Sustainable Northwest

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Mr. Lacey:

We are submitting this letter to encourage the Conservation Advisory Council of the Energy Trust of Oregon to embrace and consider funding community-scaled thermal applications that use locally-derived woody biomass to replace natural gas or electricity. These projects cannot be funded or supported under the Energy Trust's Renewable Energy program since state statute limits the scope of applicable renewable energy projects to "power generation." However, the use of woody biomass in thermal applications does help to address energy efficiency goals as per the charge of the Energy Efficiency Program:

1. Increasing the availability of natural gas or electricity for current residential rate payers,
2. Reducing the pressure on peak load, and
3. Incorporating efficiency measures during retro-fit improvement projects to outdated boilers.

From our experiences in working with community-scaled biomass projects, if Oregon wants to support woody biomass utilization for energy purposes, thermal applications are realistic, tangible, and cost efficient mechanisms to do so.

Implementing biomass thermal projects could provide a host of benefits to Oregon communities, including:

- Increased energy efficiency and independence at a grassroots level (schools, community facilities, local governmental buildings, etc.)
- Provide economic development & employment opportunities by creating local jobs to produce fuel supply, service and maintain facility, etc.
- Improved forest health and ecosystem functionality
- Increased wildfire resiliency for community structures and facilities
- A net decrease of carbon emissions with potential environmental and economic benefits

Fuel for community-scaled woody biomass thermal applications consists of forest slash produced as a by-product during forest fuel reduction or restoration treatments. In comparison to burning this material in the forest (per current management strategy and due to a lack of local markets), burning this material in a controlled setting significantly reduces air quality effects since combustion efficiency is greatly improved.

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Woody biomass fuel cost ranges depending upon forest conditions (average removed stem size, density of trees, terrain), harvesting technology, and transportation distance to a facility. In general, due to the relatively low amount of fuel necessary for community-scaled projects, transportation costs are minimized since longer hauling distances are not required to supply the needed volume of material. Additionally, there is an opportunity to lower delivered costs of woody biomass fuel by integrating a value-added wood processing facility with the fuel consumer. Still, when compared to natural gas and electricity, fuel cost per MMBtu is much less for woody biomass fuels (see Table 2 in Additional Material).

The current pioneer efforts and projects moving forward (see Table 1 in Additional Material) validate the interest and demonstrate the potential for woody biomass thermal projects to be applicable for rural communities, economically viable, and beneficial for local economies. There are several regional and local organizations currently engaging local communities in thinking through the potential for woody biomass thermal applications. Through financial support and technical assistance, the Energy Trust could move these, and additional, community-scaled woody biomass thermal projects forward and could have a significant effect on overall energy efficiency and independence for the state of Oregon.

Thank you for the opportunity to submit this letter. Please refer to the Additional Material for more detailed information and feel free to contact Chad Davis for any necessary clarification at 503.221.6911 ext. 110 or cdavis@sustainablenorthwest.org.

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Additional Material

Current Projects

There is a tremendous amount of interest at the community level to assess the feasibility of woody biomass thermal applications in facilities improvement projects, particularly retro-fitting existing natural gas or electric boilers to utilize woody fuel. This interest exists in both the public and private sector as evidenced by the three current applications across central and eastern Oregon:

- Prineville Sawmill Company – using sawmill residual to produce steam in a kiln to dry lumber; will continue to produce building heat with existing natural gas boiler
- Harney County Hospital – using wood pellets to heat facility
- Enterprise School – construction to begin soon on retro-fit of heating oil boiler

Sustainable Northwest received Federal funding thru the USDA Woody Biomass Utilization Grant program to assist the implementation of two community-scaled thermal projects in central Oregon. The intent in these two projects is to utilize woody biomass from forest restoration treatments on surrounding Federal forests as fuel. In addition, five other community-scaled projects across southern, central, and eastern Oregon have completed a pre-feasibility analysis with three of these projects likely to pursue implementation. All of these proposed projects, along with the potential of many others, are within the have the following features:

- Outdated natural gas boilers or heated with electricity
- Natural gas-fired or electric water heater and/or gas-fired boiler for building heat in process heat projects, ensuring that a meter remain onsite,
- Served by Northwest Natural Gas or Cascade Natural Gas, or for electric heating, Portland General Electric or PacifiCorp
- Local access to woody biomass fuel,
- In most cases, the woody material used as fuel would be burned in the forest, thus not utilizing the energy content and contributing smoke and particulates to the local atmosphere.

Below is a table with details for current and potential projects across Oregon.

Table 1. Details of current and potential woody biomass thermal projects across Oregon.

Facility	Displaced Fuel	Type	Fuel remaining on site
Prineville Sawmill	Natural gas (Cascade)	new project	Natural gas (building heat)
Crook Co. School	Natural gas (Cascade)	retro-fit	Natural gas (building heat)
Woodgrain Millwork	Natural gas (Cascade)	retro-fit	Natural gas (building heat)
J & S Animal Bedding	Natural gas (Cascade)	new project	Natural gas (building heat)
Three Rivers School District	Natural gas (Northwest)	retro-fit	Natural gas (hot water)
Harney Co. Hospital	Heating oil	retro-fit	Heating oil
Enterprise School District	Heating oil	retro-fit	Heating oil
Wallowa School District	Heating oil	retro-fit	Heating oil
Sisters School District	Heating oil	retro-fit	Heating oil

Several organizations are planning a Regional Workshop for Woody Biomass Thermal Applications to spur interest, discussion, and implementation of projects utilizing woody material from forest restoration treatments as a fuel to generate thermal energy in rural communities across Oregon,

Washington, and northern California. The workshop will share information modeled on the Fuels for Schools approach and draw from the experiences of others who have implemented woody biomass thermal projects, in Oregon and elsewhere. The workshop is scheduled for spring 2008 and will target: community leaders, facility managers, rural economic development interests (governmental and non-profits), renewable energy consultants, and agency staff (Federal and state). From gauging initial interest, over 100 rural communities, small businesses, and organizations should be represented. Support from the Energy Trust would bring this event into the fore and help accelerate implementation of community-scaled woody biomass thermal projects across Oregon.

Finally, the Oregon Department of Forestry is currently analyzing capacity for potential conversion of all registered boilers in the state. A feasibility rating will be assigned to each for conversion to woody fuel based on: age, location (proximity to woody biomass fuel), load, and current fuel and type. This should prioritize existing boilers that are old, relatively large and near a woody biomass fuel supply. The analysis should be completed in 2008 and could serve as a starting point to prioritize woody biomass thermal projects.

Expressed Concerns

As with any new technology or approach, concerns over potential issues should be discussed openly and addressed before advancing too far down the path. In our experience, the following concerns have surfaced in regards to woody biomass thermal applications. However, there is sound resolution for each of these.

Operation & Maintenance

The capacity for communities and small businesses to appropriately service and maintain woody biomass boilers seems to be the most valid concern. There have been a few entities that chose not to pursue woody biomass thermal projects because of the lack of capacity to service the system. However, there are current projects in the state, and more moving forward, that have decided they do have the needed capacity. As more community-scaled projects come on-line, the potential exists that thermal projects could serve as a stimulus to create local jobs for service contractors to maintain multiple woody biomass boilers in the surrounding area.

Emissions

Whenever there is combustion of fuel, potential emissions should be considered and evaluated thoroughly. Technology in wood-fired boilers has advanced to the point where emissions are acceptable under Federal, State and local regulations. Boilers that utilize wood pellets, in fact, are not required to install a short smoke stack to meet air quality standards. The Environmental Protection Agency considers the use of wood-fuel and the release of CO_2 from its emissions to be impact-neutral to global warming (EPA 2003).

The majority of woody biomass fuel for community-scaled projects would be produced as the by-products from forest health and restoration treatments. Under current management strategy, this woody material would be burned (as piles) in the forest, contributing smoke and particulates while continuing to smolder. Comparatively, burning this material in a controlled setting significantly reduces emissions since combustion efficiency is greatly improved.

Long-term fuel supply and cost

Reliable, long-term fuel supply is of tremendous concern for large scale consumers (ex. biomass power plant or biofuel facility). However, community-scaled woody biomass thermal projects

typically only utilize 750-1500 tons of wood chips per year. For a typical forest restoration project, this volume translates into needing the woody material from 100-200 acres per year. According to a 2006 OFRI report, 4.25 million acres of forestland in central, eastern, and southern Oregon is in need of fuel reduction thinning (OFRI 2006). If treated over a 20 year period, this acreage could supply 1 million dry tons of forest biomass fuel on an annual basis.

Because of the forest equipment and trucking necessary to move woody material to a biomass thermal facility, fuel cost is a valid concern. Ranges in forest conditions (average removed stem size, density of trees, terrain), harvesting technology, and transportation distance make explicit delivered cost figures difficult (OFRI 2006). In general, as the average size of removed stems decreases, harvesting costs increase. There is some opportunity to lower delivered costs of woody biomass fuel by integrating a value-added wood processing business with the fuel consumer in a local community. Under this scenario, a portion of the small-diameter stems are processed into value-added wood products (posts & poles, flooring, etc). This effectively offsets the harvest costs of the smallest trees only utilizable as fuel and residuals from the value-added business can be sold as low-cost fuel.

Transportation distance is a concern when trucking low-valued material of any type. Woody biomass used for fuel would have the lowest value of any wood product. However, due to the relatively low amount of fuel necessary for community-scaled projects, transportation costs are minimized since longer hauling distances are not required to supply the needed volume of material. Typically, most community-scaled projects could locate fuel within a 25-50 mile hauling radius of the facility. Additionally, utilizing residuals from a value-added business located within the community would further reduce transportation costs for woody biomass fuel.

When compared to natural gas and electricity, fuel cost per MMBtu is much less for wood chips and comparable between natural gas and wood pellets. Below are fuel costs per MMBtu for several sources:

Table 2. Fuel cost for various fuel options for thermal heating.

Fuel Source	Purchase Price[1]	MMBtu/unit[2]	$/MMBtu[3]
Wood Chips	$40 / green ton	10.1	$ 3.96
Wood Pellets	$160 / ton	16.4	$ 9.76
Natural Gas	$ 1.05 / therm	.10	$ 10.50
Heating Oil	$2.95 / gallon	.139	$ 21.22
Electricity	$ 0.075 / kW	.00341	$ 21.99
Propane	$ 2.10 / gallon	.0905	$ 23.20

[1] Prices obtained during Fall 2007 and meant to represent average values for the region.
[2] Montana DNRC 2006.
[3] Price assumes 100% efficient combustion for all fuel sources since combustion efficiencies can vary from site to site dependent on a variety of factors. Typical efficiency rates are 65% for wood chip boilers, 75% for heating oil boilers, and 80% for wood pellet, natural gas, and propane boilers.

The costs above are based on fall 2007 values and specific pricing can vary; these values are provided to show the general trend. From the table, it should be evident that savings from fuel costs is one feature of woody biomass thermal that attracts rural communities and small businesses. It seems likely that in the upcoming years the gap between fuel cost for natural gas or electricity and woody biomass will increase or at minimum, remain constant.

Going Forward

The successes and lessons learned from these pioneer projects will be transferable to communities not served by natural gas. In these communities (Enterprise, John Day, Lakeview, Sisters) public facilities currently burn heating oil in outdated, inefficient boilers. Conversions to woody biomass thermal in these instances, coupled with efficiency improvement measures, would reduce Oregon's carbon footprint and reduce Oregon's reliance on oil.

Community-scaled projects can increase energy efficiency across Oregon by reducing consumption of natural gas and by encouraging specific efficiency measures for improvement projects to outdated boiler systems. Additionally, these projects provide social, economical, and ecological benefits to rural communities and their surrounding forests. Through financial support, technical assistance, and professional connections, the Energy Trust could move these, and additional, woody biomass thermal projects forward in rural communities and could have a significant effect on overall energy efficiency and independence for the state of Oregon.

Who are we?

Sustainable Northwest
SNW is a Portland-based non-profit engaged in building economic development and capacity in rural communities. SNW promotes local ownership of small wood products businesses to utilize small-diameter removals from ecologically-based forest restoration projects.

Central Oregon Intergovernmental Council
COIC is a regional Council of Governments that offers community and economic development assistance to communities in central Oregon. COIC launched the COPWRR, a community forestry initiative focused on fire risk reduction, forest restoration, and economic development.

The Resource Innovation Group
TRIG is a non-profit organization affiliated with the Institute for a Sustainable Environment. Their Community Capacity and Environment Program aims to build capacity in rural communities in the Northwest addressing wildfire risk, forest restoration, and economic development.

Wallowa Resources
WR provides leadership on natural resource, economic and community issues, creating opportunities for sustainable land management, ecosystem health, family-wage jobs and community well being, and preserving Wallowa County's rural way of life for future generations.

Lake County Resources Initiative
LCRI is a community-based organization dedicated to promoting an understanding of the inter-relationships between people and their environment. Their mission is to demonstrate a sustainable approach to natural resources to ensure the quality of life for present and future generations.

References

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