WOODY BIOMASS
OFFERS POTENTIAL FOR HEAT, ELECTRICITY AND FUEL

Oregon Forest Resources Institute

POWERED BY OREGON

FUEL FROM WASTE

Sawdust, chips and other residual material left over from mill processing, logging or forest restoration projects can be compressed into pellets or bricks, a convenient fuel source.

ON THE COVER

Matt King of Wallowa Resources shows the wood pellets now used to heat its facility in Enterprise. The pellets are stored in a hopper that formerly stored coal.

Something old is new again

As a fuel, wood has been with us since humans tamed fire. So what's the big deal? Why the renewed interest in wood as a source of energy?

If we imagine a way to power Oregon that is less dependent on fossil fuels, that is built instead on renewable and homegrown sources of energy, then woody fuel should be a significant part of the picture. Why do we import oil or propane to heat a rural town, for instance, when abundant, clean-burning fuel is a few miles away? Using local fuel creates jobs and keeps money at home. Many small Oregon towns could use more of both.

Is it sustainable? Yes. In Oregon, we produce millions of tons of woody byproducts every year, from logging slash to sawdust to small trees from US Forest Service thinning projects. All of it contains stored solar energy – in total, enough to power hundreds of thousands of homes, businesses and public buildings.

Moreover, technological advancements are making possible liquid transportation fuel made from woody material. As for heat and electricity, modern wood-burning technology extracts more energy from a pound of wood than ever before, and does so with negligible emissions.

WHAT IS WOODY BIOMASS?

It's a technical term for something very simple: Woody biomass includes branches, tree tops and other slash left over from logging, as well as bark, sawdust, chips and other residuals from sawmills. It also includes small trees that are removed from overcrowded forests to make those forests healthier and more resistant to unusually severe wildfires.

Most mill residuals are sold into a mature market – for products such as paper and particleboard – and have long been used to help power paper mills. Other forms of woody biomass traditionally have had little value. Slash and thinnings are often piled and burned in the woods. Where possible, we can use them in more constructive ways.

IT'S HAPPENING NOW

Entrepreneurs, scientists and advocates are at work finding ways to extract energy and other saleable products from woody biomass. They are heating schools and hospitals, generating electricity, and developing fuel to power cars, trucks and airplanes. They're also finding simple, practical uses for what we used to call a "waste product."

But this is challenging work. While it's easy to say there is enough woody biomass to, in theory, power half a million homes, it's not as easy to accomplish.

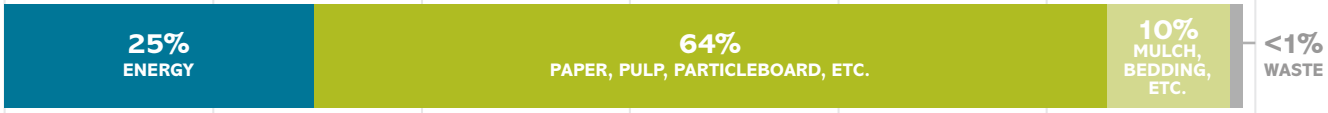
The cost of creating energy from biomass is sometimes competitive with fossil fuels, and sometimes not. There are many variables, and many obstacles.

To overcome them, government can continue to encourage and support the businesses and communities that are building these young markets. With time, they will learn to operate more efficiently, and the markets can begin to sustain themselves. The long-term economic and environmental benefits are worth it.

UNDERUSED Logging residuals are one underutilized source of biomass, but restoration of overcrowded and diseased forests on Oregon's east-side could provide a far bigger reservoir of fuel.

Three main sources of woody biomass in Oregon – and its uses

Mill residual biomass: 5.9 million BDT

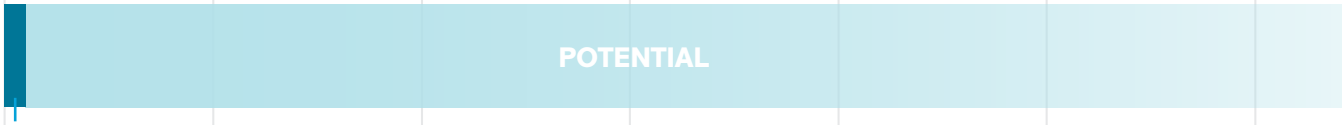


The market for mill residuals such as chips, shavings and sawdust is well established and little is wasted. Roughly 25 percent is used to produce energy, according to a 2002 US Forest Service study.

Logging slash biomass: 1.5 million BDT

The Oregon Department of Forestry estimates that about half a million tons of logging slash is recovered and used for energy production. About twice that amount is left in the woods, either burned or left to decay – and is conceivably available for use.

Forest restoration biomass: up to 6.4 million BDT



200,000
bone-dry tons
ENERGY

Depending on the scope of forest restoration projects, as much as 6.4 million tons of small-diameter trees too small to saw into lumber could be available annually in Oregon over 20 years, according to the US Forest Service. From 2008 to 2012, an average of 200,000 tons was removed annually and made available for energy production, the Forest Service says.

Biomass use and forest health

To understand why woody biomass is a long-term renewable resource, you need to know the conditions in some of Oregon's forests today, particularly the drier forests in the eastern and interior southwestern parts of the state.

HOW WE GOT HERE

Historically, the energy in the biomass we're talking about was released by wildfire. In the ponderosa pine forests the pioneers found when they came to Oregon, large trees were spaced widely apart, with few woody plants between them. A diverse array of native plants and grasses thrived on the ground. Relatively mild and frequent ground fires burned through these forests, clearing understory and leaving the larger trees intact.

A century of logging and fire suppression gradually changed these forests. And by the 1990s – after years of litigation to protect wildlife species and big, old trees – logging was curtailed in federal forests. However, the aggressive fighting of wildfire continued. The result is millions of acres of forest stands thick with small trees, completely unlike the forests that greeted settlers in the 1800s.

These stressed forests are prone to insect infestation and uncharacteristically intense fires that climb into the forest crown and kill even older trees. Many of these overly dense forests have few plants in the understory, and thus provide poor wildlife habitat.

SOLUTIONS

The good news is that these problems sparked unusual alliances: Groups of local elected leaders, environmentalists, wood products businesspeople and US Forest Service officials began working together to find practical solutions.

These groups are known as "collaboratives." In the past 10 years, more than 20 collaboratives have been founded in Oregon. Partly as a result of their efforts, multiple forest restoration projects are ongoing, and the Forest Service is interested in accelerating the scale and pace.

Restoration means thinning a number of trees per acre, removing woody plants

THE BENEFITS OF USING BIOMASS

- Produce affordable, local, renewable energy and other products of value by using material that would otherwise be wasted
- Stimulate rural economies, providing jobs and keeping dollars in the community by collecting, processing and using the resource locally
- Support needed forest restoration projects by offsetting some of the costs and using market forces to leverage the federal dollars spent on forest health to bring broader benefits to the community
- Reduce air pollution through more controlled burning, by creating markets for material that would otherwise be burned openly in slash piles or wildfires
- Reduce net carbon emissions to the atmosphere – although both fossil fuel and biomass release carbon when burned, biomass removes it from the atmosphere while it is growing

RESTORATION

Many federal forests in eastern Oregon are choked with underbrush and too densely stocked with small trees (left), making them more susceptible to insect infestation and unusually destructive fires. The goal of restoration is to create stands more like what was typical in dry forests before the 20th century (right).

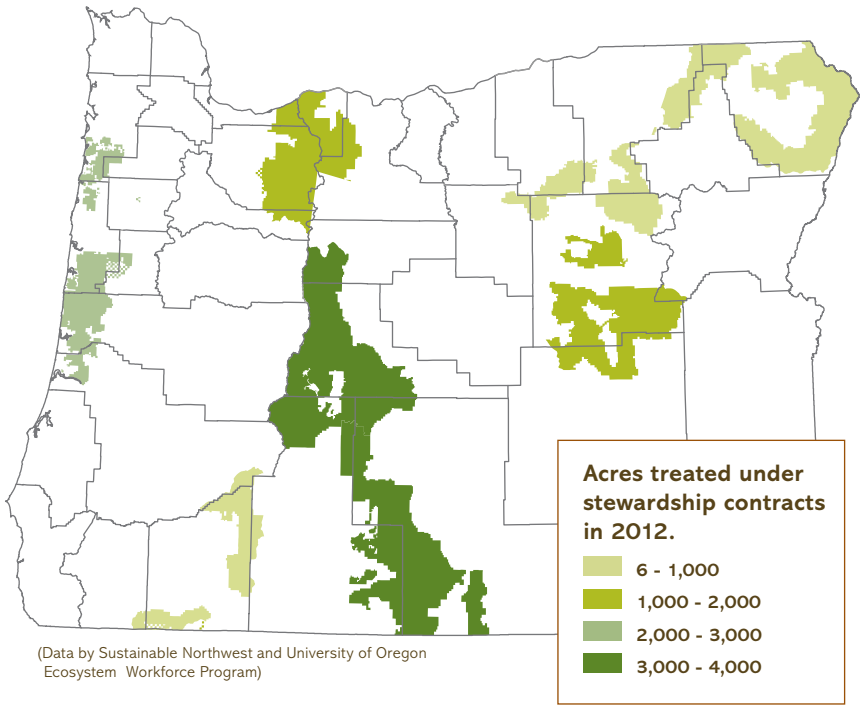
from the understory and selectively harvesting some logs big enough to be made into lumber or plywood. The goal is to create forest stands more typical of historic conditions and more resistant to uncharacteristically severe fires.

This work results in large piles of trees less than 7 or 8 inches in diameter. If we view this as waste, the forestland managers are simply paying to have it removed.

A WIN-WIN

If we view this as a resource and build a market for it, the agencies still will pay to have it removed, but those bidding to do the work end up with something of value in addition to the selectively harvested sawlogs. This means contractors vying for the work can bid less to do the job, so limited federal funds will stretch further, allowing more acres to be restored for the same cost.

Restoration is large-scale



Most of the potential biomass supply from forest restoration thinning projects comes from national forests east of the Cascades.

Keeping warm

Of the three major uses of energy – transportation, heating and electricity – heat is most fundamentally linked with wood. A cluster of projects around John Day reveals a fresh approach to wood heat.

A challenge

Small amounts: Heating a rural school might take 100 or 200 tons of wood pellets per year. It takes far less biomass than what is available from forest restoration projects.

What's needed

Increased public awareness of biomass heating, underscoring that it's efficient, clean-burning and uses low-cost fuel.

Incentives to support evaluating and developing heating projects, and to encourage equity investment.

Promote international markets and export opportunities for Oregon-made biomass fuels and equipment.

Explore opportunities for district heating – an efficient way to provide heat to multiple buildings from a central boiler.

JOHN DAY – Ochoco Lumber's venture into biomass was about survival. The central Oregon company had milled ponderosa pine into boards since the 1930s. The mill provided a livelihood for generations of rural Oregonians.

But by the time Bruce Daucsavage, now Ochoco's president, started working for the company in the 1980s, there were signs of trouble. Over the next couple of decades, as logging on federal land mostly ended, dozens of mills in central and eastern Oregon closed – including Ochoco's long-time operation in Prineville.

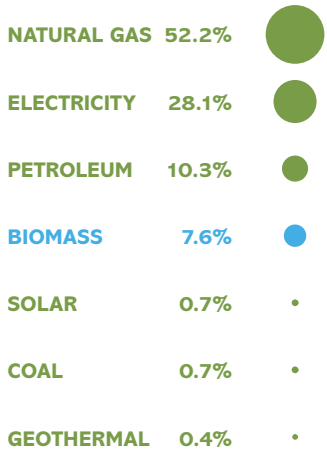
By then, the company had a newer mill in John Day – Malheur Lumber – built to handle the smaller logs, down to 14 inches, that were the new reality at the time. But Daucsavage hedged his bets. The company diversified, investing in timber ventures as far away as New Zealand and Lithuania.

A NEW PATH FORWARD

Daucsavage told an Associated Press reporter in 2004, "The forests on public lands are so political, I don't know what it would take" to resolve the standoff in eastern Oregon.

Nearly a decade later, an answer is emerging. It began with a collaborative, a group that includes himself, Forest Service officials, county leaders, environmentalists and others. Together they found ways to restart forestland management in the Malheur National Forest near John Day.

SOURCES OF HEAT ENERGY IN OREGON



Resulting forest restoration jobs produce a lot of material that wasn't of use to sawmills. There are some sawlogs, which are important as their value helps offset costs of the work. But there are many trees less than 7 inches in diameter. These don't have any 2x4s inside them. But they do contain stored sunlight – which is to say, energy.

In 2009 Malheur Lumber, with the help of a federal stimulus grant, constructed a mill to make heating pellets and compressed heating bricks from these small trees. The bark is peeled off, the logs are chipped and the chips are compressed into pellets, the kind that fuel a residential pellet stove – or

a commercial boiler of a size that would heat a school or a small hospital or a Forest Service ranger station – if only there were more of these nearby.

So Malheur started looking for ways to build a market close to home.

A LOCAL ECONOMY

Some school districts bought in. A hospital. A small local airport. They got rid of boilers that ran on propane or heating oil and replaced them with modern, clean-burning pellet boilers. Their heating bills went down.

There's now a cluster of seven schools and other institutions nearby that buy heating fuel in bulk from Malheur's pellet mill. This commerce means more than one company staying afloat; it creates jobs, saves schools money and reduces oil imports.

"You cannot be a pure sawmill and survive" in eastern Oregon, Daucsavage says now. And he adds, "I don't think you could do a stand-alone pellet facility. But when you throw this all together you have a chance."

OREGON-MADE A number of the new biomass heating systems, such as this one at Oakridge Elementary School, are manufactured in Oregon by SolaGen Inc., which is based in St. Helens.

BIOMASS HEAT AT INSTITUTIONAL BUILDINGS IN OREGON

	LOCATION	ONLINE	ANNUAL SAVINGS*
Milo Academy	Days Creek	1950	**n/a**
Tillamook Forest Center	Tillamook	2006	**
Harney District Hospital	Burns	2007	**$75,000**
Enterprise School District	Enterprise	2007	**$820,000**
Burns High School	Burns	2009	**n/a**
Grant County Regional Airport	John Day	2010	**
Evergreen Elementary School	Cave Junction	2011	**$15,285**
Illinois Valley High School	Cave Junction	2011	**$332,000**
Days Creek Charter School	Days Creek	2011	**$6,580**
Estacada High School	Estacada	2011	**$11,000**
Blue Mountain Hospital	John Day	2011	**$422,875**
Sisters High School	Sisters	2011	**$30,000**
Deschutes National Forest Office	Bend	2011	**
Oakridge Elementary School	Oakridge	2012	**$20,000**
Prairie City School	Prairie City	2012	**$63,000**
Grant Union School	John Day	2012	**$12,500**
Vernonia High School	Vernonia	2012	**
Wallowa Resources Center	Enterprise	2012	**$50,000**
BLM Wildwood Rec Center	Mt. Hood Village	2012	**n/a**

* Compared to older heating systems, mostly fueled by oil or propane.
** Was installed in a new building; didn't replace an older heating system.

CO-GENERATION

Powering up – on the grid

Burning woody biomass to produce electricity can use the large amounts of biomass that are available, although the economics are difficult. Seneca Sawmill in Eugene figured out how to make it pencil out.

EUGENE – Seneca Sawmill's venture into electrical generation grew out of its core business: making lumber.

But many stars had to align to make the idea work. The Jones family, which owns four sawmills and about 165,000 acres of sustainably managed timberland, recognized an increasing demand for kiln-dried lumber. Through the 1990s, the company's Eugene mill ran two small kilns fueled by natural gas. The kilns dried about 15 percent of its lumber.

For years the family had been considering the idea of burning wood waste to create the heat and steam needed to dry lumber. At the same time, they could use the steam to generate electricity. This wasn't a new idea. Sawmills and paper mills have been burning wood byproducts to power themselves for decades. Seneca had large, continuous supplies of bark, logging slash, sawdust and other residuals from the mill.

THE INCENTIVES

By 2009, things started to gel. Seneca obtained a $10 million Business Energy Tax Credit from the state, plus a $170,000 federal stimulus grant, along with other incentives. Meanwhile, the state was directing large utilities to find more sources of renewable power. This boosted interest in Seneca's plant, which would produce electricity to be sold onto the public power grid.

Two years and $60 million later, the plant was completed. It produces the steam to dry Seneca's lumber and also generates enough electricity to power 13,000 homes. The power is sold to the Eugene Water & Electric Board for public consumption.

The fuel is mostly bark and sawdust, as well as logging slash the company hauls from its timberlands. In all, it amounts to 135,000 bone-dry tons per year, about 75 percent from the mill and the rest logging slash.

EVERY CASE IS DIFFERENT

"Every forest biomass opportunity is unique," Seneca's Todd Payne told attendees at a renewable energy conference after the

SOURCES OF OREGON ELECTRICITY

HYDRO	38.74%
COAL	35.46%
NATURAL GAS	16.24%
WIND	4.31%
NUCLEAR	3.66%
BIOMASS	0.77%
PETROLEUM, GEOTHERMAL, SOLAR AND OTHER	0.81%

A challenge

Cost of getting slash out of the woods: Trucking biomass more than 30 or 40 miles pushes the cost of producing electricity higher than the price utilities can pay for it.

What's needed

Continued pursuit of distributed generation; that is, a network of smaller local power plants rather than large, concentrated sources of power.

Policies to support utilities' purchase of biomass power, especially from existing in-state plants that are not running at full capacity.

Policies that recognize and monetize the public benefits of local biomass-fueled electricity, such as improved air quality and reduced fire risk.

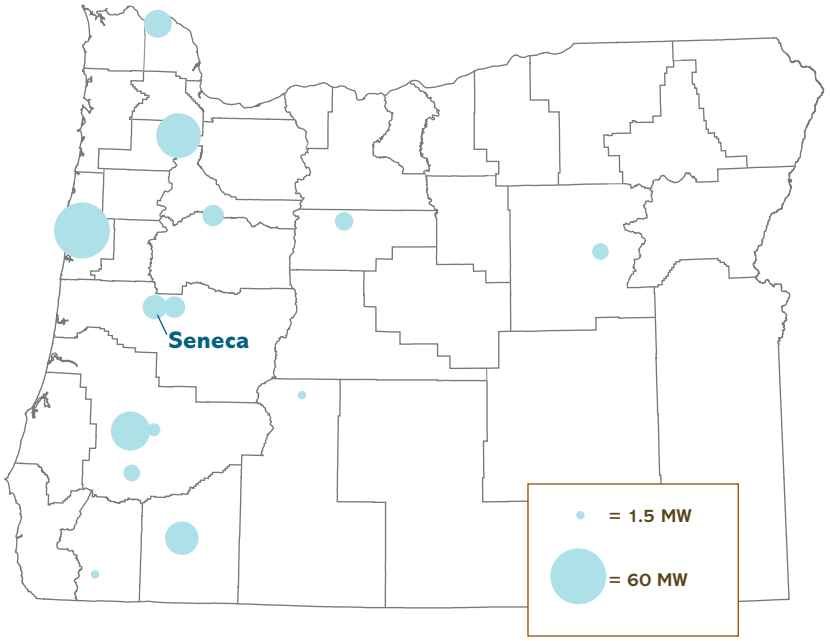
Avoid disruption of existing markets for biomass that are economically important to Oregon, such as the manufacture of paper and other products made from chips and sawdust.

Streamlined permitting processes and better education of state and local permitting officials.

plant had been up and running for two years. “It is an art and a science.”

Payne, who managed the project, explains that all the key ingredients converged in Seneca’s case: The company had a need for steam. It had access to ample biomass fuel nearby. The local utility was in the market for renewable electricity and was willing to negotiate a purchase contract. And government incentives were in place to help offset some construction costs. In the end, Seneca eliminated its natural gas bill and its reliance on fossil fuels to run the kilns. All the pieces came together, and Seneca turned waste into a valuable resource.

Electrical generation plants fueled by woody biomass



Most of the biomass-powered electrical generation plants in Oregon are co-located at sawmills or paper mills. Total statewide installed capacity in 2013 was 287 megawatts, enough to power about 250,000 homes.

POWER FROM BIOMASS Seneca’s renewable energy plant generates about 19 megawatts of electricity. It is fueled by bark and other residuals from the sawmill as well as logging slash hauled from nearby timberlands.

Finding uses for 'waste'

Energy isn't the only use for the small-diameter trees removed during forest restoration projects. A public-private partnership in Enterprise has taken a broader, integrated approach to using woody biomass.

A challenge

High cost of hauling: It's difficult to make products worth enough to justify the cost of harvesting and hauling the raw material.

What's needed

New business models that merchandise all forest products that result from harvest and forest restoration.

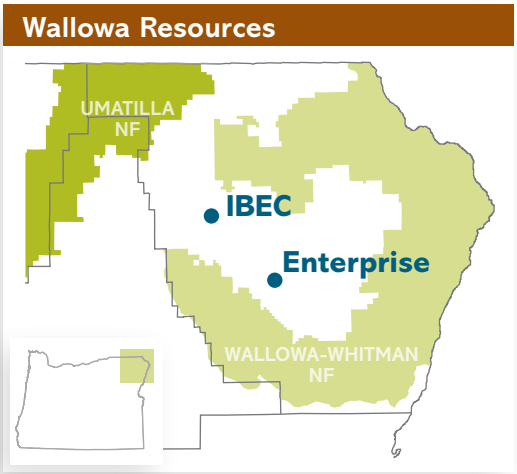
Policies that encourage small-scale entrepreneurs who are trying to build innovative business models based on the harvest, use or sale of biomass.

ENTERPRISE – The halt of logging in federal forests in the early 1990s pulled a linchpin from the economies of many small towns in the Northwest. In Wallowa County in Oregon's northeastern corner, three mills closed in 1994. Hundreds of people lost their jobs. Families moved, schools lost enrollment and unemployment surged.

RISING FROM THE ASHES

As local legend has it, a group of local citizens found themselves around a table in a bakery two years later, forming an organization called Wallowa Resources that would try to build a new industrial backbone in the community.

Wallowa Resources is a nonprofit that promotes renewable energy and rural economic development. It helped create cooperative groups to initiate thinning and fuel-reduction projects in nearby federal forests. This resulted in the Arroz Stewardship Contract in 2004, the first



The Integrated Biomass Energy Campus in the northeastern corner of Oregon acquires biomass from the surrounding Umatilla National Forest and Wallowa-Whitman National Forest.

commercial timber contract there in 10 years that did not face a lawsuit.

These kinds of federal stewardship projects bring a few large trees out of the woods for sawmills. But many trees harvested are only a few inches in diameter. Traditionally these had so little value that they were piled up and burned on-site. Wallowa Resources and a growing group of partners saw something else. The nonprofit teamed up with county government and a private company called Integrated Biomass Resources to build the Integrated Biomass Energy Campus, which opened in 2012.

A VARIETY OF PRODUCTS

Using these small logs, as well as logging slash from private-land timber harvests, Integrated Biomass Resources started making products they could sell: firewood, compressed "logs" to be burned in woodstoves, posts and poles for fencing, and landscaping timbers.

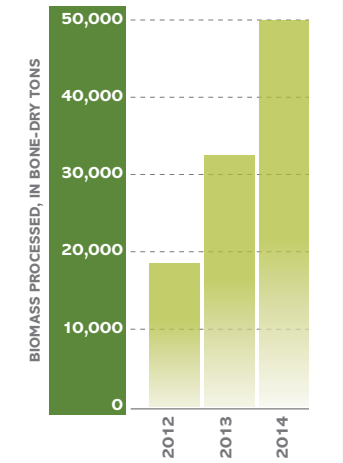
These are "existing markets" that can be accessed by those who collect and process forest biomass. Wallowa Resources and Integrated Biomass Resources have also helped create a market for coarse wood fuel, known as "hog fuel," to heat a school and other buildings in Enterprise.

And with the help of federal and state grants, Integrated Biomass Resources has constructed a small 100-kilowatt co-generation plant, to produce electricity to run the campus. Whatever material cannot be used to make the company's other products can be burned for heat and electricity.

So nothing is wasted, and the campus powers itself.

As in the thermal energy cluster around John Day, people in Wallowa County have retooled to find new ways to use the resource that is now available from the surrounding forests. And as in John Day, their initiative in using small-diameter woody material will help support forest thinning and restoration projects that will return eastern Oregon's forests to healthier, more historical conditions.

Ramping up



IBEC expects to triple its output over three years (biomass processed, in bone-dry tons). Figures for 2013 and 2014 are estimates.

HIGH-TECH HEAT Efficient, computerized Austrian-made Tarm boilers heat Wallowa Resources' Community Stewardship Center in Enterprise, Oregon (left). The pellet-fueled system is expected to cut energy bills by $50,000 per year.

INTEGRATION One of the keys to the Integrated Biomass Energy Campus is centralizing all of its activities on one site, from post and pole making to hog fuel (right).

Getting around

Turning the energy in wood into liquid fuel is more complicated than getting heat from wood. A company called ZeaChem is pioneering a way to make fuel from biomass on a large scale.

A challenge

Capital-intensive: Building a refinery takes millions of dollars in capital.

What's needed

Increased coordination between industry, university researchers and government to help develop new technologies.

Policies that encourage market demand for biofuels and set goals for use of alternative liquid fuels.

Additional research on the use of bio-char for remediation, water filtration and soil improvement.

BOARDMAN – More than a third of Oregon's energy consumption is for transportation. Most of that is gasoline and diesel fuel. Can woody biomass help here? How can you produce a wood-based liquid fuel to fill a car's gas tank?

In the lab, the chemistry isn't terribly difficult. On a larger scale, it's not as easy.

FROM THE LAB

Now a company called ZeaChem has built a demonstration refinery in Oregon as it tries to prove the viability of turning wood chips and agricultural waste into liquid fuel and other chemicals, at a price that's competitive with petroleum.

ZeaChem was founded in 2002 by two chemists who had worked together at an R&D company. They had been looking for solutions to the inefficiency of fermenting with yeast. When yeast ferments sugar into alcohol, a third of the energy potential of the sugar bubbles off as CO_2. The chemical engineers instead used another natural organism, a bacterium found in the digestive tracts of termites and in compost piles, that breaks down plant material with almost no loss of energy.

With this innovation they launched ZeaChem, thinking it would be a better way to make ethanol from corn. But they learned that the process worked on other plant material. So they turned away from corn, and found other excellent raw materials, including hybrid poplar, a fast-growing tree that is routinely farmed for paper-making and for cabinet lumber.

ON THE FARM
Fast-growing poplar trees farmed by GreenWood Resources will be one of ZeaChem's primary sources of biomass.

SOURCES OF ENERGY FOR TRANSPORTATION

PETROLEUM (gasoline and diesel)	91.28%
ETHANOL	6.02%
NATURAL GAS, BIODIESEL, PROPANE, ELECTRICITY	2.70%

They plan to grow the trees for about three years, then harvest them and let them grow back from the roots.

TO THE MARKET

After a decade of research and development, they opened a demonstration refinery in the Columbia River Gorge in early 2013. It's capable of making 250,000 gallons of ethanol and other chemicals per year.

Located in Boardman, the demonstration plant will test processes developed in the lab on a larger scale. Once fine-tuned, ZeaChem intends to scale up production with a commercial 25-million-gallon-per-year refinery, to be built next door.

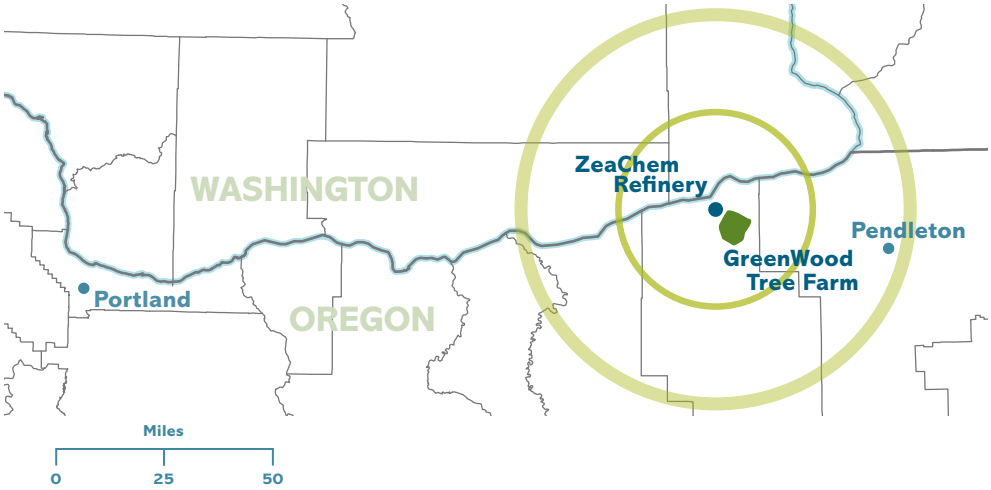
This has cost a lot of money. ZeaChem rounded up tens of millions of dollars in private investment, but the company also won $25 million in financing from the U.S. Department of Energy.

The company – headquartered in Colorado – chose Boardman partly because it has easy access to renewable, sustainably grown poplars at a tree-farming company called GreenWood Resources.

CEO Jim Imbler, who formerly worked in the oil industry, says ZeaChem believes it can produce liquid fuel from wood chips at a price equivalent to petroleum when oil is priced at $50 per barrel. For now, the plan is to blend the poplar-based ethanol into gasoline, just as corn ethanol is now blended into gas, at 10 percent.

Eventually, there is a vision of refining the wood further, into gasoline and jet fuel.

ZeaChem refinery and the GreenWood tree farm locations



ZeaChem plans to acquire the biomass it needs within 25 to 50 miles of its Boardman refinery, much of it from GreenWood Resources' tree farm, as well as nearby wheat farms.

THE PROMISE OF BIO-CHAR

Another emerging use of woody biomass is "bio-char." Essentially, it's highly refined charcoal.

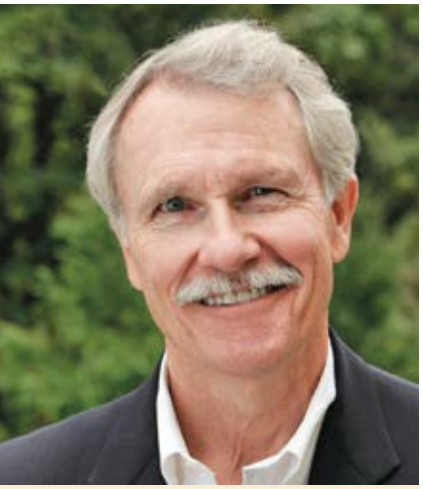
It shows promise as a soil amendment that helps retain moisture and nutrients. It is being marketed to farmers and, at the retail level, gardeners. Bio-char is also effective in filtering water, and might be sold for use in industrial or municipal storm runoff systems.

Bio-char is created by heating sawdust, chips or larger pieces of wood without oxygen present. So instead of burning, the wood chars. It's a process called pyrolysis.

During pyrolysis, the biomass gives off a flammable gas, the heat from which can help produce the char itself. Pyrolysis also produces bio-oil, which can be refined into biodiesel and other biofuels.

And finally, the process leaves the char itself, which is mostly carbon.

Looking ahead



"Oregon's natural resources and environment are at the center of the state's identity and economy. Agriculture and forestry represent two of Oregon's top three industries and employ more than a hundred thousand Oregonians while contributing billions of dollars to the state's economy. Strengthening the health of our environment, these key industries and rural communities is a priority for the state and will be advanced by a strategic, integrated approach to bioenergy opportunities."
– Gov. John Kitzhaber

A common thread runs through the stories of Malheur Lumber, Seneca, Wallowa Resources and ZeaChem.

All of these projects got off the ground, in part, due to supportive public policies:

- Government investment helped pay for the purchase, construction, research or installation of biomass projects in all four cases.
- Incentives helped offset private investment and risk.
- Policies such as the Renewable Portfolio Standards helped create a stronger market for biomass-generated electricity and other renewable sources of energy.

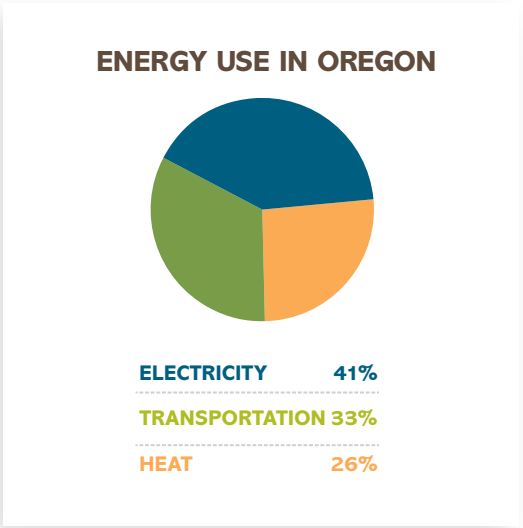
The players involved, despite their own initiative and ingenuity, all say their projects would have been unlikely today without help from the public sector.

But Oregon can do more if it is to build its energy future with intention and purpose, as Gov. Kitzhaber has suggested, rather than let our current system "shape us."

Oregon can position itself for an energy future that is more sustainable, more local and more economically healthy, especially in rural communities.

Looking purely at money out of pocket, sometimes biomass is a clear winner – it costs less to heat a building in eastern Oregon with biomass fuel pellets than it does with imported heating oil.

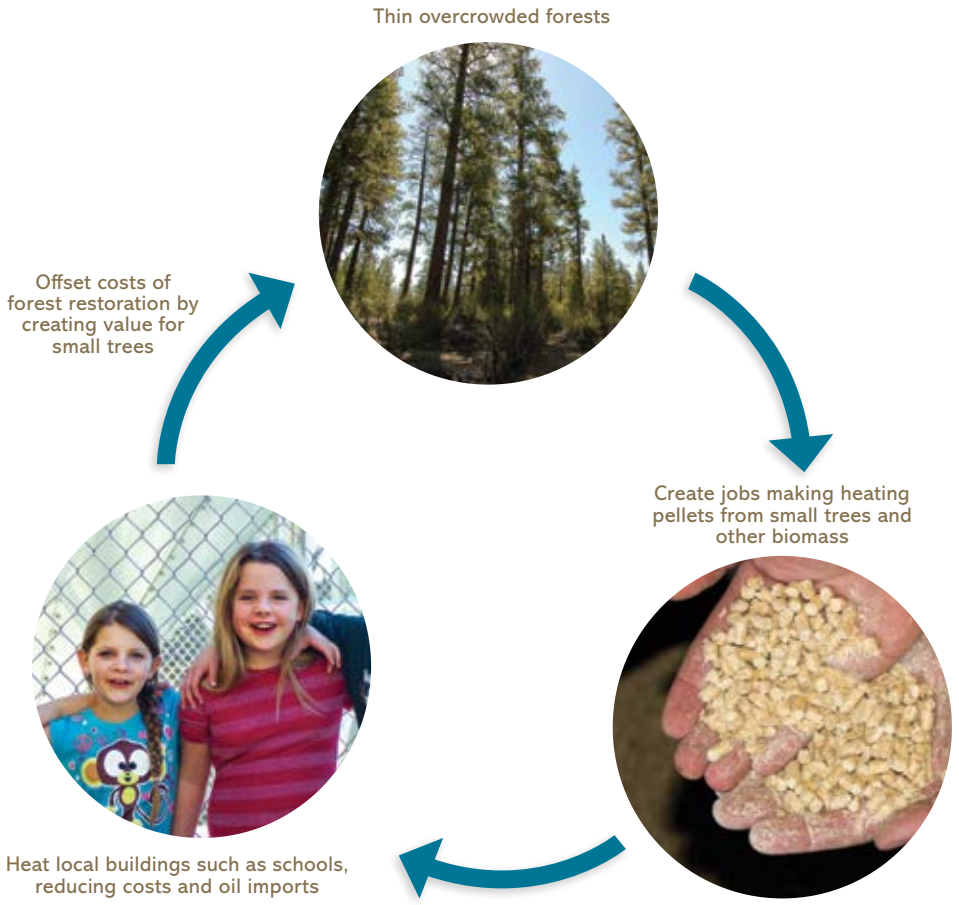
Taking a broader view, sometimes the costs and benefits of biomass are more complicated. Perhaps the out-of-pocket cost is more, but what if we add in other benefits: healthier forests resulting from accelerated restoration work; the presence of Oregon jobs that would not otherwise exist; money spent on locally derived energy instead of mailing a check out of state; support of Oregon equipment manufacturers; less wasteful use of forest resources; cleaner air because of less slash burning; reduced reliance on fossil fuel and greater energy independence.



These are the considerations state leaders must weigh as they chart the course of Oregon's energy future. Oregon has the potential to lead the nation in the development of woody biomass. When harvested responsibly and sustainably, biomass can be a reliable and clean source of heat, power and fuel. It is a crucial piece of a smarter energy system.

With biomass, we can say: "Powered by Oregon."

Benefits of a localized economy



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ABOUT OFRI

The Oregon Forest Resources Institute was created by the Oregon Legislature in 1991 to improve public understanding of forests, forest products and forest management, and to encourage sound forestry through landowner education. A 13-member board of directors governs OFRI. It is funded by a dedicated forest products harvest tax.

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