Growing Oregon's Biomass Industry

Oregon's Forest Biomass Strategy

Oregonians have a strong connection to our natural resources. Stewardship of our forests is inseparable from our environmental and economic well-being. This strategy provides a series of actions that will increase forest biomass utilization, create Oregon jobs, revitalize rural economies and community prosperity, generate home-grown energy, and sustain healthy, resilient forests for future generations.

November 1, 2012

Forest Biomass Work Group

Oregon's Forest Biomass Working Group (FBWG) is comprised of a wide range of stakeholders in the private, public and non-profit sectors working to advance sustainable biomass utilization in Oregon. Participation in the FBWG is open to any member of the public.

The FBWG is an important statewide forum for information sharing, problem solving, and knowledge creation relating to forest biomass. The FBWG provides education, strategic recommendations, and advice to state agencies, policy makers, the biomass industry and other stakeholders.

The FBWG operates under the basic premise that biomass utilization is a unique opportunity that can provide a myriad of benefits to the state, our forests, and our citizens. Forest biomass that is utilized in an ecologically and economically sustainable manner can help accomplish important goals for Oregon:

- Increase the health and resiliency of Oregon's forests
- Reduce wildfire threats to communities and restore Oregon's forest to reduce the risk of uncharacteristic wildfire
- Improve air quality
- Diversify and strengthen rural economies
- Provide base-load renewable energy and bio-based products
- Maintain the existing forest products industry and support job growth and retention in Oregon

Participants in the FBWG include:

Association of Oregon Counties	Association of Oregon Loggers	Bear Mountain Forest Products
Big Horn Logging	Biomass One, LP	Bureau of Land Management
Business Oregon	Carlson Small Power Consultants	Carpenters Industrial Union
Central Oregon Intergov. Council	Coquille Indian Tribe	Douglas County Forest Products
Energy Trust of Oregon	Mater Engineering	Oregon BEST
Oregon Business Council	Oregon Dept. of Energy	Oregon Dept. of Env. Quality
Oregon Dept. of Fish and Wildlife	Oregon Dept. of Forestry	Oregon Forest Industries Council
Oregon Forest Resources Institute	Oregon Public Utility Commission	Oregon State University
Oregon Wild	Pacific Northwest Gen. Cooperative	Rexius Forest Products
Roseburg Forest Products	Seneca Sustainable Energy	Sustainable Northwest
T2 Inc.	The Climate Trust	The Nature Conservancy
Trails End Recovery	TSS Consultants	USDA Rural Development
USDA Forest Service	USDA FSA	US Environmental Protection Agency
Warm Springs Forest Products	Western Governors' Association	Weyerhaeuser Company

For more information about the FBWG please visit:
http://oregon.gov/energy/RENEW/Biomass/Pages/forest_biomass_working_group.aspx

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EXECUTIVE SUMMARY

The economic well-being and vitality of many rural communities is inseparable from the health and management of our forests. These forests provide employment, protect our watersheds, provide valuable habitat, create unparalleled recreational opportunities and serve as a driver of our economy. We have an opportunity to improve the health of these forests, create economic opportunities and develop local, renewable energy sources. This forest biomass strategy provides a set of actions that will allow us to seize that opportunity while maintaining consistency with the state energy plan to provide stable, reliable, home-grown energy.

Oregon has long been at the forefront of biomass utilization and biomass energy projects and has a unique ability to lead in developing the next generation of biomass projects. The forest products industry has long pursued and developed new and innovative approaches and products using low-value residuals or forest health treatments. From installing biomass boilers and developing new manufactured wood products, to helping reduce emissions from teepee burners in the late 1970's to installing new product lines that can utilize small diameter materials from restoration treatments in 2012, the industry has led the way. Oregon mills installed boilers and have used the renewable energy the heat for kilns and station power starting back in the 1950s – well before renewable energy was a common topic. Oregon's pellet industry also took off in Oregon before anywhere else in the country.

The need to develop and expand biomass opportunities has perhaps never been greater. Forest health, especially within federal forests, continues to decline with large areas at increasing risk of catastrophic wildfire. Rural communities that are connected to these forests are experiencing lingering, high unemployment. It is critical to keep the remaining forest products infrastructure viable while enabling the conditions for retooling where appropriate.

There is also great opportunity that comes as these environmental and economic needs grow. A consensus is growing concerning the need and scope of forest restoration. New collaborative approaches and funding have been provided to advance these activities. Science has progressed and we are now able to make new products from biomass while commercializing new energy conversion and biorefining technologies. Research and development will help position Oregon in the vanguard of innovation and commercial activity. We can use these opportunities to grow jobs, improve the health of our forests and watersheds, keep more of our energy spending local, and develop new industries.

This strategy provides a set of actions that will advance Oregon's biomass industry and provide the foundation for future development. The Forest Biomass Working Group recognizes that limits exist to government expenditures and incentive programs. The recommendations included in this strategy are made with this dynamic in mind. This strategy recommends four market development initiatives that target specific growth opportunities and industry sectors, supports and enhances existing forest industries, and creates additional market opportunities for forest landowners and forest-based businesses. The initiatives are:

1. Biomass Thermal: the generation of on-site heat at commercial and institutional facilities.
2. Distributed Generation: the generation of heat and electricity at existing wood product facilities
3. Existing Markets: landscape bark, shavings, bedding, and other commercial products
4. Emerging Markets: biofuels, biochar, cellulosic ethanol and other nascent markets

Implementing these initiatives, as well as pursuing recommendations included in this strategy, will create a setting in Oregon that is conducive to successful commercial enterprises utilizing biomass. The combination of forest restoration and economic development along with the opportunities to grow the biomass industry into new and advanced markets will diversify and improve Oregon's energy system. Creating this setting will take different forms for different uses, and these recommendations are designed to address the needs in each of these areas.

NEED AND OPPORTUNITY

Forests cover nearly one-half of Oregon's 63 million acres, and about 60 percent of those lands are managed by the federal government. Forests also are the source of about 75 percent of Oregon's drinking water. Many of these forests are overgrown and at risk of uncharacteristically severe wildfire, insect outbreaks, and disease. Rural economies and communities connected to these forests are in need of revitalization, and in some regions, the remaining forest products infrastructure in some regions is at risk of closing. Much of the residuals from forest harvest, such as tree tops and limbs, are underutilized (e.g. burned on-site). This misses an opportunity to increase value per acre and potentially decrease management costs.

The solutions to these environmental and economic needs are complex and require a concerted, sustained effort. Following an extended debate over the role of our public forests, there now appears to be broad agreement to implement forest health restoration activities to improve the condition and resilience of Oregon forests and to contribute to local economies. There is also significant support for the multiple values that private working forests provide. Increasing market opportunities for biomass and low value, small-diameter trees are can add value to private forest lands and raise the cost effectiveness of stewardship treatments on federal lands. A systematic approach is needed to build a successful forest biomass industry. The opportunity can be summarized by the need to:

Restore and manage healthy functional forests and protect watersheds

Despite both the treatments completed over the last decade by federal agencies and the increased efforts by industry, environmental and conservation groups, governments and other stakeholders, the trend in our forests is still toward poorer overall health and greater fire potential, despite improvements in some local areas. Limitations in or lack of both markets and infrastructure, lack of resources for treatment, and disagreements over management and harvest levels continue to be barriers to addressing the forest health problem. Biomass utilization can contribute to increased forest restoration and management by reducing costs associated with treatment.

In addition to leveraging additional forest restoration treatments, providing markets for biomass utilization can offer additional value and reduce costs for private landowners, encouraging forests to stay as forests.

Engage economic opportunities

Using biomass to create energy and develop value-added products provides jobs both in the woods and at the energy and manufacturing facilities that use the raw material. This is a great benefit and opportunity for Oregon, but the economic impacts don't stop there. Biomass utilization provides multiple benefits to our local, state, tribal and regional economies.

In addition to the new jobs conducting restoration treatments and collecting and processing biomass, increased utilization can add to and complement the existing forest products sector. This provides new revenue opportunities, adds value per acre and helps keep those industries strong. Pursuing biomass utilization opportunities that are currently available will help maintain and enhance our existing workforce and infrastructure as we prepare for emerging and future opportunities. Oregon's entrepreneurs and companies have a key role to play in addressing these broad needs, thus capitalizing on biomass utilization opportunities.

Biomass is also a tool to improve our community health. Many rural, resource-based communities have been hard hit economically by the reduction in federal timber harvests. Providing new opportunities in the clean energy and renewable materials industries can help revive these economies and help increase their resiliency. New industries and developments can increase the tax base for schools, allow improved local services and create a positive financial trajectory for the future. The development of a new-natural resource based industry should also include a broader focus on economic diversification that provides resiliency and lowers risks associated with a new growth industry.

Provide local, home-grown energy

Oregon currently spends billions of dollars out of state to purchase fossil energy, while burning millions of tons of biomass, either as slash burns or in wildfires. Fuel loadings have increased in our forests, putting our communities and watersheds at increased risk. We can re-arrange this equation and utilize our home grown energy resources locally. Retaining those energy dollars in our local economy can strengthen and make our energy system more resilient to natural disasters and price fluctuations, while reducing our dependence and use of fossil based energy.

Biomass is unique among renewable energy sources. It is the only one that can provide energy for all of our uses – transportation fuel, heat and electricity. Forest biomass is also almost exclusively rural. Woody biomass utilization, when done sustainably and at the aappropriate scale, creates a healthier, more fire resilient forest. These attributes are why biomass is a cross-cutting opportunity for Oregon that integrates forest health, economic benefits, and energy security.

Biomass chipping operation in Wallowa County. Nils Christoffersen.

Oregon must not only continue, but also accelerate leadership in pursuing biomass opportunities. A shared strategy and coordinated approach that includes public, private, tribal, academic and non-profit partners will address the forest health challenges that face our public forests and advance the economies of rural communities.

The following market development initiatives and recommendations provide a series of actions that can accelerate market development and ensure effective, sustainable practices.

MARKET DEVELOPMENT INITIATIVES

This strategy proposes four viable market development initiatives including:

5. Biomass Thermal: the generation of on-site heat at commercial and institutional facilities.
6. Distributed Generation: the generation of heat and electricity at existing wood product facilities and at other large industrial sites
7. Existing Markets: landscape bark, shavings, bedding, and other commercial products
8. Emerging Markets: biofuels, biochar, cellulosic ethanol and other nascent markets

These initiatives will:

- Support and enhance existing forest sector industries
- Promote additional market opportunities for forest landowners and forest-based businesses
- Target specific growth opportunities for new businesses and industry sectors
- Improve the economics of thinning activities, allowing more forest management within a given budget

What is biomass?

Oregon defines biomass as "any organic matter, including woody biomass, agricultural crops, wood wastes and residues, plants, aquatic plants, grasses, residues, fibers, animal wastes, municipal wastes and other waste materials.

Woody biomass is defined as "material from trees and woody plants, including limbs, tops, needles, and other woody parts, grown in a forest, woodland, farm, rangeland or wildland-urban interfaces that is the by-product of forest management, ecosystem restoration or hazardous fuel reduction treatment." Woody biomass does not include treated or painted wood, any wood that must be retained on site under state or federal regulations, wood for woody debris recruitment or solid waste.

Ref. - Oregon Revised Statutes 526.005

Renewable Thermal Energy Initiative

This initiative focuses on developing a thoughtful and sustainable build-out of the renewable thermal sector. Renewable thermal applications provide on-site renewable energy, reduce energy bills, and re-circulate energy spending in local and regional economies. Businesses with national recognition in boiler manufacturing, wood conversion equipment production, and energy services call Oregon home and are poised for growth. Oregon has a significant opportunity to build on its leadership in equipment manufacturing and biomass thermal installations to develop a strong renewable thermal industry.

November 1, 2012

Conduct statewide market analyses to direct market growth and track progress.

Detailed information about the overall market size would help foster growth while demonstrating that the market is within the carrying capacity of our natural resource base. Data exist regarding most of the heating systems at public buildings such as schools and government buildings; however, there are quality issues with these data and a gap exists in understanding the potential for commercial, agricultural and industrial applications.

Recommendations:

1. **Establish a thermal energy baseline.** Currently, the state does not have a complete inventory of thermal energy consumption across the residential, institutional, commercial, agricultural and industrial sectors. This information is critical to developing state level goals for our thermal energy portfolio. Once established, this information should be incorporated into the state's Ten Year Energy Action Plan.
2. **Complete assessment of state-owned facilities.** Oregon Department of Energy (ODOE) has initiated a preliminary analysis of thermal energy use and an assessment of opportunities to implement renewable thermal projects in state-owned facilities. This project could identify some significant opportunities to offset energy costs and consumption of petroleum-based fuels. This analysis should be expanded and a similar analysis should be conducted for other government facilities and commercial building stock. Federal agencies are encouraged to develop a similar analysis of federally-owned facilities.
3. **Evaluate opportunities for district energy and small-scale CHP projects.** District energy projects could provide broad benefits in addition to individual building level projects. District energy opportunities should be assessed and potential "green downtown" projects identified that could link rural downtown development with pilot biomass energy developments. Small-scale CHP projects can provide higher asset utilization for biomass thermal projects.

Former logging community replaces fossil fuel with biomass. The rural community of Days Creek has a community supported school with an average class size of 20 students and nationally recognized curriculum. The school also has something else that other school districts around the state are considering, an advanced biomass heating system.

The system, installed in 2011, was manufactured in Oregon by Solagen, Inc. and installed by Oregon contractors. The high efficiency boiler uses wood pellets that are manufactured nearby and is saving the school over $10,000 per year.

Embracing the new technology and their logging heritage, the teachers at Days Creek Charter School are working to integrate biomass topics into existing classes.

"We're excited," said Kim Dunn, Days Creek Charter School District Business Manager. "It's hard to imagine getting excited about a boiler, but it is very exciting."

Similar projects are being implemented around the state in schools, hospitals, and community facilities. To learn more about the Days Creek project, see this case study: http://oregon.gov/energy/Recovery/docs/Days_Creek.pdf

Biomass boiler at the Days Creek Charter School. The boiler was manufactured in Oregon by Solagen, Inc.

http://www.solageninc.com/

Educate and engage the public and interested parties about the benefits of biomass thermal.

In general, Oregonians are not aware of the role that renewable thermal energy plays in reducing Oregon's carbon footprint and supporting the state's economy. In particular, building owners, facility managers and residential consumers do not have easy access to current and accurate information about biomass thermal systems, fuels, and operations.

Recommendations:

1. **Create and host an information portal for renewable thermal energy.** ODOE has created a renewable thermal webpage. This site should be expanded, updated frequently and provide information to the public regarding the thermal energy sector. This website should also provide access to tools and other resources.
2. **Develop technical information and case studies for potential project owners.** Several case studies have been completed to document biomass heat projects in Oregon. Additional case studies, technical descriptions and lessons-learned evaluations could aid potential project owners. This information should be maintained on the renewable thermal website and linked from various technical assistance service providers.
3. **Develop a state-issued "Produced with Oregon Bioenergy" Certificate.** Signature-branded Oregon consumer product manufacturers such as specialty food products, microbreweries, distilleries, coffee roasters, creameries and others could benefit from a designation that they use rural Oregon bioenergy in their operation. This designation would be a resource in their marketing efforts and help to reduce operational costs. This certificate could address electric power as well as biomass thermal energy.

Provide targeted technical assistance and project development support to foster strong project development.

Building owners and project sponsors need access to robust early project development support when exploring and evaluating potential projects. This assistance does not take the place of services provided by consulting engineers and project developers; rather, it can remove initial barriers and shorten the project development timeline. This support will help to identify high potential projects that should be prioritized for further support and funding.

Recommendations:

1. **Develop and host a series of renewable thermal workshops.** ODOE should work with partners, such as Oregon Solutions, to develop and organize a series of renewable thermal workshops targeted at government staff, building owners, and others that are interested in implementing renewable thermal projects.
2. **Provide direct technical assistance and develop tools for project development.** ODOE should coordinate state efforts and identify other partners to provide direct technical assistance and tools to assist building owners' complete pre-feasibility assessments of project opportunities. Emphasis should be placed on building this capacity in rural communities where local entities (both governments and non-profits) could provide assistance on an ongoing basis to a particular region.

Develop and deploy financial models and incentives that increase the availability of capital and encourage greater capital investment.

As demonstrated by Oregon's existing biomass-fired institutional heating systems across the state, renewable thermal systems can yield annual energy savings and significant long-term return on investment, particularly for public entities. Up-front capital cost has proven to be a barrier to broad implementation. This is especially true for institutional applications such as schools, hospitals and government facilities where it is difficult to justify new debt.

Recommendations:

1. **Ensure renewable thermal projects are eligible for the Oregon's Energy Incentives**. Prior to 2011, renewable thermal projects were eligible for the Business Energy Tax Credit (BETC) Program. This program was critical to building existing biomass thermal facilities. The new Renewable Energy Development Grant program, limits eligibility only to projects that generate electricity. Renewable Thermal projects may qualify for an incentive under conservation incentive programs. Renewable thermal applications should have a specifically designed program.
2. **Develop and implement a Renewable Thermal Program.** The Oregon Department of Energy should work with stakeholders to develop mechanisms that promote the build out of a renewable thermal energy sector. One potential mechanism would be to implement a Renewable Thermal Program to drive renewable project development through standards, incentives, or other methods. Other promising policy options should be considered. Learning from the feed-in tariff programs, net metering programs or other production based incentives can help inform options for renewable thermal programs.
3. **Develop Innovative Financial Models.** Innovative financial models must be developed and implemented to allow for effective long-term industry development. These models can be pursued as public-private partnerships or as private sector offerings. The State Building Innovation Lab or other innovations could be an effective mechanism to develop these models. Aggregation of public facilities, backed by effective risk management, can help to deploy these new models.

Distributed Generation Initiative

This initiative encompasses two components that will improve the viability of existing and new biomass energy facilities. This first addresses increasing the market share for biomass energy with a related focus on the value of the energy produced. Combined heat and power (CHP) projects should be prioritized projects due to the enhanced efficiency that comes from a well designed CHP facility. This improves the energy returns from the biomass and allows much more energy to be utilized from a given amount of sustainable biomass.

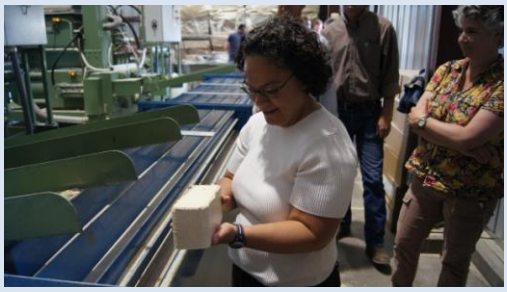
Compared to other western states with similar forest health needs, Oregon has been fortunate to maintain parts of its wood products manufacturing infrastructure and retains an experienced, though greatly reduced, workforce. This infrastructure is critical to an increased forest restoration effort. Without a forest products industry, we will have an increasingly difficult, if not impossible task managing the health of our federal forests. Challenges facing states' like Arizona and Colorado illustrate this critical need.

Mill facilities have also contributed to Oregon's energy goals for years by generating both renewable electricity and process heat. The related energy revenue streams have been critical to retaining a critical mass of wood products facilities. Oregon's distributed biomass energy facilities provide market opportunities to add value to harvest residuals and provide alternatives to open burning of forest slash.

Wood Energy Cluster Emerges in John Day

Forward thinking. That is how the developments in John Day have been described by various participants and observers. Ochoco Lumber Company has made a big investment in a new product line that provides a market for small diameter materials from forest restoration and thinning treatments in the national forests surrounding the community. The mill will be producing heating pellets and compressed heating bricks.

This development was coupled with the conversion of the community hospital, airport and area schools to biomass heating systems. These investments create demand for the product that Ochoco will be producing at the mill, but also reduces the annual energy costs at each of those facilities. These savings can be re-invested in education, health care and community services, while the dollars they do spend are sent to the local mill. This type of forward thinking is an example of how communities can work together to solve complex economic, ecological, and energy issues.



Nancy Sutley, President Obama's Chair of the Council on Environmental Quality, visits John Day to learn about the rural energy cluster.

This initiative focuses on positioning distributed generation that is integrated with or near existing mills to reduce energy costs, realize operational benefits, increase utilization of the forest biomass resource, and contribute additional revenue streams.

Increasing Demand for Renewable Biomass Electricity

Increasing demand for the energy generated from biomass will help maintain the existing energy infrastructure in the forest products sector and support the broader forest industry. Continuing to encourage market demand for forest slash or other biomass materials could help to reduce the amount of slash burning occurring in Oregon.

Recommendations:

1. **Support Distributed Generation.** The state should support and pursue the established goals for distributed generation and take steps to achieve these targets. These include both the overall targets for Oregon's Renewable Portfolio Standard as well as the goal for community-based renewable energy projects contained in Oregon Revised Statutes 469A.210. Any increased focus and effort in these areas should recognize that existing facilities which may not now qualify for inclusion in the RPS programs should be included.

2. **Develop purchase preferences for State government and/or industry clusters.** The state of Oregon should consider establishing specifications which would provide a preference for purchasing electricity generated by in-state distributed energy facilities. Industry clusters can also use a "Produced with Oregon Bioenergy" certificate program to add value to their brand.

3. **Expand net metering opportunities.** Net metering can offer benefits for customer sited distributed generation. The state's net metering program should be expanded and additional mechanisms to support and expand net metering should be pursued.

Recognizing the full benefits of biomass power

Many of the public benefits that are provided by biomass energy facilities are not reflected in the market prices paid for the energy they produce. This dynamic is reflected in both the regulatory approach and the accounting of benefits. Incorporating these benefits, such as firm capacity, voltage control and local reliability, into the market price will send clear price signals and encourage additional biomass utilization at these facilities.

Recommendations:

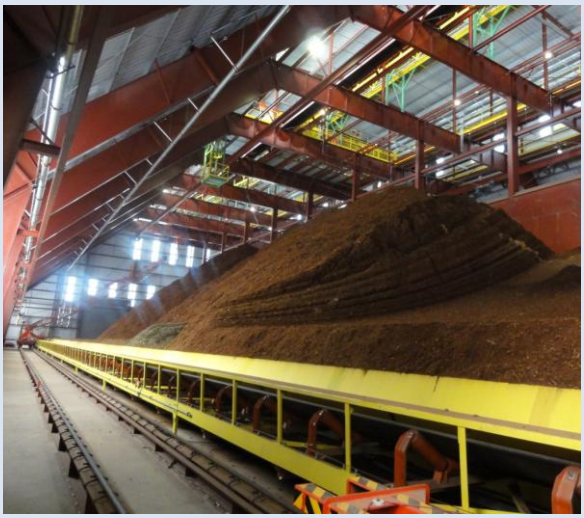
1. **Remove barriers to distributed generation.** Oregon Department of Energy and Oregon Public Utility Commission should review their 2005 staff report " Distributed Generation in Oregon: Overview, Regulatory Barriers and Recommendations" and issue an updated report that describes what regulatory changes have been implemented to promote distributed generation and what actions could be taken to maintain and expand distributed generation in Oregon. This analysis should include evaluation of avoided cost determination, how base load distributed generation is included in utility planning, and utility incentives and disincentives for distributed generation at customer sites.

2. **Develop public benefit adders for biomass generation facilities.** The Oregon Departments of Energy and Forestry and the Public Utility Commission should convene a stakeholder group to study and evaluate the efficacy of establishing an "adder" to the price of power for the public benefits that these projects provide. This study group should determine at a minimum, the value of the service provided, what costs those benefits offset, potential sources of revenue or expenditure reduction that could fund the adder and policies or additional evaluation to be considered. Recommendations could include establishing resource specific avoided cost rates, environmental benefit adders, valuing the thermal component of CHP facilities, or other funded mechanisms that provide additional value for the services provided by biomass energy facilities. This effort could build on such studies that have been conducted in other states.

Innovative sawmill generates energy and more. Seneca Sawmill Company has a good story to tell. The 58-year old firm still runs two shifts a day with 250 employees in an industry that has been hard hit by the recession and decline in the US housing market. When demand for lumber declined, Seneca's management actually expanded to grow a new economy tied to founder Aaron Jones' commitment to a sustainable future.

In April 2011 Seneca opened a new $50 million combined heat and power facility at the existing mill north of Eugene. The new plant created 10 permanent jobs, and produces 18.8 aMW of renewable energy and provides heat for dry kilns.

Projects like these embody the multiple benefits that biomass utilization can provide; it offers distributed renewable energy, creates additional revenue streams for the mill while creating jobs, and helps provide markets for forest biomass.



Above: inside the fuel building at Seneca Sustainable Energy.

Below: Seneca Sustainable Energy

Existing Markets Initiative

Existing markets for forest biomass materials should be enhanced through this strategy without distorting markets or creating conflicting policy objectives. Oregon businesses already utilize forest biomass to produce animal bedding, mulch and soil amendments, post and poles, lumber, composite panels, pulp and paper, firewood, pellets and other specialty products such as biofilters.

This initiative continues the effective work that Oregon Forest Resources Institute, Oregon State University's Wood Innovation Center, USDA Forest Service, Business Oregon and others have done to promote this industry.

Recommendations:

1. **Promote integrated biomass utilization.** Encourage integrated biomass merchandizing operations that produce multiple products based on the concept of all classes of fiber utilized for its highest value.

2. **Increase markets for western juniper.** Juniper wood products are designated as a "naturally durable species" by the Oregon Building Codes. However, for example, no lumber grading rules have been established to allow juniper timbers and/or beams to be utilized in such applications as guardrail and sign posts for Oregon Department of Transportation projects. Funding could be provided to guide western juniper through the required process for engineering design values and lumber grading rules by an accredited lumber grading agency.

Integrated Biomass Energy Campus

Following the closure of one of the last mills in the region, Wallowa Resources launched an effort to recapture those lost jobs and achieve the vision of integrating business, environmental and social benefits in this rural Northeast Oregon location. The Integrated Biomass Energy Campus, located near Wallowa, combines various processing systems at a single location. Businesses at the campus produce engineered heating fuels, firewood, post and poles, landscaping timbers and other products. The site is also incorporating a sort yard and combined heat and power system that will further expand commercial markets for small diameter materials and biomass.

This new business model can reduce processing costs and impacts in the forest, allow for diversified marketing at one site, encourage the highest value for the raw material, provide additional wood supply for mills and regional customers, and pump additional resources into the local economy. To learn more about this project visit Wallowa Resources' Website.

3. **Provide access to biomass utilization market information.** Landowners, contractors, and others are seeking information about market opportunities and want to know where the local buyers are for biomass. To provide a central repository for this information the Wood Innovation Center at OSU should continue to maintain the Oregon Forest Industry Directory. The directory should be expanded to include additional information and functionality related to biomass utilization such as mapping features and locations of firms utilizing biomass or biomass fuel.

Emerging Markets Initiative

Continued price increases in petroleum products and refined fuels, greenhouse gas emissions, and national security implications are some of the reasons to pursue alternatives to fossil fuel-based resources for fuels, chemical, and other products. Oregon has, for decades, lead in the adoption of alternatives to fossil-based resources. This leadership needs to continue as the state engages in efforts to advance the biomass industry.

Opportunities for forest biomass abound in emerging technologies and markets, but additional work and sustained commitment is needed. Basic research and discoveries have illustrated promising discoveries and technologies; however, taking these discoveries from the research lab to commercial operation has proven difficult. This initiative will accelerate emerging technologies, biofuels and biomass based products.

Recommendations:

1. **Coordinate and expand basic and applied research.** Oregon University System can coordinate with Oregon businesses so that they have access to the research and technical assistance they need to develop and commercialize advanced biofuels and biomass products. This also offers opportunities for the private sector to provide university researchers and extension staff perspectives on market opportunities and customer needs. This research should include basic research into breakthrough technologies and advanced conversion opportunities, supply chain improvements and harvesting innovations, and additional applied research. This recommendation encourages the development of specific university-industry research agendas to develop value-added products that utilize forest biomass.
2. **Coordinate research, commercialization and market development efforts.** University research, Oregon Innovation Council, Oregon Built Environment and Sustainable Technologies Center and state promotion and development programs should be coordinated to identify and prioritize promising technologies and foster effective, demonstration, deployment and commercialization.
3. **Re-authorize and implement Oregon's Clean Fuel Standard.** Creating market demand for advanced biofuels will bring new opportunities for Oregon businesses that supply biomass or manufacture biofuels.
4. **Grow existing markets for biofilters, mulch and soil amendment.** Improve science and outreach about the use of wood biofilters to reduce odors from wastewater treatment facilities, animal management areas, and other applications. Improve mulch and soil amendment outreach programs to increase use and obtain other benefits, such as increased crop yields, reduced water use and reduced use of chemicals.

5. **Promote export opportunities**. Business Oregon should use existing state programs to promote export opportunities for Oregon-manufactured biofuels and biomass-based products, including wood conversion equipment, pellets, and emerging biomass-based solid fuels and products. Promoting the development of products and companies that bring traded-sector revenue to Oregon from biomass utilization is an important aspect of this recommendation. Generating traded-sector revenue is critical to making a biomass utilization industry successful in Oregon.

POLICY FOUNDATION AND ENABLING RECOMMENDATIONS

Sustainable development of a forest biomass utilization industry requires clear goals, committed policy support, careful planning, and integrated and inclusive effort by all stakeholders. These recommendations address foundational and enabling actions.

$80 million helps seed the Northwest's biofuel industry.

In 2011 two $40 million grants were awarded to Northwest teams to develop a regional biofuels industry using woody biomass.

The Northwest Advanced Renewables Alliance is a joint effort by public universities, government laboratories and private industry throughout the Northwest that have joined together to convert forest residues into sustainable aviation fuel. More information can be found at http://www.nararenewables.org/

The second project, the Advanced Hardwood Biofuels Northwest, is focused on sustainable grown woody biomass crops, mostly poplar, into renewable aviation fuel. Oregon partners include Portland based Greenwood Resources and ZeaChem, Inc. ZeaChem is constructing a biorefinery in Boardman and will use hybrid poplar trees produced by Greenwood Resources. http://ahb-nw.com/

Top: Greenwood Resources Poplar farm.

Bottom: ZeaChem's biorefinery in Boardman

State Policy

It is critical to have clear policy goals to guide state actions. State policy should be revised to focus not just on energy development, but integrated biomass utilization and markets that support forest restoration needs and the existing forest products and biomass utilization infrastructure..

Oregon Revised Statutes Chapter 526.277 provides the state's current forest biomass policy:

The policy of this state is to support efforts to build, and place in service, biomass fueled energy production facilities that utilize biomass collected from forests or derived from other sources such as agricultural crop residue when:

(a) The facilities utilize sustainable supplies of biomass from cost-effective sources;

(b) The use of forest biomass for energy maintains or enhances the biological productivity of the land, taking into consideration transportation costs, existing forest conditions, management objectives, vegetation growth rates and the need to sustain water quality and fish and wildlife habitat; and

(c) The set of forest values to be sustained, in addition to wood and biomass for energy, is considered. Forest values include forest products, water, wildlife and recreation.

Recommendations:

- **Update Oregon's forest biomass policy**. State policy should focus on all biomass utilization opportunities and markets including wood products, advanced biofuels and chemicals, bio-based products, and thermal and electric energy.
- **Establish a policy framework for developing and promoting the bioeconomy.** Oregon's natural resources and forestry and agricultural industries are essential to the state's economy. Strong state leadership is needed to help these industries advance and grow.

Coordinated State Efforts

Consistent with the State's Ten Year Energy Action Plan, a coordinated approach is needed to implement this strategy and broader goals related to federal forest restoration and bioeconomy development. State agencies should also be communicating, coordinating and leveraging each other's tools and expertise. State agencies currently have overlapping or competing missions related to biomass activities. Closer coordination will allow state agencies to present a unified approach to biomass utilization and streamline the regulatory process for new projects. This collaboration will provide businesses and entrepreneurs access to state programs, assist in market development and help leverage federal support.

Recommendation:

- **Coordinate Biomass Market Development Efforts with existing statewide and other government natural resource plans.** Efforts to advance markets for biomass should be developed in coordination with existing statewide plans including Oregon's Conservation Strategy, Oregon's Statewide Forest Assessment and Resources Strategy, and Oregon's Integrated Water Resources Strategy. These plans, along with this forest biomass strategy cannot be fully accomplished without the cooperation of federal, tribal, and state land management and regulatory agencies, non-governmental organizations, private landowners and others.
- **Coordinate forest restoration, biomass utilization, and forest cluster economic development efforts.** Current state efforts to promote forest restoration, forest cluster development and biomass utilization are fragmented

and suffer from a lack of coordination. Existing state policies should be audited or evaluated for alignment. Improving communication and coordinating efforts between these teams will facilitate a more effective approach to each of these areas. Oregon state agencies should present a united approach to businesses involved in bioenergy development and should reduce redundancies, shorten the regulatory review process, and provide a consistent, predictable process for doing business in Oregon's bioenergy sector.

Ensuring Sustainability

Biomass utilization is an important tool that can help increase the resiliency of Oregon's forests, communities and industries. These practices must be accomplished in a sustainable manner. The Oregon Forest Practices Act recognizes woody biomass as a commercial activity subject to the guidelines of the FPA. Oregon's Conservation Strategy (OCS) is consistent with and supportive off the intent of this strategy to advance sustainable biomass utilization and increase the health and resiliency of Oregon's forests. One of the key statewide conservation issues identified in the OCS is disruption of disturbance regimes. A goal related to fire regimes is to reduce uncharacteristically severe wildfire and restore fire or use site-appropriate techniques that mimic the effects of fire in fire-dependant ecosystems.

Recommendations:

- **Conduct periodic monitoring and evaluation of biomass utilization.** Explore opportunities to provide evaluation and guidance on emerging topics of interest, such as nutrient retention, growth enhancement, and changes in fire behavior. This monitoring and evaluation should include not only those within the framework of Oregon's Forest practices Act, but should also include federal lands, air quality impacts, water quality, habitat and other ecosystem services.

- **Complete a comprehensive and defensible life-cycle analysis of biomass utilization**. A scientifically sound and credible life cycle analysis (LCA) on biomass harvesting and utilization practices in Oregon is needed to bring clarity to the discussion of carbon emissions from biomass utilization. This analysis should include a full review of practices currently underway or planned in Oregon, and evaluations of alternatives to biomass utilization such as slash burning. This analysis should inform an appropriate and reliable accounting system that can be used for energy and climate planning.

- **Provide state-level biomass supply information to identify appropriately-scaled biomass energy locations.** Project developers routinely gather supply information on proposed biomass projects; however, this information is rarely available to the public. To help improve public understanding of potential biomass projects and ease concerns about resource competition and sustainability, provide coarse-scale biomass supply information about proposed projects.

- **Monitor environmental and economic effects of biomass utilization**. The Oregon Department of Forestry should continue to monitor, research, and report on the environmental impacts and benefits of biomass harvesting and utilization as per existing legislative requirements. This should be coordinated with Oregon Department of Environmental Quality, Oregon Department of Fish and Wildlife, recreation and other agencies involved in reviewing the effects of forest practices.

Outreach and Education

Accurate, up-to-date information about biomass utilization and how it can support forest health, economic development and energy security is needed. State agencies such as Oregon Departments of Energy, Forestry and Environmental Quality should provide information to the public, industry, and other stakeholders. This information should include:

- Integrated benefits of forest restoration and biomass utilization.
- Biomass utilization opportunities and end-uses.
- Robust and complete information on biomass supply volumes and characteristics.
- Life-cycle energy and carbon impacts of current and planned biomass utilization.
- Biomass harvesting practices and the regulations and controls that exist to ensure forest health.
- Air quality implications of biomass utilization and reduction in slash burning and forest fire.
- Environmental effects of biomass utilization.
- Economic and social implications of biomass utilization.
- Renewable energy and advanced fuel potential.

Recommendations:

- **Communication**. Develop a communication plan designed to increase understanding and raise awareness of the integrated social, environmental, and economic benefits that biomass utilization provides to Oregon. This includes facilitating and coordinating activities between state agencies, developing educational materials appropriate to key stakeholder groups, and actively conducting outreach to these stakeholders.

Effective Incentives

Incentives can be an effective policy tool if designed correctly. Otherwise, incentives can distort markets and put existing businesses at risk. Incentives should be focused on maintaining and increasing market demand for biomass, not subsidizing the supply. Supply side policies should focus on improving access to a consistent and dependable supply of biomass and improving the efficiency of the supply chain.

Recommendations:

- **Target incentives toward market development**. State incentives for biomass should be designed to encourage market development, expand opportunities for biomass products and stimulate, along with with Federal grants and other financial assistance, deployment of proven bioenergy, biofuel and bio-based manufacturing capabilities.

Supporting Collaboratives and Increased Forest Restoration

Forest collaboratives exist in many parts of the state and additional collaboratives are being formed. State agencies and the biomass industry should engage with these groups, and provide assistance and technical expertise to help identify and pursue biomass utilization opportunities. Resources and market development efforts should be directed toward areas that have the greatest need and the greatest potential for success.

Recommendations:

- **Support Collaboration.** Collaboration can be an effective tool to gain agreement on and increase the scale of forest restoration treatments. Collaborative efforts should be supported by the state and resources should be provided to support existing and emerging collaboratives.
- **Support funding for restoration treatments.** It is critical to increase the pace and scale of restoration treatments on federal forest lands in conjunction with the expanded uses for biomass in the state. State and federal agency efforts to increase management on public lands and implement restoration treatments should be fully funded.
- **It must be recognized, however, that no amount of collaboration can make a project successful in the absence of sound business opportunities.** This effort should focus on creating an environment where forest products industries and bioenergy projects can be successful, and support those collaborative efforts that seek to take advantage.

Research, Development and Commercialization

Additional research, development and commercialization assistance is needed to bring advanced biomass products and bioenergy technologies to market. Oregon's universities should continue to conduct research into advanced biofuels and biochemical technologies and other bioproducts.

An integrated, university-industry research, development and commercialization program is essential for a healthy forest biomass sector in Oregon. The State of Oregon, through the Oregon Innovation Council, has designated anad invested in Oregon Built Environment and Sustainable Technology (BEST) Center to lead such efforts.

The state and industry should continue to support research, development and commercialization of techniques and technologies that can improve the efficiency and reduce the cost of biomass harvest, processing, and transportation, and create and retain Oregon jobs. These efforts should seek to work with established Oregon manufacturers to deploy these technologies in Oregon and beyond.

Recommendations:

- **Support commercialization efforts**. Consistent with the Ten Year Energy Action Plan, continue to fund integrated , university-industry research, development and commercialization through Oregon BEST.
- **Improve the efficiency of the supply chain.** Utilize the Oregon BEST platform to support robust applied research and development projects to develop and deliver near-term innovations in already identified opportunities such as to improve efficiencies in the supply chain through collaboration with forest contractors and equipment manufactures.
- **Support advanced conversion technologies.** Designate Oregon BEST to convene researchers at its Oregon University System partners, entrepreneurs and other partners to identify and implement research and development agendas for longer-term value-added biomass product opportunities such as biochemicals, advanced biofuels, and bio-based products. This effort should be closely coordinated with regional and federal research projects and programs.

IMPLEMENTING AND MAINTAINING PROGRESS

This strategy builds on the goals and strategy in the State's Ten Year Energy Action Plan. It is an ambitious roadmap for growing Oregon's forest biomass industry. Implementing this strategy will require legislation, prioritized state agency efforts, stakeholder engagement, close coordination with environmental and industry interests, and resources. While it may seem ambitious, we cannot afford to stand by and let our forests and rural communities continue to deteriorate.

The strategy that the Forest Biomass Working Group has laid out can be implemented, but not simply by issuing this document. These recommendations should be pursued by the state, FBWG participants, and others. Implementation must be monitored and revised as conditions change. This is not a vision document – it is a set of recommendations to grow the industry. This strategy is about implementation, not formulation.

The first step in pursuing this strategy is to develop and deploy an effective implementation plan. This implementation plan will inform the public, agency staff, and other stakeholders about the strategy and what needs to be done to implement it. These efforts should also encompass the outreach and education recommendations that are embedded in this strategy. Sustained, active engagement with stakeholders and the public will be necessary to ensure that implementation is monitored and evaluated effectively and the FBWG is able to refine the strategy as needed.

State agencies need to develop detailed work plans to complete the relevant recommendations. They should work on aligning existing resources and securing additional resources needed to implement these recommendations. Industry and environmental stakeholders and the FBWG participants need to be engaged with and supportive of these efforts.

Results of restoration. These are before and after photographs of the same site in the Deschutes National Forest. Without markets for the material that is removed, it will be piled and burned on-site, increasing cost and emissions.

CHALLENGES FACING THE INCREASED USE OF FOREST BIOMASS

This strategy seeks to advance the biomass utilization industry in Oregon by overcoming or surpassing the various challenges and barriers that face this sector. While many of the challenges are similar to those faced in the past, many have evolved or as they have dissipated, new challenges have arisen. These challenges reflect the understanding of the industry and the economic conditions we currently face. As this strategy is implemented these challenges should be revisited and evaluated against the recommendations to ensure we continue on an effective path forward.

Markets

Existing markets are insufficient to recoup forest restoration treatment costs in fire-prone forests or encourage value-added use of residuals from harvest. In many markets, generating electricity and liquid fuels from biomass is not competitive with fossil fuel-based resources. Emerging markets for biochar and liquid biofuels remain underdeveloped, and technological scale-up issues exist for products such as torrefied fuels, chemicals, and synthesis gas. There are many specific barriers and challenges and these also vary from those facing existing technologies to the barriers faced by new and emerging technologies that have yet to be proven. This summary provides a simplified view of this challenge; the challenge is real and complex - without sufficient markets, biomass utilization will not provide enough economic value to offset the harvest and transportation costs. As a result existing forest biomass will be underutilized or burned in slash piles.

Knowledge, Awareness, Understanding

There is a general lack of awareness and understanding of the benefits that biomass utilization can provide to the environment, and to the social and economic well-being of our communities. This deficiency can give rise to public concern and understanding regarding the use of biomass. The lack of knowledge and understanding about biomass utilization opportunities and realities can cause disconnected public policy and misalignment between federal and state actions, and natural resources, energy and business development efforts.

Supply

The cost, complexity, and reliability of developing a high-quality, secure source of biomass is a challenge to project development and financing. New biomass projects often hinge on supply agreements that are elusive due to the fragmented nature of the forest resource (i.e. federal, state, or private ownership), competing markets, changes in forest sector economics caused by global forces, and potential future value of the biomass itself. Increased forest restoration treatments promoted by Federal and state agencies may provide additional material for which limited markets currently exist. Smaller scale thermal and combined heat and power projects do not face the same supply challenges as new, large power generation facilities.

Regulation

Oregon wood products manufacturers are considering or planning to add kiln drying capacity to respond to market demand. Additional cooperation between industry and Oregon Department of Environmental Quality

can identify technologies and opportunities to implement biomass fueled systems and improve air quality constrained air sheds proactively.

Financing

The capital intensive nature of biomass projects and perceived risk introduce financing challenges that limit opportunities for project development. Federal and state policies and incentive programs may be limited or are so uncertain that they discourage private capital from supporting new biomass projects.

Research and Technology Advancement

Continued focus is needed on research and development of technologies to reduce the cost of converting biomass to value added products and energy. Lack of detailed market analysis and information is also a limiting factor. Additional information is needed as well to better characterize biomass supply and develop specifications that will assist in optimizing utilization opportunities.