Biomass Heat for the Health and Human Services Center

Presentation to the Plumas County Board of Supervisors

July 11, 2017
Why is a replacement system needed?

• Undersized geothermal loop: 28°F water
  – Electric boiler to heat water
  – $40-$45k/year for electric boiler to pre-heat water
• Failing heat pumps: 64 total, $8-12k each to replace
• 60% of offices use space heaters 24 hours a day

→ Building utility costs increase 3-6% last 2 years
Bottom line: the system is failing

Fixes and alternatives are expensive
Options/Alternatives

- **Business as usual**: Replace all heat pumps: $500k-$770k
- **Expand geofield, drill additional wells**: $14k, 26 more needed
  - does not include cost for connections etc
- **Install Solar** ~$818k = 41.9 year payback
- **Install Propane System** ~$500k
Price of propane compared to heating oil measured in dollars by energy content
# Plumas Energy Efficiency and Renewables Management Action Plan

**Plumas County:**
- Plumas Unified School District
- Fire Safe Council
- County Officials
- Hospital Administrators
- Feather River College
- Portola City Council
- Plumas National Forest
- Forestry Professionals

**Regional:**
- US Forest Service
- State Agencies
- UC Berkley
- State Wood Energy Team
- Biomass Working Group
- Other Communities

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Danielle Banchio,</td>
<td>Registered Professional Forester</td>
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<tr>
<td>Nick Boyd,</td>
<td>Feather River College Director of Facilities</td>
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<tr>
<td>David Keller,</td>
<td>Plumas County Community Development Commission</td>
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<tr>
<td>Charles Plopper,</td>
<td>Professor Emeritus, UC Davis</td>
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<td>Dony Sawchuk,</td>
<td>Plumas County Director of Facility Services</td>
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<tr>
<td>John Sheehan,</td>
<td>former Executive Director of Plumas Corporation</td>
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<tr>
<td>Lori Simpson,</td>
<td>Plumas County Supervisor District Four</td>
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<tr>
<td>Elaine Vercruysse,</td>
<td>Logging Systems Planner with the Plumas National Forest</td>
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<tr>
<td>Randy Wilson,</td>
<td>Plumas County Planning Director</td>
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Unhealthy Forests = Mortality, Fire, Compromised Watersheds

Decline of Timber Industry = Loss of Wood Products Jobs

<table>
<thead>
<tr>
<th></th>
<th>Greenville CDP</th>
<th>Portola CDP</th>
<th>Westwood CDP</th>
<th>California</th>
<th>National</th>
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</thead>
<tbody>
<tr>
<td>Unemployment</td>
<td>12.2%</td>
<td>21.3%</td>
<td>16.5%</td>
<td>5.3%</td>
<td>4.6%</td>
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<tr>
<td>Poverty Rate</td>
<td>17.6%</td>
<td>21.0%</td>
<td>24.2%</td>
<td>16.3%</td>
<td>15.5%</td>
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<tr>
<td>Median HH Income</td>
<td>$26,481</td>
<td>$33,098</td>
<td>$34,464</td>
<td>$61,818</td>
<td>$53,889</td>
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</table>

*Overstocked forests and a changing climate have contributed to catastrophic fires.*
Value of Increasing Biomass Utilization

- Reduce the risk of wildfire
- Improve forest and watershed health
- Improve air quality, reduce black carbon emissions
- Revitalize the wood products industry, create jobs
- Stabilize heating costs
- Utilize an abundant, local resource
Efficient

Development of emissions of Austrian Biomass Boilers, measured by the federal agency for agricultural engineering Wieselburg (BLT)
Development of emissions of Austrian Biomass Boilers, measured by the federal agency for agricultural engineering Wieselburg (BLT)
Emissions based on burning 5,000 BDT of biomass

The Landscape Scale Overview

- CEC: $2.6M grant
  - County match: $400k
- Biomass boiler coupled with power generation
  - 400 kW thermal energy
  - 35 kW electricity
  - Peak demand reductions 205 kW
- Backup propane boiler
  - Original system also will remain intact—triple redundancy
- ~400-500 bone dry tons per year
  - Opp. to use locally-sourced fuel, support local logging ops
System Overview

Photo credits: Wisewood Energy

Power revenue and $ savings

Recharging the geofield

- Hot water: 220°F
- Warm water: 80°F
- 60°F

Sierra Institute for Community and Environment
## Current Heating Costs vs. Biomass Heating Costs

(Annual, Operations and Maintenance)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Current Costs</td>
<td>$62,981</td>
</tr>
<tr>
<td>Modeled Biomass Costs</td>
<td>$84,234/year (overall costs)</td>
</tr>
<tr>
<td>-</td>
<td>$51,704 (savings in electricity generation and increased efficiency)</td>
</tr>
<tr>
<td>-</td>
<td>$32,530</td>
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<tr>
<td>Savings (Compared to Existing System)</td>
<td>=$30,451</td>
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</table>

~13 year Return on Investment
Site Layout and Piping Plan
Wood Chip Bins
For Mill Waste
Fuel Supply

- Ample biomass
- Deliveries by J&C Enterprises
- Supply guarantee from local operation
- Backups: Waste Management for hauling, SPI mill for chips
- Crescent Mills guarantee: clean chips
Forest Biomass Material Potentially Available from Forest Operations on Public and Private Land within Study Area.

<table>
<thead>
<tr>
<th>Biomass Material Source</th>
<th>Low Range</th>
<th>High Range</th>
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<tbody>
<tr>
<td>Timber Harvest Residuals</td>
<td>81,120</td>
<td>109,750</td>
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<tr>
<td>Fuels Treatment/Restoration/Timber Stand Improvement Activities</td>
<td>51,250</td>
<td>96,250</td>
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<tr>
<td>Fuels Treatment Activities - Fire Safe Council and similar</td>
<td>550</td>
<td>1,150</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>132,920</strong></td>
<td><strong>207,150</strong></td>
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TSS Consultants, 2012, Prepared for the Sierra Institute
Construction Phase 1

- Excavation
- Foundation
- Trenching to HHSC
- Boiler building

County’s $400k match is applied here
Some grant funds
Construction Phase 2

Complete building structure, grant funds kick in:

- Equipment
  - Biomass boiler
  - ORC machine
  - Wood chip bins
  - Propane boiler backup

- Installation
- Electric
- Plumbing

Photo credits: Wisewood Energy
Cross Laminated Timber Building & an Opportunity
Mass Timber/Cross Laminated Timber

- Seismic safety
- Construction efficiency
- Utilization of small diameter timber

= Revitalization of wood products industry in rural communities?
Ownership

Year 1:
• SI owns
• Cost to county for heat
• Electricity benefit: county
  – Meter on county side
• Geofield: shoulder season heat
  – Monitoring for CEC

Year 2:
(completion of CEC grant)
• Ownership transferred to county
Fossil Fuel Heating vs. Biomass District Energy 25-Year Heating Cost Comparison
Harney Community Energy - Burns, OR

- Old Fossil Fuel Heating System
- New Biomass Fuel Heating System
Questions?

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