

WOODY BIOMASS ENERGY

A Renewable
Resource to
Help Meet
Oregon's
Energy Needs



A Special Report
of the Oregon
Forest Resources
Institute

The interest in renewable energy resources is growing daily. It is becoming increasingly clear that use of traditional fossil fuels is taking a heavier toll on our global environment, and that global supplies of petroleum are dwindling. Biomass, the organic matter in trees and all living plant material, is an alternative energy source of particular interest to Oregon because of its vast agricultural and forest lands. Woody biomass is any form of biomass composed of wood, including mill waste, urban wood waste and material generated by timber harvest, and forest restoration activities, including thinning. The concept of energy from biomass derived from forests is at once old (wood was and continues to be a primary source of heat for much of the world) and new, as technology is putting woody biomass to work in creating electricity and even biofuels for transportation. As a state whose rich forestland covers nearly half its surface, Oregon is looking at the potential for woody biomass to help address its ambitious renewable energy goals.

HIGHLIGHTS

- Governor Theodore Kulongoski has adopted a Renewable Energy Action Plan, which sets a goal for Oregon to meet 25 percent of its total energy needs from new renewable resources by the year 2025.
- Oregon currently gets 6 percent of its total energy consumption from various forms of biomass, which is twice the national average, and that figure could easily double in the next 20 years.
- Oregon has a significant untapped source of renewable energy in the form of woody biomass. The use of woody biomass for energy has the potential to address other challenging needs in the state: restoring forest health through thinning treatments, followed by slash reduction to reduce fire risk, improving wildlife habitat and providing a stimulus for revitalizing Oregon's rural economies.
- The most feasible immediate short-term opportunity for developing woody biomass energy generation is through the use of slash left over from harvest operations on private lands along with thinning dry, fire-prone Oregon forests, the majority of which are on public land.
- In the long term, the potential of woody biomass to create biofuels and other bio-products may prove to be even more significant than for creating electricity.
- A Forest Biomass Working Group with diverse statewide representation has been established to develop collaboration and agreement among stakeholders and to address challenges and obstacles.
- Demonstration plants in Lakeview, Warm Springs and other locations are being planned to assess the potential for future biomass energy initiatives.

Cover: Unnaturally dense forests like this one in central Oregon's Deschutes National Forest are prone to insect infestations, disease and severe wildfire. This forest would have been a prime candidate for thinning for both forest health and as a source for woody biomass. Instead, it was consumed in a wildfire.

Right: Kevin Moore of the U.S. Forest Service, Chiliquin Ranger District, explains fuels reduction treatments to a tour group. More than two-thirds of Oregon's forestland at moderate to severe risk of fire are on federal lands.



ENERGY FROM OUR FORESTS

As the dialogue on the nation's energy future moves to the front pages, the term "biomass" has taken its place alongside solar, wind, geothermal and other renewable resources as an alternative to fossil fuels. The word sounds exotic, but biomass—quite simply the sum total of all organic matter in trees, agricultural crops, other plant material and animal waste—is neither new nor complicated. The simple burning of wood to provide heat, which has been going on for millennia, is biomass at work—energy from organic matter. Around the time of the Civil War, more than 90 percent of U.S. energy for heat, cooking, transportation and industry came from biomass. With the onset of the industrial revolution, fossil fuels began taking over as the dominant energy source.

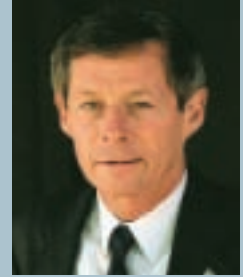
As states and the country as a whole have begun to think seriously about alternative energy, it comes as no surprise that Oregon, nearly half of which is forestland, might find the use of woody biomass for fuel an attractive means of meeting some of its growing energy needs. Woody biomass for fuel, in fact, is already happening in Oregon at over 50 industrial sites across the state, including facilities that burn wood or convert papermaking byproducts for energy. For the most part, these plants are creating steam, but about 20 percent of them have cogeneration facilities, meaning that they are producing electricity at the same time by using some of that generated heat to power turbines.

"This isn't rocket science," says Allyn Ford, chief executive officer of Roseburg Forest Products. "In fact, historically in Oregon, sawmills across the state often built their own cogeneration plants right on their mill sites. These were particularly efficient setups because they could burn their own residual wood waste to create both a consistent source of power—a rarity in Oregon in those days—while at the same time use the excess heat from that process to power their drying kilns." When hydroelectricity came to Oregon, there was suddenly an abundant source of inexpensive power available, and many mills quit providing their own.

OREGON'S RENEWABLE ENERGY POTENTIAL

In a world where energy consumption is rising at a dramatic pace and fossil fuel resources are both shrinking and threatening our atmosphere and oceans with unprecedented levels of carbon dioxide, Oregon is taking a fresh look at its own renewable energy resources.

The Pacific Northwest has been unique in the extent of its development



James Bowyer
Wood Science &
Bio-Products Consultant
Shoreview, Minnesota

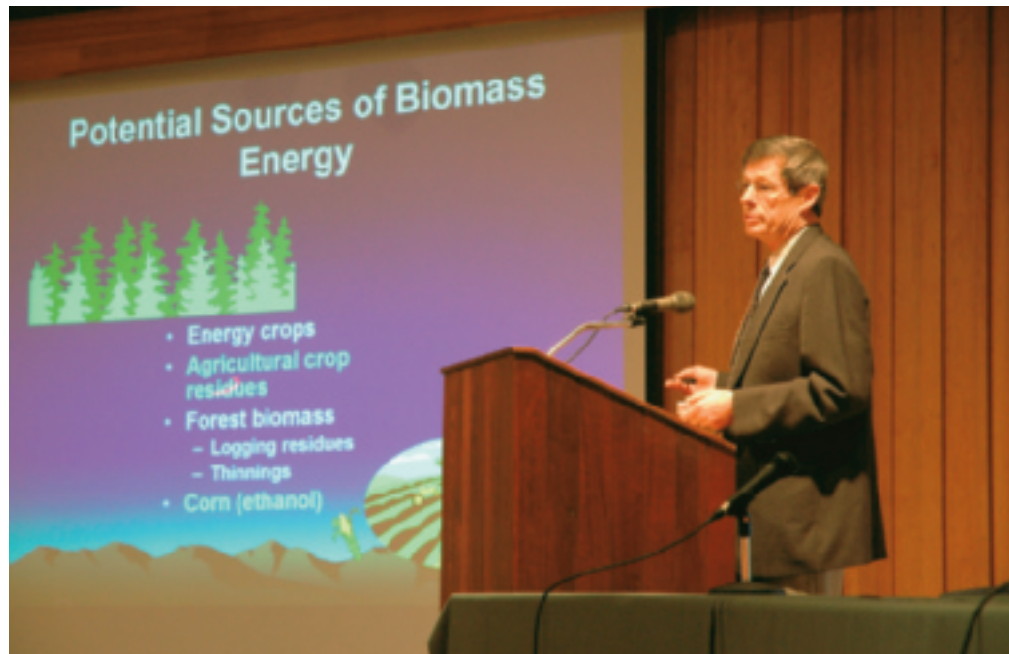
"Bio-energy alternatives are emerging as substitutes for fossil fuels in power generation, transportation fuels (ethanol and biodiesel), steam heat and production of biochemicals. Oregon has significant potential for bio-energy development, with the greatest near-term opportunity in the area of biomass-derived electricity generation and perhaps biomass-fueled hot water and steam district heating and/or wood pellet production for home heating on various scales. Over the longer term, Oregon is also in a strong position to exploit cellulosic ethanol and biodiesel [liquid fuel from biomass] markets, as well as markets for various chemicals and chemical feedstocks not produced from petroleum, as these products become technologically and economically feasible."



Mark Kendall

Senior Policy Analyst
for Renewable Resource
Development,
Oregon Department
of Energy,
Salem

"The beauty of biomass is that it's value-added. What's needed to fuel boilers is just a part of a harvest and treatment process that is taking place now or that needs to be as part of a restoration effort. Historically, Oregon has had a robust marketplace compared to other states. The 6 percent of our energy needs that presently comes from all biomass sources is twice the national average, and our governor's commitment to it has led to a resurgence of interest. We could easily double our use of biomass in the next 20 years while improving forest health and resiliency using best ecological practices."



Dr. James Bowyer, a leading forest futurist, gives the keynote address on the big picture of bio-energy and bio-fuels - globally, nationally and what it means for Oregon - at an OFRI Woody Biomass Conference in January 2007. Attendees from all parts of the forestry, energy, policy and business communities heard Bowyer describe what he felt are major opportunities for Oregon to take advantage of thinnings and other waste wood to generate electricity and to produce transportation fuels (ethanol and biodiesel).

and reliance on hydropower. While hydropower is renewable, it like any energy source has impacts on other resources. "The adverse impacts of hydropower to salmon have been well documented," said Ted Lorensen, assistant state forester. "But other impacts such as change to stream flow and/or sediment regimes are now becoming better understood. Concerns related to hydropower and fish have led to the consideration of dam removal as one option to restore salmon runs. Wind, geothermal and biomass all have potential or real adverse impacts. A diversity of renewable approaches likely offers a lower-risk approach than putting all our energy eggs in one basket."

Mark Kendall, senior policy analyst for renewable resource development at the Oregon Department of Energy, characterizes Oregon as rich in renewable resources. "We have," he says, "more solar energy potential than most of the southeastern U.S.; better currents and depths for ocean energy than California, Washington, British Columbia or Mexico; and richer forest resources than nearly any state for creating energy from biomass." In fact, the state has an abundance of woody biomass that today goes unused, including waste wood, dead and dying trees and unnaturally dense fire-prone forests.

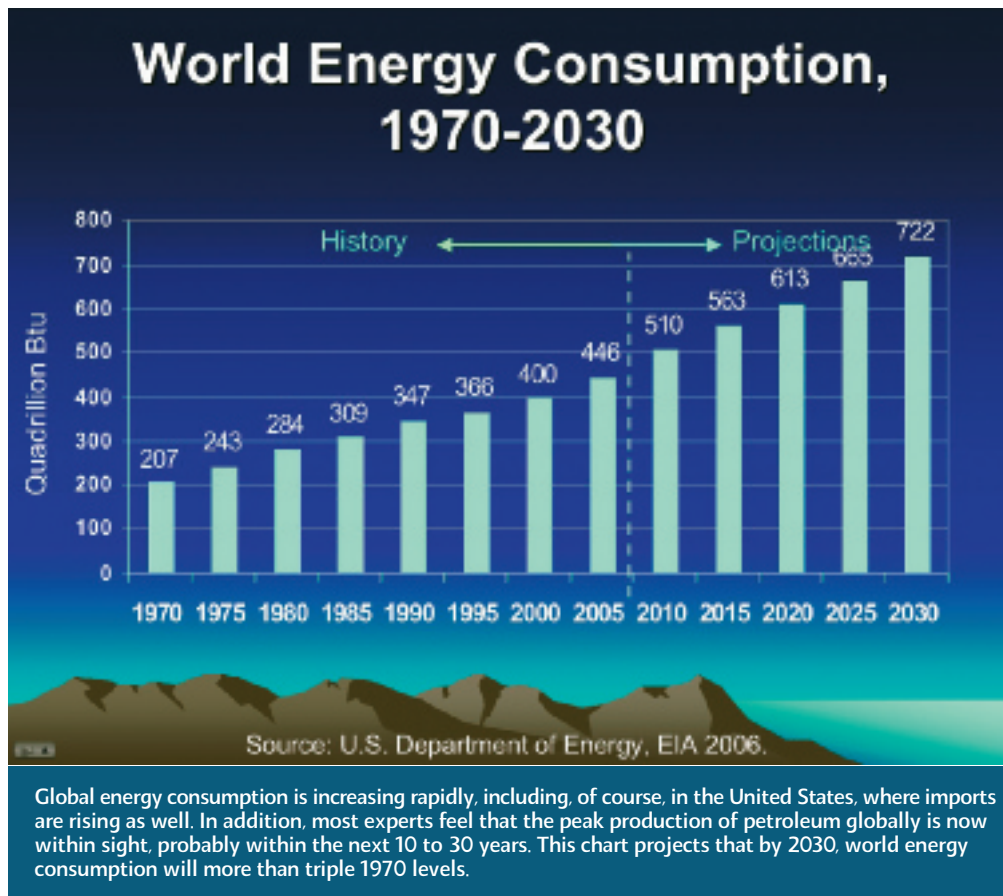
Oregon today gets 6 percent of its total energy consumption from various forms of biomass, which is twice the national average. And Kendall says that figure can easily grow by 50 percent in the next 10 years and double in 20 years. "That alone can mean not millions, but billions of dollars back into the state's

economy,” he says. By way of perspective, Oregon presently spends over \$10 billion for energy per year, Kendall says, of which over \$8 billion is spent out of state for the imported petroleum, coal and natural gas that help meet its energy needs.

Benefits Beyond Energy

The opportunities are intriguing, since the benefits of an active woody biomass program extend far beyond Oregon’s need to find new renewable energy alternatives. For one, a market for woody biomass energy could also provide an economic incentive for addressing the critical need to restore forest health on Oregon’s federally owned forests by fostering active thinning treatments, followed by slash reduction, to reduce the fire risk. Due to a century of fire suppression without adequate thinning, millions of acres of Oregon’s federally owned forestland in eastern and southern Oregon are dangerously overstocked, and at high risk of large, uncharacteristically intense wildfire. In addition, because the source of such fuels tends to be in more rural parts of the state, the jobs and commerce created through thinning and slash reduction would help revitalize the economies of Oregon’s rural communities.

This special report examines the potential of energy from woody biomass in the global context, Oregon’s unique position to capitalize on this resource, and the renewed opportunities as well as the challenges and obstacles that exist.



Allyn Ford
President & Chief
Executive Officer
Roseburg Forest
Products

“Oregon has a unique ability to take advantage of woody biomass because we already have much of the infrastructure in place to remove the materials—good forest roads, highways and a vigorous forest products industry. The exploration of biomass as a means of helping Oregon reduce its dependence on fossil fuels for energy is a forest cluster priority. We see the possibility of an integrated strategy that will restore forest health and wildlife habitat through the thinning and treatment of our fire-prone forestland, increase our renewable energy supply and revitalize the state’s rural economies. This is a triple win for the state.”



Adam Serchuk
Senior Program Manager
Energy Trust of Oregon
Portland

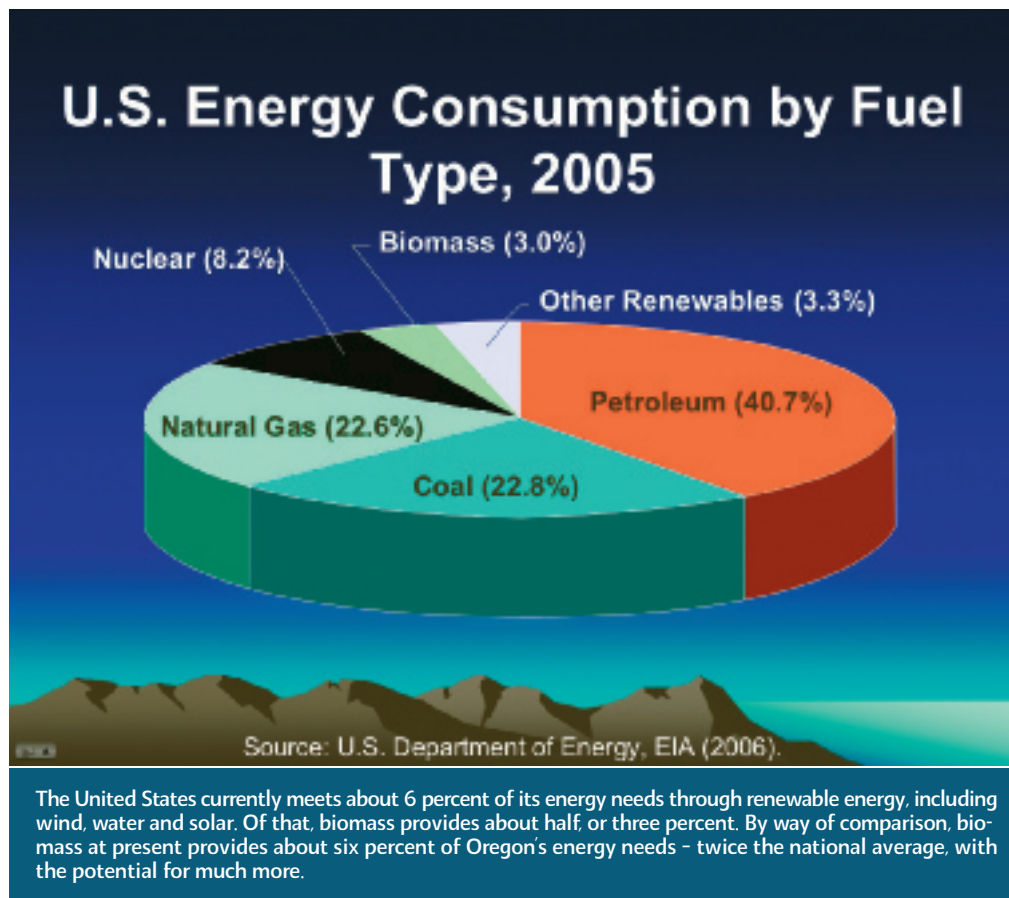
"As an organization committed to promoting the use of renewable energy, the Energy Trust sees the potential of woody biomass to help address Oregon's energy needs. But we also have to look at all our requests from a business perspective, and there are hurdles that woody biomass will have to overcome. A consistent supply is one of them, and any application for help—whether to us or a bank—will have to include a guaranteed supply for at least 10 years. Since federal lands will be the source of much of the needed biomass fuel, Forest Service policy will need to provide such guarantees, which in turn means that a critical mass of credible public stakeholders will have to agree that biomass energy is part of the solution for protecting public lands. This is a significant challenge for the future."

THE RENEWABLE ENERGY IMPERATIVE

A variety of recent developments may make biomass an attractive alternative fuel for transportation as well as for electricity. On a large scale, the peak of worldwide petroleum production is approaching quickly, perhaps within the next few decades according to a number of sources, including the U.S. Department of Energy. Dr. Jim Bowyer, nationally known wood science and bioproducts expert, says that with the peak "now likely to occur within one to three decades, complacency is beginning to be replaced by a sense of urgency."

Moreover, he says, trends in the world's developing regions may bring the date of peak production even closer. China, for example, whose economy is growing rapidly, was a net exporter of petroleum as recently as 1993. Just four years later, it was importing 800,000 barrels a day. By 2006, that figure had more than quadrupled, reaching an estimated 3,600,000 barrels. It is expected to approach 10,000,000 barrels by 2025. Development like China's, now occurring in India and other countries, inevitably translates to increased consumption globally. Per capita energy consumption in the U.S., meanwhile, continues to rise.

Bowyer points out that presently 6 percent of U.S. energy consumption comes from renewable resources, and nearly half of that (almost 3 percent) comes from biomass—more than hydroelectric, solar, wind or geothermal. Of that



amount, over half is produced by the wood products industry. According to Bowyer, the West has very large volumes of available woody biomass, due primarily to high tree density caused by decades of fire suppression. He notes that removal of this biomass would be beneficial, since many western forests, and particularly those on federal lands, are in desperate need of treatment to reduce risks of catastrophic fire.

The Governor Sets the Stage

Against this global backdrop, the stage was set for Oregon's response. In a broad stroke, Governor Theodore Kulongoski in 2005 adopted the Governor's Renewable Energy Action Plan, which set a goal for Oregon to meet 25 percent of its total energy needs from new renewable resources by the year 2025, a target that excludes a significant amount of hydroelectric generation. A Forest Biomass Working Group was formed specifically to explore the potential of power from woody biomass. The group's nearly 40 members represent a diverse spectrum of the community from forest and energy industries, resource agencies, environmental groups, elected officials, tribes, labor representatives and local communities.

Also in 2005, the Oregon Legislature passed SB 1072, directing the State Forester to assess biomass opportunities in the state, enhance public understanding of the issues and explore working more closely with federal agencies on land management and stewardship issues since the majority of Oregon's fire-prone, high-risk forests are on federal lands.

In a study commissioned and published by the Oregon Forest Resources Institute (OFRI) in 2006, Roger Lord of Mason, Bruce & Girard led a team that assessed the opportunities and barriers for biomass energy and biofuels from Oregon's forests.

Woody Biomass Potential

Although there are other sources of biomass in the state, including urban, industrial, agricultural and other forest waste, the question explored in the OFRI study is whether Oregon's emerging woody biomass industry can be scaled primarily to the biomass available from treatment and restoration of these fire-prone public forests in the eastern and southern parts of the state alone.

According to findings of the OFRI study, about 15 percent (4.25 million acres) of Oregon's forestland, mostly on federal lands in eastern and interior southwestern Oregon, has the potential to provide usable forest biomass by thinning to improve forest health and reduce the risk of fire. This does not include forests in wilderness, roadless areas or other areas where timber harvest is excluded. Thinning these forests over 20 years could produce about 1 million bone dry tons (BDT) per year of woody biomass at about \$59 per BDT, enough to fuel

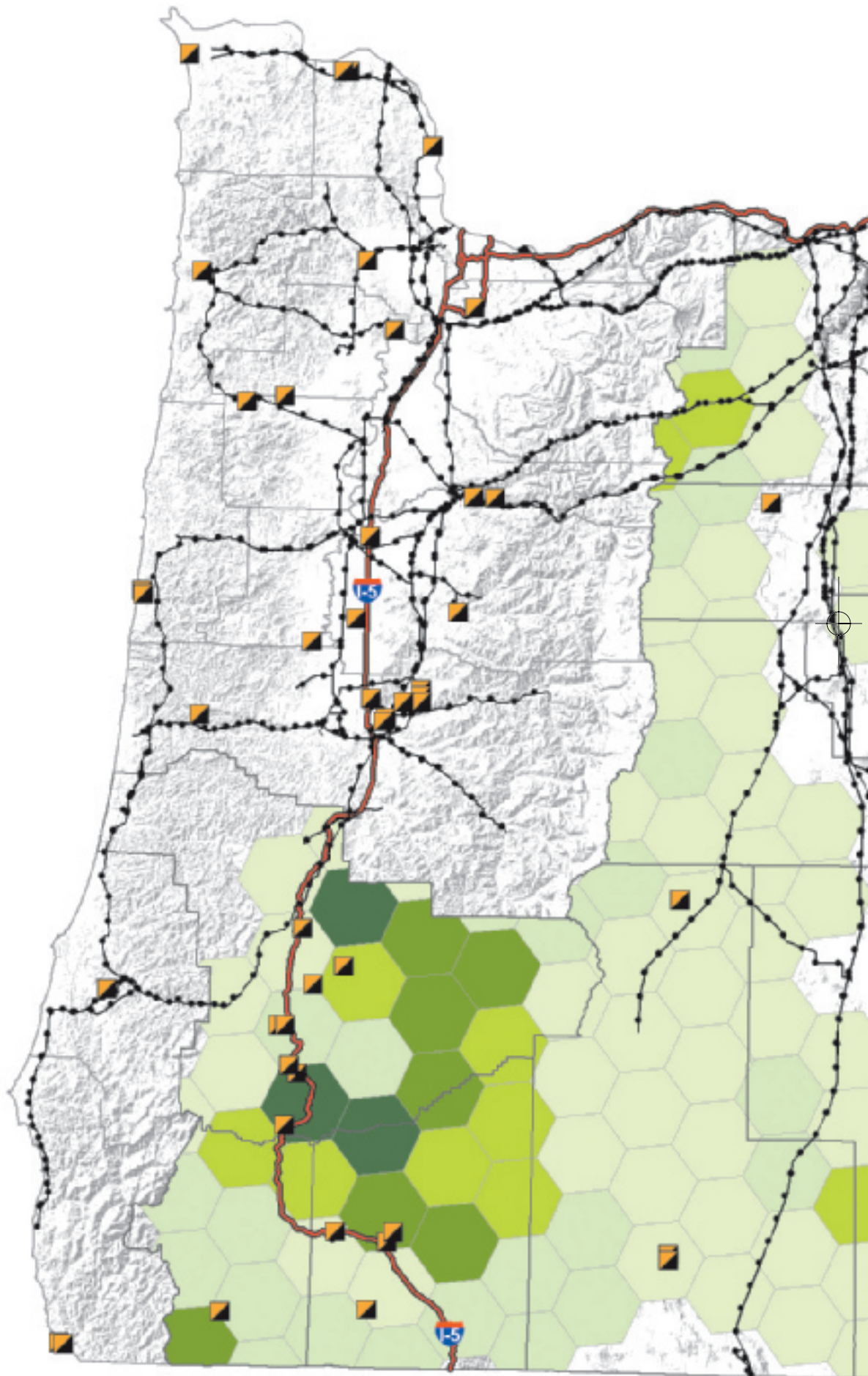


Roger Lord
Forest Economist
Mason, Bruce & Girard
Portland

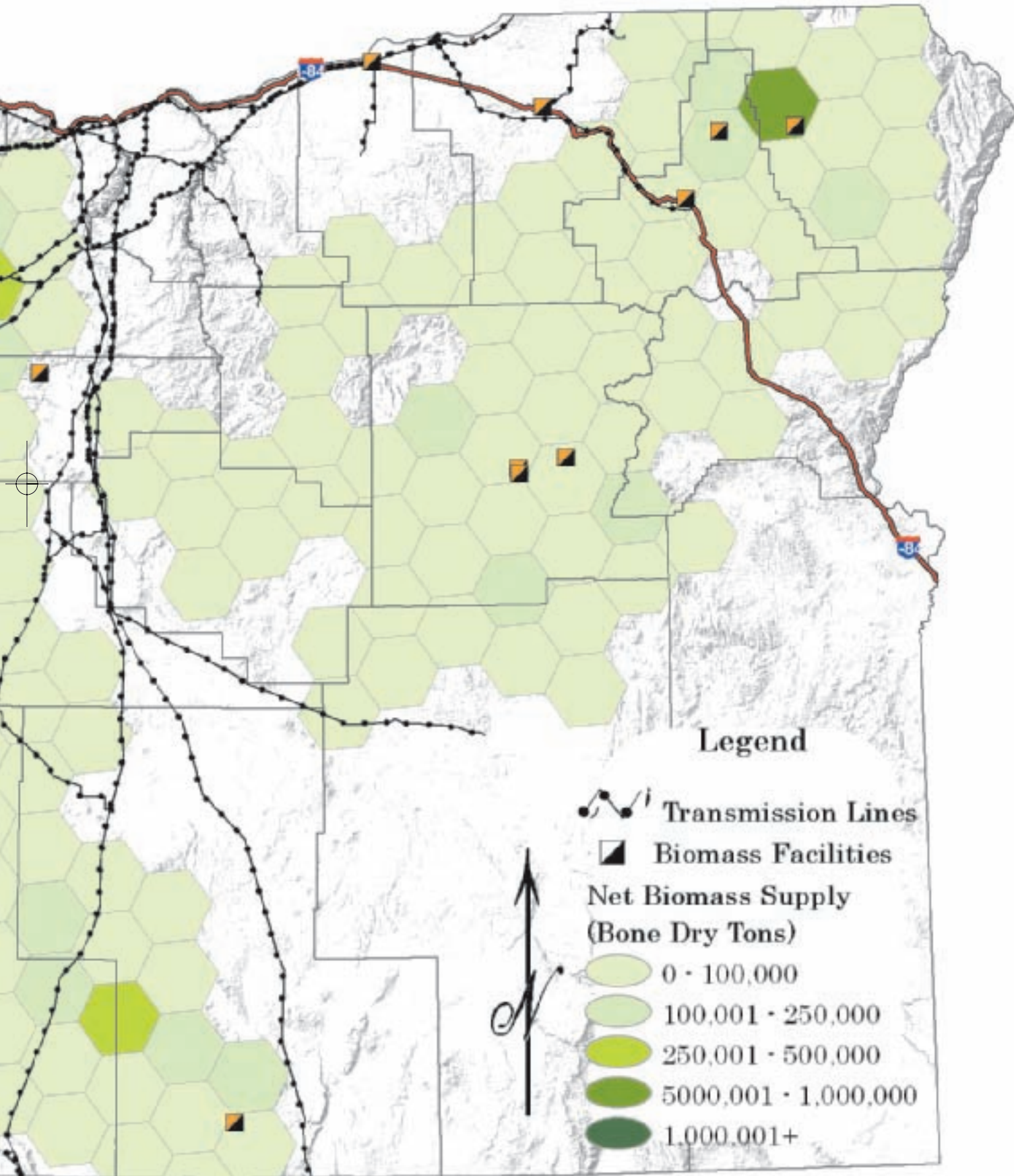
"To quantify the forest biomass supply potential in Oregon, we focused on the dry forests in 20 eastern and southwestern counties. Of the 15 million acres of forests in this region, excluding roadless areas, wilderness and parks, we identified 4.25 million acres with very high fire risk on both public and private lands. Some 70 percent of this was on federal lands. These forests need mechanical thinning and removal of excess material to reduce the risk of catastrophic fire and restore forest health. If treated over 20 years, this source alone would provide one million bone dry tons (BDT) of biomass a year."

FOREST BIOMASS EN

Those familiar with the over-stocked, fire-prone nature of much of Oregon's prime forestland see in biomass a way to help meet Oregon's renewable energy goals while at the same time achieving forest restoration through needed fuel-reduction treatment. This map shows the net woody biomass supply in Oregon — mostly in the eastern and interior or southwestern regions of the state — that can be recovered by thinning overly dense, fire-prone forests. It shows the amount of recoverable woody biomass in 160,000-acre hexagons and the proximity of biomass concentrations to existing biomass energy facilities and major electric transmission lines.



BIOMASS ENERGY OPPORTUNITY MAP





Russell Hoeflich
Vice President and
Oregon Director
The Nature Conservancy

"We estimate that to bring the bulk of our public forests back to healthy conditions, federal agencies will need at least to quadruple current thinning and prescribed fire treatments on a sustained basis over a period of 25 years. Lives, homes and millions of dollars now spent fighting fires could be saved by reducing the risks of unnaturally severe wildfires. Restored forest lands would more reliably provide clean water for people and nature. Fish and wildlife would thrive. Rural communities would see new business opportunities with the potential to employ Oregonians in living-wage jobs. A new source of renewable energy could be tapped while we restore healthy forests in Oregon."

a 150-megawatt power plant that would produce electricity at about 8.1 cents per kilowatt-hour (kWh). These economics can best be achieved through integrated stand management where some merchantable timber is also harvested for wood products such as lumber and plywood. In the long term, if a production infrastructure develops, the same 1 million BDT of woody biomass could alternatively produce about 63 million gallons of ethanol.

There is also a near-term opportunity to produce biomass energy at current market rates by focusing on regions in southwestern and eastern Oregon where biomass supply, transportation access and the electric power grid are in proximity to each other. This, the study estimates, would result in an annual biomass supply of 600,000 BDT at \$45 per BDT, which could produce about 81 megawatts of electricity at a cost of about 6.5 cents per kWh.

There would be benefits to this in addition to the forest health, rural economic stimulus and the fossil fuel displacement benefits. For one thing, biomass energy is carbon neutral. While burning woody biomass in power plants releases carbon, just as forest fires do, this is offset by the increased collection and storage of carbon by the vigorously growing forests that remain after the thinning and removal of biomass.

Another benefit is that power plants could be located close to the source of the biomass material and could provide power to nearby rural areas, thus eliminating the need to transmit power from distant sources, where there are inherent losses in efficiency.

By emphasizing good forest management practices, including thinning and slash reduction to reduce fire



The Nature Conservancy takes a pragmatic, scientific approach to conservation, and on the issue of restoration and fuels reduction treatment on its forestland, it has been quite proactive. This group of Nature Conservancy professionals, shown at the Conservancy's 30,000-acre Sycan Marsh Preserve in south central Oregon, served as guides on an OFRI-sponsored biomass tour in 2006, sharing their work on thinning and burning to restore historic conditions and a healthier forest. Front row, from left, are Catherine Macdonald and Craig Bienz. Second row, from left: the Conservancy's Oregon Director Russell Hoeflich and Mark Stern. In back is Mark Hedrick.

risk and provide a supply of biomass for energy, we can make a significant contribution to off-setting human causes of climate change.

OBSTACLES TO ADDRESS

Despite the opportunities and tremendous potential biomass power affords, there are barriers and obstacles to realizing its promise. Basic questions of supply reliability and cost, federal agency policy issues, public perception and trust, and environmental concerns have a direct effect on a large-scale commitment to woody biomass.

At present, much of the energy that could be produced from biomass costs more compared with traditional sources like hydropower, coal, petroleum and natural gas. Electricity in the Pacific Northwest today is relatively inexpensive, so in purely economic terms it has been difficult for a power plant to justify investing in biomass. Biomass advocates respond that all the ground rules will change in coming years as traditional fuel grows more scarce and expensive. But for now the higher biomass cost is a deterrent to its immediate expansion.

John Bremerman and Gordon Draper of Biomass One, in White City, are charged with running their biomass plant as a commercially viable business and have on-the-ground experience with the promise and pitfalls of biomass energy. “The key question of whether biomass plants throughout the state will be built is whether or not they are economically viable,” says Bremerman. “There are costs associated with the procurement of materials to burn. And if those costs can be paid with the power they are selling back to public utilities, the plants will be built. If not, then they will not be built, at least not without subsidies.”

Additionally, although the inevitable rising cost of petroleum products seems, on the surface, to be good for the alternative energy sector, for Biomass One it has an immediate and very direct negative effect. Its fleet of 14 trucks costs twice as much to operate as it did only a couple of years ago because the price of diesel fuel has risen so dramatically. Previously, trucks could afford to travel up to 100 miles to pick up biomass material—at a mill for residuals, for example, or into the woods with a portable grinder for slash from logging operations. With the rise in petroleum prices, however, the distance trucks can travel economically has basically been cut in half. Now a 50-mile radius around their plant represents their break-even point.

Cost issues also led to concerns about the extent to which utilities would utilize biomass-generated electricity over alternative renewable energy sources. While this was identified in the OFRI study as a challenge to overcome, circumstances are changing quickly. In fact, PacifiCorp officials have already



Duncan Wyse
Executive Director
Oregon Business Council,
Portland

“When I first heard about The Nature Conservancy’s woody biomass proposal, the stars aligned for me. Converting woody biomass to energy will help advance forest health and the economic health of rural Oregon—and create a carbon neutral energy alternative to fossil fuel. Because of its great promise, we highlighted woody biomass energy at the 2007 Oregon Business Plan Leadership Summit.”



Larry W. Potts, Jr.
Former Chief Executive
Officer
Warm Springs Forest
Products Industries,
Warm Springs

"In planning to generate electricity from woody biomass at our Warm Springs mill, the Confederated Tribes of the Warm Springs Reservation is hoping to demonstrate that a viable, market-based solution exists that will address forest health, cultural resources and sustainable rural communities. Recent wild-fire activity indicates that our project is timely and our location in central Oregon is appropriate."

announced a major near-term commitment to purchase electricity generated from woody biomass fuel by wood products manufacturers. One of the reasons for utility interest in woody biomass is that it can be predictably scheduled. Wind- and solar-generated electricity are inherently intermittent resources. When the wind doesn't blow or the sun doesn't shine, these attractive forms of renewable energy must be backed up. Often, these back-up sources are powered by fossil fuel. Well-managed biomass generating facilities, on the other hand, can be steady and predictable sources of power that utility managers will find attractive.

Moreover, as all three West Coast states implement laws requiring "renewable portfolio standards" (whereby utilities must meet target percentages of their power generation with renewable energy sources), the cost differences in relative terms will be less important. Many people in the electric industry believe that separate energy markets for renewable electric resources may emerge as state requirements for renewable energy begin to take effect.

The Issue of Supply

With all the biomass in Oregon's forests, one would assume that supply would not be an issue, but most of the forestland in need of treatment for fire risk is federally owned, and it is difficult for the U.S. Forest Service and the Bureau of Land Management to guarantee a constant supply of biomass for a defined



Tom O'Leary, a Silver Lake area rancher in south central Oregon, talks about his range restoration efforts involving the removal of invasive western juniper. Such action, while difficult, would improve his land. Juniper is pervasive in parts of Oregon, and its removal would provide a source of woody biomass for fueling power plants.

period of years. Private investors must be assured that if they invest in biomass infrastructure, they will have a secure and long-term guaranteed supply of fuel.

William Von Segen of the U.S. Forest Service (retired) in Portland says the agency is very much in agreement with the development of woody biomass energy. Von Segen believes that the supply issue can be negotiated successfully, but any challenges to the federal program to thin overcrowded forests, like litigation, for

example, could disrupt the supply of woody biomass to a biomass plant. Adam Serchuk, senior program manager for renewable energy with the nonprofit Energy Trust of Oregon, says that 10-year stewardship contracts have now become a possibility with the Forest Service, but that is the bare minimum for securing financing from a bank or the Energy Trust to fund a project. Fifteen to twenty years is closer to the timeframe necessary to obtain investor commitments to these kinds of projects.

The Public Mandate

Beyond the technical issues, all participants in the process recognize the critical importance of a public mandate, without which biomass cannot move forward to help meet Governor Kulongoski's ambitious energy goals. Biomass energy generation to date has occurred successfully primarily at lumber mills and paper manufacturing sites. So although its potential has been proven, the general public has had little exposure to information about the potential synergy between biomass energy and modern forest management.

There is general public agreement about the need to improve forest health and reduce fire risk, but the public has had no real exposure to data regarding the adequacy of supply or the historic forest conditions that would determine treatment goals. There is also a wide range of opinion in the conservation community. Some have opposed biomass development, questioning the impact on the ecosystem. Others, like The Nature Conservancy, are convinced of the need for restoring forest conditions that support healthy water flows, provide diverse wildlife habitats and are at reduced risk of unnaturally severe fires. They see biomass energy as one potential means of moving toward that goal.

The Conservancy is an active manager of its own lands and is concerned about the millions of acres of Oregon's forests that have been dramatically altered from their historic conditions and are in need of restoration. For example, the Conservancy is using thinning and prescribed fire to restore forest habitats on its 30,000-acre Sycan Marsh Preserve and is monitoring wildlife and other environmental criteria to assess the effect.

The Forest Biomass Working Group has developed recommendations to address existing barriers to the sustainable use of forest biomass in Oregon, and is providing a forum for the exchange of ideas among all the various interests and organizations.

THE FUTURE OF BIOMASS

As discussions continue, biomass initiatives in the state are moving forward. A project by DG Energy Solutions in Lakeview is among the first new biomass



Loren Kellogg
Lematta Professor of
Forest Engineering
Oregon State University,
Corvallis

"From a forest management standpoint, removal of biomass material may be essential to returning our drier, mixed conifer forests to historic fire regimes, and fuels reduction projects that reduce biomass material can be beneficial ecologically. We're looking at greater efficiency in extracting such material to help reduce the costs of restoration treatments and provide a landscape approach to fuels-reduction silviculture."



Joe Misek
Co-Chair, Forest Biomass
Working Group
Oregon Department of
Forestry,
Salem

“The Forest Biomass Working Group is a perfect example of Oregon’s forward-looking, consensus-style approach to creative problem solving. Biomass energy in Oregon is full of potential, but it raises many issues that require airing and debate. That is the role of the working group—bringing all the parties to the table to address the barriers that exist for sustainable use of forest biomass. To those who ask if we can’t just let the market take its course, we answer no. Other energy sources like coal and oil are subsidized, so we have to look at the long term just as the governor does and take the right policy direction to reach our goal.”

facilities in Oregon since 1992. Using woody biomass as fuel, the \$20 million facility can provide nearly 100,000 megawatt hours of electricity to the regional Oregon power grid annually while at the same time providing process steam to a nearby sawmill owned by the Collins Company. “Using biomass from overstocked forests, this innovative project will produce electricity while helping restore forest health, reduce fire risks and create jobs,” Oregon Governor Ted Kulongoski said in announcing the new plant.

The Confederated Tribes of the Warm Springs Reservation of Oregon is planning to construct a demonstration biomass cogeneration facility at its mill site in Warm Springs. At the same time, it will undertake a long-term resource management program that involves forest fuels reduction and restoration projects on reservation and non-reservation land that will provide fuel for the plant. Larry Potts, former manager of the Tribe’s Warm Springs Forest Products Industries mill, said the 15 megawatts (MW) of renewable energy generated will provide more than 15,000 homes with continuous renewable electricity.

In Cave Junction, the Rough and Ready Lumber Company is building a 1.5 MW cogeneration plant powered by biomass fuel. It will provide steam for its two sawmills and lumber drying kilns, in addition to generating electricity for sale to the Pacific Power grid. Link Phillippi, president and general manager, expects the plant to cost about \$5 million and to pay back its cost in energy savings in four years. Rough and Ready is offsetting some of its startup costs by applying to the Oregon Department of Energy for a business energy tax credit, and the Energy Trust of Oregon is providing seed money of \$1.7 million as part of its mandate to promote renewable energy.

In addition to these initiatives, woody biomass-fueled electric power generation plants are completed or under construction by Hampton Affiliates’ Tillamook Lumber Company at Tillamook, Freres Lumber Company at Lyons and Douglas County Forest Products at Winchester, and others are proposed at LaPine, Enterprise and elsewhere in Oregon.

The Oregon Business Council has been vocal and active in promoting the development of biomass energy in Oregon. Executive Director Duncan Wyse says he was first introduced to the idea when he heard a presentation by The Nature Conservancy’s Russell Hoeflich on the urgent need for treating and restoring Oregon’s fire-prone forests. “It immediately occurred to me,” he says, “that from a purely business perspective, here was an opportunity to rebuild the rural communities of Oregon while at the same time addressing many of the state’s environmental, social and energy issues. Biomass may also bring to the table such disparate groups as the U.S. Forest Service and Oregon’s Public Utilities Commission.”

Furthering the Dialogue

To further the dialogue, incentive efforts continue to be studied in the policy arena, including proposals to promote development of renewable energy sources. Work also continues in the laboratory and the field. Demonstration projects underway may well clarify the discussion and move it forward in coming months and years. Research continues on uses for biomass, including the whole area of biofuels that lie beyond the creation of electricity. It is now technologically possible to make liquid transportation fuel from biomass. Although most current ethanol production is based on corn starch, the technology exists to make ethanol from woody biomass. There is research going on around the globe directed at producing bio-based liquid transportation fuels.

According to Jim Bowyer, U.S. production of ethanol from biomass “could eventually reach about 50 billion gallons annually, a sizable quantity when compared with current annual nationwide gasoline consumption of about 138 billion gallons.” A new OSU economic analysis suggests that ethanol made from wood cellulose produced the greatest net energy, netting 84 percent of its energy after production fuel costs were subtracted. Ethanol made from corn netted a mere 20 percent of its energy after subtracting the energy spent to produce it.

Reaching Governor Kulongoski’s ambitious goals for renewable energy use in Oregon is challenging, but across the state work continues on exploring the contribution that biomass can make toward that effort. For his part, Kulongoski said at the 2006 Oregon Leadership Summit that he is “committed to making Oregon a national leader in forest biomass energy development. ... Our forests make biomass a natural fit for Oregon. We will be able to reduce the risk of forest fires by removing dry debris—and then use that debris to generate energy, all the while creating jobs, attracting new businesses and shifting our economy into a higher gear.”

Oregon Forest Biomass Working Group Conclusions

- The current hazardous fuel buildup is worsening over time as evidenced by more catastrophic fires.
- Most of the high-risk land is found in southern and eastern Oregon.
- Addressing the issue could improve forest health, provide jobs and keep in place some infrastructure that otherwise might be lost.
- Select high priority communities with high probability of success to target forest health concerns that others could learn from.
- Leadership needs to work for change to encourage investment in renewables, and biomass in particular.
- Work toward a supportive regulatory environment at the policy level.



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