Biomass Waste for Energy**
  - Fully supported by Placer County Air Pollution Control District
  - To be completed Sept. 2009

- **Forest Fuel Treatment -- Wildfire Reduction, Enhanced Forest Growth**
  - Partial support of $150,000 by Placer
  - U.S. Forest Service team – End of 2011

* California Climate Action Registry

Protocols ensure GHG offsets are Real, Permanent, Quantifiable, Enforceable, and Verifiable, as required under CA H&SC Section 38562(d)(1).
GHG Protocols For Biomass and Forest Management

**Biomass Protocol**

**Operations at Biomass Generation Site**
- **Biomass Waste for Energy Project**
  - **Biomass Processing**
    - **Fossil Fuel Engines : CO₂**
  - **Biomass Transport**
    - **Fossil Fuel Engines : CO₂**
  - **Energy Recovery**
    - **Biomass Conversion Process : CH₄**

**Baseline, Business as Usual**
- **Biomass Waste**
  - **Uncontrolled Open Burning**
    - **CH₄**
  - **In-field Decay**
    - **CH₄**
  - **Baseline Energy Supply**
    - **Fossil Fuel Combustion : CO₂**

**GHG Reduction**

\[
GHG_{\text{Reduction}} = GHG_{\text{Open Burn}} + GHG_{\text{Decay}} + GHG_{\text{Baseline Energy}} - GHG_{\text{Biomass Energy}} - GHG_{\text{Biomass Processing}} - GHG_{\text{Biomass Transport}}
\]
GHG Protocols for Biomass and Forest Management

*Forest Fuel Treatment: Wildfire Reduction and Enhanced Forest Growth Protocol*

- Quantify GHG reductions for forest fuel treatment projects
  - Wildfire reduction – size, intensity
  - Forest growth rate enhancement
- “Baseline business as usual” vs “forest fuel treatments”
- Experimental research to correlate and validate models
- Research Team
  - U.S. Forest Service Pacific Southwest Research Station, U.C. Berkeley, and Spatial Informatics Group
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(Environmental & Public Health Improvements)

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Forest Fuel Treatment Economic & Emission Analysis

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Land Development (CEQA) / Carbon Offsets

• Land Development Project review
  ▪ CEQA Review to determine GHG impacts
    ▪ Credit on-site GHG reduction activities
  ▪ Mitigation to below significance

• Off-site GHG Mitigation Program
  ▪ Cost of GHG at market rate
  ▪ PCAPCD to issue credits by applying funds to viable carbon beneficial projects
    ▪ Forest management protocols

• Schedule
  ▪ GHG Mitigation program targeted for implementation in 2009
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  - Wildfire Mitigation
    - (CWPP, Defensible space creation by mechanical means)
  - Fire as a Resource Management Tool
    - (Prescribed burning & Smoke management)
  - Land Development (CEQA) / Carbon Offsets
  - GHG Reductions

**Related topics**
- Bio Energy Facility Development
- Regional Biomass Material Collection and Processing
- GHG Protocols for Forest Management and Biomass
- Public Health Research Air Quality Impacts
- Monetize Benefits
- Watershed Ecosystem
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Bio Energy Facility Development

- System in Lake Tahoe Basin
  - Conversion methods
    - Combustion
    - Gasification
    - Pyrolysis
  - Technology Assessment Evaluation Criteria
    - Technology development status, operating experience
    - Air and water impacts
    - Economics
    - Operability, reliability
  - Cogeneration: 1 - 3 MW, hot water for heating and cooling
  - 10,000 BDT biomass / year
  - Target date: 2011 - 2014
  - USFS, Placer County, DOE and congressional grants of more than $2 million
Regional Biomass Collection

- Efficient biomass waste collection, processing, and delivery to energy recovery facility
  - Reduce biomass open burning, disposal in landfill
- Implementation
  - Municipal urban wood waste -- Material Recovery Facilities, recycling cans
  - “Biomass Boxes” -- centrally located for defensible space clearing
  - Regional collection yards for processing and transport
- Achievements
  - 2007 : 600 tons
  - 2008 : 3,400 tons
- Resources
  - Federal and local grants: $200,000 for two years
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**Forest Fuel Treatment**
Economic & Emission Analysis
- Bio Energy Facility Development
- Regional Biomass Material Collection and Processing

**Land Development**
(CEQA) / Carbon Offsets

**Fire as a Resource Management Tool**
(Prescribed burning & Smoke management)

**Wildfire Mitigation**
(CWPP, Defensible space creation by mechanical means)
Public Health Research
Air Quality Impacts

- Understand link between air quality and medical impacts in Placer County
  - Ambient air data -- PM, ozone
  - Hospital records -- mortality, respiratory and cardiovascular, lost worker / student time
- Identify promising mitigation measures, with emphasis on children
- Community training and involvement
- Resources
  - UCLA School of Public Health, under direction of Placer County Department of Health and Human Services
  - $150,000 in grants from Calif. Endowment, PCAPCD, and Placer County Wildfire Protection & Biomass Utilization Program
- Schedule
Challenges and Opportunities

• Challenges
  – Biomass fuel availability
  – Biomass fuel cost
  – Facility location
  – Facility size
  – Air permitting
    • Offsets may be needed in non-attainment regions.
    Emission reduction credits in short supply

• Opportunities
  – Renewable energy credits, carbon credits
Bio Refinery
CoGen
Gasifier
Lumbermill
Other

**Biomass Emission / Economic Process Model**

**Benefits of Biomass Use**
- Energy production
- Reduces air emissions
- Displaces need for fossil fuel usage
- Reduces greenhouse gas burden
- Reduces landfill burden
- Probable water quality enhancements
- Likely forest health improvements
- Lessening of catastrophic wildland fire threats

**Possible Offsets/Credits?**
(Real, Quantifiable, Surplus, Enforceable, Permanent)
- Bio Refinery
- CoGen
- Gasifier
- Lumbermill
- Other

**Possible Carbon Market**
- Energy Products
- Fuel (liquid, gas)
- Electricity
- Heat
- Lumber Products

**Products**
- Energy Products
- Fuel (liquid, gas)
- Electricity
- Heat
- Lumber Products

**Prescribed In-Forest Burn**

**Biomass/Forest Fuel Loads**

**Catastrophic Wildfire**

**Air Pollution / Emissions from open burning**

**Relative Emissions Reduction**

**Emissions from fuel-processing plant**

**Biomass Processing plant**

**Biomass harvest**