

From Wood Waste to Renewable Energy:
*A Summary Report of Wood Utilization Efforts in Heating Systems in the
Western United States and Territories.*
JUNE, 2008



**WESTERN
FORESTRY
LEADERSHIP
COALITION**

*Promoting science-based forest management that serves the values of
society and ensures the health and sustainability of western forests.*



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About the Western Forestry Leadership Coalition

The Western Forestry Leadership Coalition (WFLC) is a state and federal government partnership. The members of the coalition include: the 23 State and Pacific Island Foresters of the West and the 7 western Regional Foresters, 3 western Research Station Directors, and Forest Products Lab Director of the USDA Forest Service. This partnership creates a clear voice on western forestry, strengthening our ability to address pertinent issues and help meet the needs of society. To advance the agenda and priorities of the WFLC members, there is a five-person staff based in Denver as well as several standing committees comprised of State and Federal staff from the west.



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Introduction

The Fuels for Schools Program began in the West after the 2000 fire season. Following these fires, Congress passed the National Fire Plan, which was aimed at reducing wood that could possibly fuel fires and fire suppression. It included funds to help with small-diameter wood utilization, which is not as valuable to the wood industry, is fuel for fire and costly to dispose of. A community group saw the Fuels for Schools program that had started in Vermont as an example, and applied for funds from the Forest Service for the first school demonstration project in Darby, Mont. From there, a regional program was developed. It developed under the cooperative efforts of the USDA Forest Service State and Private Forestry's Economic Action Program, and the Bitterroot Resource Conservation and Development District. Funding came from the USDA Forest Service Economic Development Program. The Fuels for Schools Program was initiated in the States of Montana, Idaho, North Dakota, Nevada, and Utah. Since then, other states have also successfully completed projects that utilize wood energy for heating buildings.

The Western Forestry Leadership Coalition (WFLC) wanted a better understanding of the success of the Fuels for Schools Program, and other wood biomass projects in the western states. To accomplish this WFLC directed the Forest Resource Management Committee (FRMC) to develop a "Fuels for Schools and Beyond" status report summarizing projects that use wood for heat in the western states and territories, and the potential for future projects.

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2007-2008

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Process

To accomplish this task, the Western Forest Resource Management Committee (FRMC) the following survey questions were sent to each of the Western States and Territories in March 2007, with a follow-up in February 2008.

I: Part One

- 1) To-date completed FFS&B projects by a) name and b) location
- 2) Actual annual fuel cost savings achieved by each completed project
- 3) Annual actual units (tons) of cellulose fuel utilized per completed project

II: Part Two

- 1) Incomplete but “in-the-works” FFS&B projects by a) name and b) location
- 2) Potential annual fuel cost savings of each “in-the-works” project
- 3) Annual potential units (tons) of cellulose fuel utilized per “in-the-works” project

III: Part Three

- 1) Future feasible bio-energy/biomass utilization projects (FFS&B or not) - include biomass heat and power, but also include other sources of renewable energy production from biomass such as bio-fuels like biodiesel, cellulosic ethanol, etc. by a) name and b) location (if available)
- 2) Estimated annual fuel cost savings by each future project and
- 3) Annual estimated units (tons) of cellulose fuel utilized per future project

This request for information was submitted to State Forest Stewardship Program Coordinators in the western states and territories, and to USDA Forest Service Forest Stewardship Program Branch Directors. Questions about information in this report should be directed to the respective State Forester or Territory Forester.

This report is not a complete summary of all uses of woody biomass for energy in all western states and territories. For example, there was no attempt to assess the collection and use of firewood by individuals. Some states interpreted our request as limited to projects developed under the fuels for schools earmark. Other states included every large-scale effort to use woody biomass for energy pre-dating the fuels for schools program established in Regions 1 and 4. This is understandable since there was no limit placed on project completion dates. Still other states reported only those projects that fit the fuels for schools model, but did not include all uses of woody biomass for energy such as sawmills that use their waste wood for heat.

The FRMC was charged with collecting information “beyond” fuels for schools indicating the WFLC is interested in knowing what other uses of wood for energy exist in the West. The FRMC believes all of the examples of biomass use provided by the states and territories support the feasibility of using wood as an energy source, and reflect an increasing demand for wood as a competitive source of energy. Therefore, all of the examples provided by the states have been included in this report.

Objectives

As provided in the committee’s work plan, three goals were identified for this report:

- 1) to highlight accomplishment information,
- 2) to demonstrate the cost savings achieved through utilization and
- 3) to explore future opportunities for the application of the Fuels for Schools & Beyond concept.

This is one of the priority items for the WFLC; they have a strong interest in the larger biomass utilization issue (both forest products and bio-energy) and States should be scanning the horizon for opportunities to engage and build upon forestry’s contributions within all forms of biomass utilization. This begins with a focus on the Fuels for Schools & Beyond program, but also includes biomass utilization (both forest products and bio-energy).



I - Western Fuels for Schools and Beyond - Completed Projects

State	Name	Location	Annual Cost Savings	Annual Cellulose Fuel Utilized (tons)	Notes
Arizona	Arboretum At Flagstaff	Flagstaff, AZ		5	Small pellet-fueled boiler heating system installed in 6,000 sq. ft. passive-solar Agronomy Building in 2003 with grant from Four Corners Sustainable Forests Partnership.
California	Summary of facilities using biomass	CA		5,000,000 bone dry tons	Currently 28 operating facilities using biomass in CA producing approximately 650 MW. Figure includes urban wood, mill residuals, ag residuals, and forest sourced.
	Dutch System greenhouse	Pioneer, CA	\$1000 per day when in use		Currently investigating use of wildland fuels.
Colorado	Boulder County	Longmont, CO	New facility - currently being calculated	650-800	For more information go to http://www.co.boulder.co.us/openspace/resources/forestry/for_pdfs/BCPOS_Final_Biomas_Report_web.pdf
	Gilpin County Road & Bridge	Gilpin County, CO	\$7,500	600	
Idaho	Council Public School Complex	Council, ID	\$59,000	300	60,000 square feet, replaced fuel oil and electricity, cost \$1,400,000, Operational Sept. 2005
	Kellogg Public Schools	Kellogg, ID	\$60,000	600	80,000 square feet, replaced natural gas, cost \$1,200,000, Operational April 2007
Kansas	Bert & Wetta Sales, Inc.	Abilene, KS		1,837	Converted from natural gas
	Bert & Wetta Sales, Inc.	Larned, KS		1,137	Converted from natural gas to wood waste in 2001
Montana	Darby Public Schools	Darby, MT	\$90,000	760	82,000 square feet, replaced fuel oil, cost \$650,000, operational Nov. 2003
	Victor Public Schools	Victor, MT	\$27,000	500	47,000 square feet, replaced natural gas, cost \$590,000, operational Sept. 2004
	Philipsburg Public Schools	Philipsburg, MT	\$52,000	400	99,000 square feet, replaced natural gas, cost \$697,000, operational Jan. 2005
	Thompson Falls Public Schools	Thompson Falls, MT	\$60,000	400	60,500 square feet, replaced fuel oil, cost \$455,000, operational Oct. 2005

I - Western Fuels for Schools and Beyond - Completed Projects (continued)

State	Name	Location	Annual Cost Savings	Annual Cellulose Fuel Utilized (tons)	Notes
Montana	Troy Public Schools	Troy, MT	\$12,500	60 tons of pellets	33,235 square feet, replaced fuel oil, cost \$299,000, operational Nov. 2007
	Glacier High School	Kalispell, MT	\$100,000	1900	220,000 square feet, new construction, cost \$525,000, operational Feb. 2007
	University of Montana-Western Campus	Dillon, MT	\$118,000	3800	471,370 square feet, natural gas, cost \$1,423,000, operational Feb 2007
	Townsend Elementary & High Schools	Townsend, MT	\$19,000	170 tons of pellets	120,000 square feet, replaces fuel oil and propane, cost \$425,000, operational Feb. 2007
	Eureka Public Schools	Eureka, MT	\$103,000	960	178,000 square feet, replaces fuel oil and propane, cost \$1,320,000, operational Nov. 2007
Nebraska	Chadron State College	Chadron	\$200,000	9000	Operational since 1992. Provides heat and AC for campus.
	Lied Lodge, Arbor Day Farm	Nebraska City	\$205,000	3000	Operational since 1993. Provides heat, AC, hot water, heated pool.
Nevada	White Pine County Public Schools	Ely, NV	\$35,000	300	36,400 square feet, replaced fuel oil, cost \$900,000, operational Feb. 2005
	Northern NV Correctional Center	Carson City, NV	\$1,000,000	12,000	408,000 square feet, replaced natural gas and electricity, cost \$8,200,000, operational June 2007
New Mexico	Hazardous Fuel Reduction through wood chip utilization	Jemez Mountain School District, Gallina, NM	\$40,000	400	Operational since 2004. Numerous problems. May be shut down if not rectified.
North Dakota	Bismark Landfill Solid Waste Building	Bismark, ND	\$13,000	220	18,000 square feet, replaced natural gas, cost \$200,000, Operational September 2007
South Dakota	STAR Adacemy wood biomass boiler	Custer, SD	\$208,055 (estimated)	1699	130,000 square feet, replaces fuel oil and propane, Operational February 2008

II - Western Fuels for Schools and Beyond Incomplete Projects Currently Being Implemented

State	Project Name	Location	Annual fuel cost savings*	Annual Cellulose Fuel utilized (tons)*	Notes
Alaska	Craig Chip-fed boiler school and pool	Craig, AK	\$90,000	Unknown	Will displace 35,000 gallons of fuel oil per year
	Tanana Washeteria	Tanana, AK			Will displace 10,000 gallons of fuel oil per year
	Ionia Community Center	Ionia, AK			Will displace 1,500 gallons of fuel oil and 8,200 gallons of propane
Montana	Deer Lodge Elementary	Deerlodge, MT	\$35,500	730	38,000 square feet, replaces natural gas, operational Oct. 2008
	New Browning High School	Browning, MT	\$43,000	1250	new construction, 130,000 sq.ft., operational March 2009
New Mexico	Fort Bayard Woody Biomass Fuel System	Fort Bayard, NM		3000 - 4000	
	Santa Fe Community College	Santa Fe, NM	\$100,000	unknown	
South Dakota	State Veterans Home	Hot Springs, SD	\$187,267	1581	Expect to be operational 2009
Wyoming	Cellulosic Ethanol Pilot Plant	Upton, WY		15,000	Production capacity 1 million gallons per year. Feedstock is ponderosa pine slash from forest management, hazard fuels reduction, and saw mill waste.

* All figures are estimates.

III - Western Fuels for Schools and Beyond

Future Feasible Bio-energy/biomass Utilization Projects

State	Project Name	Location	Annual fuel cost savings*	Annual Cellulose Fuel utilized (tons)*	Notes
Alaska	Community Buildings	Chistochina, AK			Will displace 14,000 gallons of fuel oil per year
	Community Center	Craig, AK			Will displace 6,600 gallons of fuel oil per year
	Delta Junction School	Delta Junction AK			Will displace 102,000 gallons of fuel oil per year
	Dot Lake School	Dot Lake, AK			Will displace 5,000 gallons of fuel oil per year
	Community bldgs and duplexes	Gulkana, AK			Will displace 13,100 gallons of fuel oil per year
	School	Haines, AK			Will displace 60,000 gallons of fuel oil per year
	CRSD School	Kenny Lake, AK			Will displace 20,000 gallons of fuel oil per year
	USFS AK Discovery Visitor Center	Ketchikan, AK			Will displace 21,000 gallons of fuel oil per year
	Mentasta Lake School & Clinic	Mentasta Lake, AK			Will displace 15,000 gallons of fuel oil per year
	Northway School	Northway, AK			Will displace 25,000 gallons of fuel oil per year
	Tanacross School	Tanacross, AK			Will displace 6,000 gallons of fuel oil per year
	City bldgs	Tanana, AK			Will displace 15,000 gallons of fuel oil per year
	School	Tanana, AK			Will displace 30,000 gallons of fuel oil per year
	Tetlin School	Tetlin, AK			Will displace 15,000 gallons of fuel oil per year
	Thorne Bay School and City Admin. Bldg.	Thorne Bay, AK			Will displace 14,550 gallons of fuel oil per year

*All figures are estimates.

III - Western Fuels for Schools and Beyond

Future Feasible Bio-energy/biomass Utilization Projects (continued)

State	Project Name	Location	Annual fuel cost savings*	Annual Cellulose Fuel utilized (tons)*	Notes
Alaska	Tok School, district offices, multipurpose facility	Tok, AK			Will displace 53,000 gallons of fuel oil per year
	Venetie washeteria and airport	Venetie, AK			Will displace 1,700 gallons of fuel oil per year
Arizona	Town of Eagar	Eagar, AZ			Project to heat town hall with steam generated by wood-fired boiler. Feasibility study completed. Looking for funding and more efficient technology.
	Yavapai Community College	Chino Valley, AZ			Feasibility study completed for steam heating from wood-fired boiler. Seeking more efficient technology and additional funding.
California	South Tahoe High School	South Lake Tahoe, CA		2500	Replace diesel system with biomass. In permitting process
Colorado	Pellet manufacturing plant	Kremmling, CO			Operational Spring 2008
	Pellet manufacturing plant	Walden, CO			
	Biodiesel plants				
	Biofuels plant				
	Summit County	Frisco, CO		5000	
	National Renewable Energy Lab	Golden, CO		+/- 3000	
	CO State University West Campus				
	3-5 mgwts CHP project	Jackson County CO			

*All figures are estimates.

III - Western Fuels for Schools and Beyond

Future Feasible Bio-energy/biomass Utilization Projects (continued)

State	Project Name	Location	Annual fuel cost savings*	Annual Cellulose Fuel utilized (tons)*	Notes
Idaho	Middle School	Bonnars Ferry, ID			rejected by school board
	Middle & High School	Priest River, ID			looking for funding
	State Prison	Orofino, ID			looking for funding
	School Athletic Center	Mullen, ID			looking for funding
	Elementary School	St. Maries, ID			looking for funding
	School Complex & County Courthouse Complex	Cascade, ID			looking for funding
	New School	McCall, ID			rejected by school board
Montana	Plum Creek MDF Plant	Columbia Falls, MT		Potential for use of 90,000 green tons.	10 MW generation plant.
	Stolze Lumber	Libby, MT			2-5 MW generation plant
	Pyramid Lumber	Seeley Lake, MT			Co-generation or manufacture bio-oil via pyrolysis
	City of Troy	Troy, MT			2-5 MW generation plant
	Pellet manufacturing and/or animal bedding plant	Forsyth/Miles City/Colstrip MT			
	Malstrom AFB	Helena, MT			
	Fort Harrison VA Hospital	Helena, MT			

*All figures are estimates.

III - Western Fuels for Schools and Beyond
Future Feasible Bio-energy/biomass Utilization Projects (continued)

State	Project Name	Location	Annual fuel cost savings*	Annual Cellulose Fuel utilized (tons)*	Notes
Nebraska	Chadron Community Hospital	Chadron		350	Waiting for grant for implementation
	NE College of Technical Agriculture	Curtis		1040	Feasibility study completed. Positive.
	Chadron Public Schools	Chadron			Feasibility study completed. Positive.
	Peru State College	Peru		3200	Feasibility study completed. Positive.
	Crow Butte Resources, Inc	Crawford		350	Feasibility study completed. Positive.
New Mexico	Wood Pellet Facility	Raton, NM			Operational 2008
	Wood Pellet Facility	Espanola, NM			Operational 2008
	Wod Pellet Facility	Las Cruces, NM			Operational 2008
	Pueblo of Santa Clara	Santa Clara, NM		210 cords	Wood biomass heating system for 35 new homes
South Dakota	Belle Fourche High School	Belle Fourche, SD	\$20,050	383	looking for funding
	Lead-Deadwood High School	Lead, SD	\$78,143	1,136	looking for funding
	Stevens High School	Rapid City, SD	\$47,974	1,079	
	Central H.S./Civic Center	Rapid City, SD	\$68,075	2,060	Awaiting results of an energy audit.
	Black Hills State University	Rapid City, SD	\$94,893	2,953	looking for funding
	Rushmore Forest Products, Inc. (SD) and Devils Tower Forest Products, Inc. (WY)	Hill City, SD and Hulett, WY	\$300,000 to \$600,000	206,000	Co-generation with Black Hills Power & Light

*All figures are estimates.

III - Western Fuels for Schools and Beyond
Future Feasible Bio-energy/biomass Utilization Projects (continued)

Utah	Park City School District	Park City, UT			Feasibility study showed a promising economic return, but this project became a lower priority because of concerns with PM-2.5 in the immediate area.
Wyoming	K-12 School	Mountain View, WY		450 (wood) 300 (pellets)	New construction, replace natural gas,

*All figures are estimates.

Other Notable Activities and Projects

Alaska

There are currently 58 wood energy projects and/or facilities in 32 communities which receive some form of assistance. The interagency *Alaska Wood Energy Development Task Group* received 17 statements of interest for feasibility studies for wood energy projects in 2008 and there are 34 feasibility studies currently underway

Arizona

The creation of a recent report entitled *The Analysis of Small-Diameter Wood Supply in Northern Arizona* involved a series of meetings with a 20-person Working Group made up of stakeholder representatives from a diversity of organizations including land management agencies, environmental/conservation organizations, industry, and community-based organizations. The applied research group at Northern Arizona University, the Forest Ecosystem Restoration Analysis (ForestERA) project, supported this group using a participatory GIS process in an effort to build agreement on the location and type of ecologically appropriate forest restoration treatments for improving forest health. The analysis focused primarily on ponderosa pine-dominated ecosystems in northern Arizona and was funded by the Southwestern Region of the USDA Forest Service. Estimated supply of wood fiber was a component of the study.

In exploratory efforts in heating of commercial facilities with pelletized-wood Forest Energy, of Show Low, attempted to establish a business designing, installing, and providing fuel for heating systems for commercial buildings. After an erstwhile effort, the company determined that they were unable to compete with conventional heating systems using fossil fuels.

California

There are many projects underfoot in California. In Etna Union High School, in Etna, CA, there is a proposed heating system for the school and swimming pool with a potential use of 2500 bone dry tons/yr. In Modoc High School, Alturas, there is a proposed biomass heating system for the school building.

A heating and power system is proposed for Parlin Fork Correctional & Rehabilitation Camp in Fort Bragg with a potential capacity of 1-3 MW. In the City of Fort Bragg, there is also a proposed electrical generation system with a potential capacity of 5-10 MW.

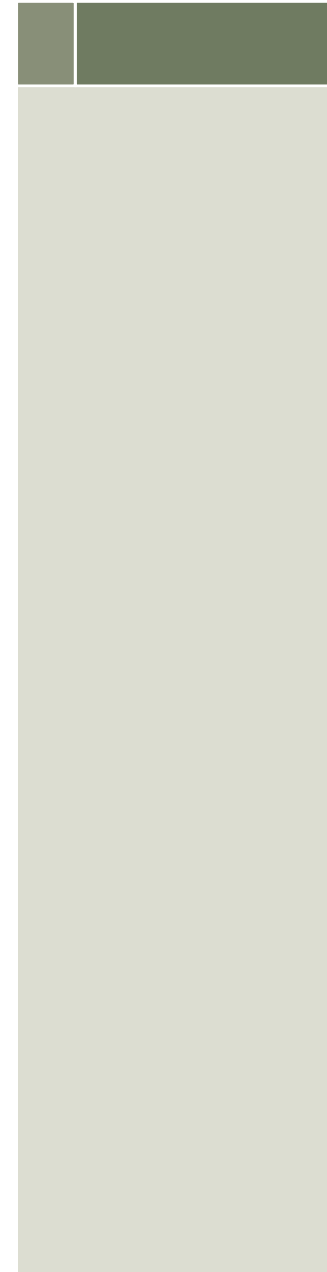
There is a proposed cogeneration facility for the high school in Foresthill Public Utility District with a potential capacity of 5-10 MW. In Placer County Sheriff Dept., Kings Beach, there is a proposed 1-3 MW cogeneration facility that would use 8,000 - 24,000 bone dry tons per year.

Lastly, in Sonora Community Hospital, there is a proposed conversion of a diesel heating system to a wood pellet fired system potentially using 10,000 bone dry tons per year.

"Later this year, Craig will become the first town in (Southeast) Alaska to use waste wood -- mostly leftover bark, branches and wood stripped from trees at the sawmill -- to heat buildings.

The wood-fired boiler is expected to burn about 2 tons of waste wood a day, saving the sawmill companies the cost of carting the stuff away. The town will get the wood for free as long as it pays for delivery. **Craig and the school district combined expect to save \$85,000 a year with the wood-fired boiler."**

Mary Pemberton, Associated Press, Anchorage Daily News, March 2008



Colorado

Mountain Parks Electric, Inc (MPEI) received a grant of \$242,500 toward the development of a woody biomass project in Walden, associated with the Pittington Sawmill for its electric and heat energy needs. The grant funds will be used toward the design, engineering, and selection of best technology for this project, with the ultimate goal of financing and constructing a facility which will provide energy from wood waste to this sawmill and the surrounding community. This is an important event for MPEI with respect to finding some solutions to the "beetle kill" problem throughout the service area, and to developing a renewable energy resource that can benefit our cooperative members.

Colorado has three cooperatives working on biomass utilization issues: 1) *CO Wood Marketing & Utilization Program* (www.colostate.edu/programs/cowood) funded by Federal and State programs, grants and contracts. Housed and managed by the Colorado State Forest Service and CO State University. COWood is involved in all aspects of biomass utilization – from bio-based product and market development to technology transfer/assistance and from product marketing (www.coloradoforestproducts.org) to biomass supply and infrastructure issues. 2) *The CO Biomass Working Group* is comprised of Federal, State and Local land management agencies, private sector businesses, non-profits/NGO's, forest industry personnel and contractors/consultants. Primary coordination of activities is by OEMC, CSFS/CSU and the USFS. 3) *The Biomass Working Group*: (www.coloradobiomass.org) works on a variety of projects mostly with the bioenergy side of biomass utilization including using biomass for energy (facility heating, CHP etc.). This includes feasibility studies, community/project assistance, supply studies/supply plans, market development for technologies, and renewable energy opportunities. The group also works on legislative and policy issues as they pertain to forestry and renewable energy.

Hawaii

Currently, there are no FFS&B projects in Hawaii. However, there are other biofuels projects occurring.

For example, *Falcataria moluccana* (formally known as *Albizia*) is being grown and eventually will be chipped and sent to a 6.5 megawatt gasification facility at about 195 tons per day. It is a 20-year contract to supply 6.5 megawatts of electricity or about 10% of the Island of Kauai's requirements.

Another project is Green Energy Hawaii, which is presently requesting that Kauai County authorize a permit to build the gasification plant on Kauai, and to plant *Albizia* for a supply. There is much controversy about this because *Albizia* is incredibly invasive and has taken over thousands of acres of native forests throughout the State. Also on Kauai, a private company is lobbying the State to allow planting this species on leased State lands. The State denied this request stating that it is supportive of this activity but not of using this species. The company is still going to plant it but on privately-leased lands. This is a very controversial issue right now.

A homesteader organization on the big island has a five-year license with Department of Hawaiian Home Lands to experiment with gorse *Ulex europaeus*. They have looked into using it as a biofuel.

The Maui district has a party interested in utilizing trees for biomass and it is anticipated that the state will work with them to achieve their resource management goals. They wish to pelletize the wood chips, and use them to provide electricity for the local electric company.

In addition, the College of Tropical Agriculture and Human Resources has a group starting to work on bio-energy. The contact is Dr. Charly Kinoshita kinoshitac@ctahr.hawaii.edu. They are looking at *Jatropha*, oil palm, *Leucaena*, *Eucalyptus*, corn, and other crops. See the article Goro Uehara and *Jatropha curcas* at <http://www2.ctahr.hawaii.edu/ctahr2001/>

Lastly, there is a rental car agency on Maui that is utilizing used and filtered restaurant frying oil as a biofuel for a fleet of Volkswagons.. <http://www.bio.beetle.com/biodieselrentalcarsfaqs.htm#what%20is%20biodiesel>

Idaho: No activity reported.

Kansas: No activity reported.

Marshall Islands:

The Republic of Marshall Islands (US affiliated) are utilizing copra (dried coconut meat) as a biofuel for vehicles. Pure copra oil will run diesel engines and there are a few operating on this pure fuel at present. They are also testing the addition of ethanol and/or kerosene to the copra oil investigating the effect and properties. These also are being used currently in vehicles. Without subsidies, the cost of this biofuel per gallon is \$3.50; with the subsidies it is \$2.50/gallon. The price of a gallon of gas in the Marshall Islands, at this point in time, is approximately \$2.50 to \$2.80/gallon

Montana:

The *Biomass Boiler Market Assessment* for Montana was completed by CTA Architects and Engineers in 2006 and identifies opportunities and challenges for facility biomass conversions in the state. Over 60 pre-feasibility assessments for facilities in Montana have been conducted and MT FFS&B staff is working on the development of a number of projects including partnering with local architects, developers and planners on opportunities for incorporating district biomass heat/energy systems in new commercial or residential development. The Eastern MT Biomass Task Force is conducting a feasibility assessment on local market development opportunities for biomass utilization. The Confederated Salish and Kootenai Tribes received a grant to conduct a feasibility assessment of woody biomass energy development in their area. The Montana State Prison in Deer Lodge plans to install a biomass system to heat the work dorm and dairy complex. Two of the first “whole tree” pellet systems under FFS&B are currently operating in the state.

The Montana Department of Natural Resources and Conservation (DNRC) helped with funding, planning and executing a national workshop on implementing biomass boiler systems hosted in Missoula, MT in October of 2007 which was a great success with over 200 attendees. An educational DVD of the workshop presentations is being produced. *A Fire and Biomass Curriculum for Middle School Students* has been developed and published by Bitterroot National Forest and Bitter Root RC&D.



Biomass Heating System in Darby, MT will save the community \$100,000+ during the '07-'08 heating season.

The DNRC is partnering with the Montana Department of Environmental Quality (DEQ) for review of biomass boiler installation projects and for design recommendations to maintain good air quality. In addition, emissions testing is being conducted by Bison Engineering, Inc. and underway for different types of biomass boiler systems in the state. The DNRC provided biomass availability data and drafted policy recommendations for increasing biomass utilization for energy to be included in Montana's recently released Climate Change Action Plan.



In contrast to the massive smoke emitted from burning slash piles (top photo), normally you cannot see the exhaust gas emitted from a wood boiler stack or you might see a moist steamy gas with no visible smoke as shown in the below photo of the wood boiler stack in Darby, Montana.



MT DNRC FFS&B program has partnered with The Climate Trust making \$355,000 available to eligible facilities to help finance biomass boiler installations through the sale of CO₂ offsets--\$185,000 has been spent. Research is underway to examine the efficiencies, economics, and soil/nutrient impacts of biomass collection and transportation using different equipment and techniques through a partnership between USFS S&PF and Research, Montana Community Development Corporation, and University of Montana College of Forestry and Conservation. DNRC efforts continue in working with fuel suppliers to hone in on ideal fuel characteristics (size, moisture content, type of processing) that operate best in different systems, as well as working with boiler manufacturers on engineering fuel conveyance systems to handle different types of fuels, especially diverting oversized pieces.

Nebraska

There are approximately seven alfalfa dehydration plants throughout Nebraska burning waste wood to dry green alfalfa during the process of manufacturing alfalfa feed pellets. The primary source of fuel is sawdust, shavings, and other fine or ground wood waste from secondary wood manufacturers (e.g. furniture, door, cabinet, pallet manufactures). The volume of wood fuel used by individual plants is dependent on production, but generally varies between 300 – 1500 tons per year per plant.


The NFS is currently soliciting bids for a USDA Forest Service grant-funded “Nebraska Wood Biomass Inventory and Analysis” to quantify the current volume of wood waste generated from urban tree removals, sawmill residue, pallet disposal, forest thinning and logging operations, utility line clearing, and other potential sources of wood waste and to identify potential institutions that could utilize wood energy and encourage small business development.

Nevada

The Nevada Division of Forestry and the US Forest Service State & Private Forestry are currently working with the Southern Nevada Woody Biomass Collaboration to identify, quantify and utilize woody biomass in Southern Nevada. To date, woody biomass waste has been quantified from urban tree waste and wildland urban interface fuels reduction treatments in and around the Las Vegas Valley. Contractors currently producing and hauling biomass have been identified (Construction & Demolition, Urban Tree Services and Fuels Reduction Contractors). Potential end users for this biomass are being identified for potential FFSB projects (heating, cooling and electricity) and other biomass utilization projects (mulch, biofuels, etc.) in the area. Emissions tests are being conducted for different types of systems in the state.

New Mexico:

There has been a “Wood Chip Fuel Specifications and Procurement Strategies for New Mexico” prepared by Biomass Energy Resource Center, in Montpelier, VT.



The New Mexico Woody Biomass Group is a collaborative group of federal agencies, tribes and pueblos, state agencies and organizations, non-government organizations, and private forest industry personnel working to establishing a market for the by-product of forest health and forest restoration initiatives in order to lower the costs of forest health and restoration efforts.

To that end, barriers have been identified to having an self-sustaining, appropriately-scaled, biomass industry and recommendations have been made to local, state and federal entities to address those barriers. Senator Jeff Bingaman's office is currently facilitating this group and meetings are at the request of the stakeholders involved. Suggestions that result from this dialogue will likely represent a wide array of ideas, thoughts and interests.

A division of Mount Taylor Machine, LLC, Milan NM called *Wood You Recycle*, in Albuquerque has a clean wood waste recycling facility providing a cost-saving disposal alternative to the landfill for clean urban wood waste created by manufacturing and construction industries, as well as government, municipalities, and individual citizenry where it can be recycled and manufactured into wood pellets.

North Dakota

The city of Minot is exploring the use of urban wood waste for a new Public Works Building . ND is contracting with the Energy & Environmental Research Center (EERC) at the UND to calculate the annual savings and annual estimated tons of wood chips needed for the project. The EERC also provided technical assistance to the North Dakota Forest Service for a feasibility study under the FFSB program considering utilization of biomass energy in western ND public institutions. Economics showed 12 facilities within the Minot and Dickinson study regions to be viable for conversion to a biomass fuel, and thus potential candidates for an FFSB biomass energy demonstration. The North Dakota Forest Service and the Bismarck Parks and Recreation District signed a MOU which provides support to establish a general framework for cooperation in implementing the FFSB program grant activities at the Indoor Aquatic Wellness Center, Bismarck State College.

Oregon

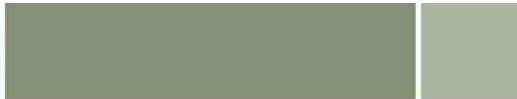
The Enterprise School District is in the final decision-making stages on a biomass system for their school. The decision will hinge on the results of an energy audit and business plan currently being developed. The Oregon Department of Forestry is also working with a community post-and-pole plant on an integrated wood processing facility. Upon completion of that facility they would have a 1-3 megawatt combined heat and power biomass system for their waste and power to the facility, heat to a small kiln, and steam to the Willowa School about 7 blocks away.

South Dakota

A wood chip specification and procurement strategy guide for wood biomass boiler systems has been completed. A planned ethanol plant in Chancellor is investigating the use of wood waste for heat in its production process.

Utah

In December 2006, the Utah Department of Natural Resources completed a full inventory of all fossil fuel boilers operating in the state. The inventory includes projected paybacks for replacing the boilers with wood energy. In total, more than 18,000 boilers were identified. The inventory's companion report, "Assessment: Potential for Using Woody Biomass for Heat and/or Power in Utah's Institutions and Industries," discusses a variety of issues, including biomass supply, the Utah wood products industry, and market potential. The report also offers the following strategic recommendations: (1) Engage key stakeholders; (2) Assess woody biomass supply viability; (3) Explore additional partnerships, drivers, and opportunities; (4) Disseminate information; and (5) Establish a demonstration project in Utah.



In the fall of 2007, the Governor’s energy advisor convened a stakeholder group to assess wood energy opportunities in the state. As part of this effort, the group generated a priority list of facilities that have strong potential for a successful demonstration project. The priority list of 42 facilities were identified by extracting only those facilities from the state inventory that have older boilers, a promising payback, and are located in counties that the state considers not to have significant air quality problems. The stakeholder group is currently creating a more refined list of criteria, especially environmental factors; these will be used to select a final demonstration project.

Also, an assessment of woody biomass supply is currently being developed for Utah. The assessment, called CROP (Coordinated Resource Offering Protocol), coordinates resource offerings within and between agencies. CROP provides a protocol for leveling supply by diameter, species and volume between resource players at important landscape scales. It changes the dynamics of resource offering in an investor landscape.

CROP data is being collected across all of Utah and some surrounding states including northern Arizona, southwest Wyoming, and northeast Colorado.

Mater Engineering is designing a Utah CROP interactive database, to be installed on the Utah Forestry, Fire and State lands website. This site will provide information to businesses, agencies and other interested parties on potential offerings of wood material across the State. The establishments of stakeholder group(s) are being investigated.

Stakeholder group(s), if established, could 1) oversee the CROP database, 2) encourage establishment of appropriate wood industry and 3) provide a venue for forest restoration discussions.

Washington: No activity reported.

Wyoming

The state of Wyoming is developing a Biomass Inventory Update, as part of a Western Governors’ Association Grant. There are ongoing discussions and investigations on a wood pellet facility in the Saratoga area.





Summary and Conclusion

Some states commented on the lack of funds to initiate a FFSB program. Consequently, they had little or nothing to report. States outside of USFS Regions 1 and 4 have been able to start programs by obtaining a variety of grants from different sources. On the local end, even when projects look good financially, local school districts sometimes have a hard time raising the funds to finance conversion to biomass.

Many projects have been completed under the West's original Fuels for Schools Program, are currently being constructed, or are considered feasible. Four out of the five states targeted by the Program have operational wood-fired boilers at either schools or some other public facility; Montana has the most with nine completed projects.

Many western states and territories are putting wood biomass to work for energy. Eleven western states have facilities operating with wood biomass heating systems. Some of these systems have been operational since the early 1990's. Five western states have projects in progress, including a cellulosic ethanol plant in Wyoming. Eleven states have projects that are considered feasible, but have not been started. Notable activities were reported from 14 states and one territory.

Cost savings were not reported for all of the facilities that have converted to wood biomass fuel. However, among reporting facilities, savings ranged from \$7,500 to \$1,000,000 per year.

This report shows that most western states have embraced using wood fuel for heat. The success of these projects, their significant annual cost savings, and the rising price of fossil fuels should continue to support the viability of this renewable fuel alternative into the future. As the program expands into less forested states, the motive in pursuing these biomass projects becomes less about managing excess biomass supply and more about utilizing renewable energy sources. Nevada, which has a renewable energy portfolio, is such a state.

The Fuels for Schools program may continue to expand. The Farm Bill (PL - 110-234) provides opportunities for wood-to-energy programs within the forestry and energy titles. If those provisions are funded, there would likely be an opportunity for FFSB efforts to be expanded throughout the United States.

This report, *From Wood Waste to Renewable Energy: A Summary Report of Wood Utilization Efforts in Heating systems in the West*, can found on-line at www.wflcweb.org/infomaterials/reports.php. You can find other WFLC information including reports, issue briefs and policies at www.wflcweb.org.

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