

Oregon's Renewable Energy Action Plan



Prepared by the
Oregon Department of Energy
for
Governor Ted Kulongoski



OREGON
DEPARTMENT OF
ENERGY

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Oregon Renewable Energy Action Plan

“We can make Oregon the national leader in renewable energy and renewable product manufacturing. Development of renewable energy will lessen our reliance on fossil fuels, protect Oregon’s clean air and create jobs.”

Governor Kulongoski, 2003

1. Introduction

Promoting a diversity of renewable energy generating resources in Oregon is good energy policy for a state that has an electricity system heavily dependent on hydropower and increasingly dependent on fossil fuels. Because some renewable energy fuels are freely accessible and others are not subject to fossil fuel price swings, they help stabilize electric rates. They contribute to a healthy electric power infrastructure. Similarly, developing a biofuels industry in Oregon will help reduce our dependence on petroleum for transportation. As importantly, developing the state’s renewable energy resources, related manufacturing and research and development presents a huge economic opportunity, particularly in rural parts of the state where economic development can be most challenging. Investments stay in Oregon, creating jobs and growing a “second crop” for farmers, ranchers and forest landowners. Finally, renewable energy is an investment in the environment by displacing the use of fossil fuel generation and avoiding numerous pollutants and global warming gases.

“It is a fairly rare initiative that is good policy, good economic development, and good for the environment, but renewable energy development is that rare gem.”¹

Oregon has long been one of the nation’s leaders in encouraging renewable energy resources. For example, the state provides tax credits and low-interest loans for all types of renewable resource projects through the Oregon Department of Energy. The Energy Trust of Oregon uses public purpose charge funds from Portland General Electric (PGE) and Pacific Power customers to achieve a goal of renewable sources supplying 10 percent of the state’s electric power by 2012. Many utilities in the state offer consumers “green power” options to support development of renewable resources. PGE ranks second in the country in sales for green power options; PacifiCorp ranks fourth. More than one million Oregon households and businesses regularly receive information on the power sources, environmental impacts and costs of generation from renewable energy sources versus fossil fuels. The Bonneville Power Administration (BPA) and the consumer owned utilities offer renewable incentives through the Conservation and Renewable Discount program. The Oregon University System, with utility funding, has done solar and wind resource assessment for decades, with all data publicly available.

¹ Quote from comments on the first draft.

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Among the benefits of renewable energy for the state:

- A net increase of 1,250 new jobs with each \$100 million investment in renewable energy resources
- Additions to the rural tax base and opportunities for local economic development.
- Income diversification in rural areas, which helps preserve family farms and ranches.
- Using forest residues to produce energy can improve forest health, reduce wildfire risk and fire suppression costs, and reduce overall smoke emissions from forestland burning.
- Clean transportation fuels can come from Oregon farm and forest products, instead of from out-of-state sources.
- Generating energy from waste gas at dairies, landfills and sewage treatment plants can reduce environmental liabilities and provide another revenue source for businesses and communities.
- Renewable resources help insulate Oregonians from volatile fossil-fuel prices.
- Using renewable energy resources reduces air pollution, thereby reducing health care costs and limiting the impact of likely stricter federal emission standards in the future.
- A healthy environment helps attract and retain businesses and is also very important to the tourist industry.

Oregon is already making use of renewable technologies including hydro, wind, direct use of geothermal, biomass, and solar. But it can and must do better. By building on these achievements with the actions as outlined in this Renewable Energy Action Plan (the Plan), Oregon will continue to be a leader on renewable energy policy and will meet a large fraction of its energy needs with new renewables by the year 2025. The Plan also will play a central role in furthering the Governor's initiatives on sustainability and global warming. The Plan complements the state's energy efficiency programs.

2. Driving forces behind the Renewable Energy Action Plan

This process was initiated under Governor Kulongoski's leadership. He has recognized the importance of developing energy efficiency and renewable energy resources in furthering economic development. There is growing evidence that oil and natural gas supplies are becoming more constrained and expensive for the long-term. It is recognized that investments in efficiency and renewable resources have significant environmental and economic benefits. As utilities plan additional capacity, an opportunity exists for growth in renewable resources.

Oregon has a long history of legislative direction supporting energy efficiency and renewable resources development. Oregon Revised Statute 469.010, adopted three decades ago, states:

- 1) Continued growth in demand for nonrenewable energy forms poses a serious and immediate, as well as future, problem. It is essential that future generations not be left a legacy of vanished or depleted resources, resulting in massive environmental, social and financial impact.

2) It is the goal of Oregon to promote the efficient use of energy resources and to develop permanently sustainable energy resources. The need exists for comprehensive state leadership in energy production, distribution and utilization. It is, therefore, the policy of Oregon:

(a) That development and use of a diverse array of permanently sustainable energy resources be encouraged utilizing to the highest degree possible the private sector of our free enterprise system.

(b) That through state government example and other effective communications, energy conservation and elimination of wasteful and uneconomical uses of energy and materials be promoted. This conservation must include, but not be limited to, resource recovery and materials recycling.

(c) That the basic human needs of every citizen, present and future, shall be given priority in the allocation of energy resources, commensurate with perpetuation of a free and productive economy with special attention to the preservation and enhancement of environmental quality.

(d) That state government assist every citizen and industry in adjusting to a diminished availability of energy.

(e) That energy-efficient modes of transportation for people and goods shall be encouraged, while energy-inefficient modes of transportation shall be discouraged.

(f) That cost-effectiveness be considered in state agency decision-making relating to energy sources, facilities or conservation, and that cost-effectiveness be considered in all agency decision-making relating to energy facilities.

(g) That state government shall provide a source of impartial and objective information in order that this energy policy may be enhanced. [1975 c.606 §1; 1979 c.723 §1]

3. The Benefits of Renewable Energy Resources

Risk Mitigation

Fossil fuels pose significant risks when considering the availability and price.

Oregon is vulnerable to oil price spikes and shortages. Oregonians spent \$4.1 billion on oil products in 2000. The vast majority of this money left the state. If oil prices doubled it would have a severe impact on the state.

Natural gas prices have increased significantly in the last few years. Oregonians spent 50 percent more per British thermal unit (Btu) to heat their homes in 2002 than they did in 1998. Oregonians spent \$1.1 billion on natural gas in 2000, not including gas used in power plants. Natural gas provides 15 percent of Oregon's electric power, but this percentage is growing. As with oil, the vast majority of this money leaves the state. New supplies are proving to cost as much or more than current supplies.

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In 2002, Oregonians spent \$2.9 billion on electricity. Oregon's economy is still recovering from a widespread economic downturn that began in the 2000-2001 timeframe. As loads grow, there will be continued pressure on rates because new resources – including renewable resources – are more expensive than existing ones.

Readily available energy at an affordable price is essential for the manufacturing, agricultural, transportation, retail, and indeed all sectors of Oregon's economy. It is prudent that we diversify our investments and allocate a greater portion to renewable resources. By focusing our efforts on renewable energy markets, Oregon will better protect itself from the volatility of the wholesale electricity and natural gas markets. It is essential that we act now to lay the foundation for accelerated renewable energy development that will sustain Oregon's progress.

Developing renewable resources reduces major health risks through reduced air, land, and water pollution. Adverse effects of global warming on weather and climate can be mitigated by reduced CO₂ emissions.

Economic Development and Job Creation

Oregonians expect their basic needs to be met. They expect the State of Oregon to plan for and develop an environment that produces social and economic benefits that meet current and future needs, while preserving and restoring the health of the natural environment.

Investments in renewable energy result in a *net* increase in jobs. For every \$100 million in investments in renewable energy, about 1,250 full time equivalent jobs are created. Furthermore, the *net* increase in economic output (the value of the production by the industries involved), wages, business and other income total almost \$200 million. In addition, the increase in state and local taxes is about \$1 million.^{2,3}

Based on these data, initiatives as outlined in this document could lead to an investment of \$300 million or more by the end of 2006, which would result in about a 3,700 net job increase. This is a significant number of new family-wage jobs in the agricultural and forestry segments of our economy, as well as other businesses.

There are several additional advantages of new renewables electric generating facilities. Some of these advantages are the result of renewables' capital intensiveness. For example, the

² Based on Economic Impact Analysis of Energy Trust of Oregon Program Activities, Final Report, by ECONorthwest, Portland, April 2003. It is important to emphasize that these are *net* benefits because they were calculated relative to the case where ratepayers, following their normal spending patterns, spent an equivalent amount of money. If a comparison were made between investing in renewable energy projects within Oregon versus with making the same investment outside the state, then the benefits from the investments would be much greater. Accordingly, they are conservative estimates.

³ See also "Assessing the Economic Development of Wind Power", Northwest Economic Associates, February 2002. Prepared for the National Wind Coordinating Committee. This study includes specific data for Morrow and Umatilla counties and the Vancycle wind farm.

property tax benefits of wind energy development have a high net value to the community because the wind energy activity in turn consumes few government services.

Recent studies indicate that by making investments in public/private renewable energy partnerships and providing incentives for the renewable energy sector, the *net bill* to American consumers may be *lowered* because an increased use of renewable energy will stem the rise of natural gas prices⁴.

The development of renewable resources can often affect land use in a positive way. Biogas generation on dairy farms solves the problem of manure disposal and associated water pollution. Biomass recovery for forest health can improve air and water quality by reducing wildfires resulting from secondary forest biomass burdens. Wind projects are commonly done on farming and grazing land, and improvements are made to pre-existing roads which farmers and ranchers use for property maintenance and agricultural operations.

Environmental Benefits

Renewable energy systems have far less impact on the environment than those systems that rely on fossil fuels and nuclear power. Reducing the environmental impact of energy use helps preserve Oregon's natural resources and enhance Oregonians' quality of life.

In addition to the obvious environmental benefits, such as improved air and water quality, we can reduce the health risks associated with pollution, minimize the impact of future federal mandates on air and water quality standards, bolster tourism and recreation, and grow Oregon's economy.

Oregon's renewable energy policy allows no backsliding on important siting standards. All new large-scale energy facilities in Oregon, including those using renewable resources, must meet siting standards that protect the public health and safety, and the environmental protection policies of the state.

4. Goals and Initiatives

The Plan's goal is to encourage and accelerate the sustainable production of energy from renewable sources, stimulate economic development, particularly in rural parts of the state, and improve the environmental future of the state. The Plan intends to demonstrate a variety of technologies for tapping renewable resources, and to help remove barriers to renewable resource development.

⁴ According to a recent study released today by the Union of Concerned Scientists, a national renewable energy portfolio standard (RPS) of 20 percent by 2020 would save families and businesses \$49 billion in lower electricity and gas bills. More than 355,000 jobs would be created if the United States obtained 20 percent of its electricity from wind, solar and other renewable energy sources

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This section articulates both long term and short-term goals, followed by potential legislative initiatives, coordination initiatives by the Governor's Office and an estimate of the fiscal impact for the next biennium. Section 4 lists the actions that will benefit renewable energy development across sectors, and section 5 lists sector-specific action items.

Long Term Goals: 2007 - 2025

Electricity Generation

1. New - post 1999 - renewable generation will meet 10 percent of Oregon's total load by 2015, which is roughly about 1 percent growth in renewable generation per year. This will increase to or exceed 25 percent of the load by 2025.⁵
2. Twenty five percent of state government's total electricity needs will be met by new renewable energy sources by 2010 and 100 percent by 2025.⁶

Transportation Fuels

1. All diesel fuel sold in Oregon will contain 5 percent biodiesel (B-5) by 2010, growing to 20 percent (B-20) by 2025. All biodiesel will meet applicable ASTM (American Society for Testing and Minerals) standards.
2. All standard gasoline sold in Oregon will contain 10 percent ethanol by 2010.
3. Five percent of all gasoline sold in Oregon will be an E-85 blend of ethanol and gasoline (85 percent ethanol, 15 percent gasoline) by the year 2015, growing to 15 percent by 2025.
4. One hundred percent of the diesel used by state government's fleet vehicles will be B-20 by ~~2010~~ 2025. (Note: The Governor later revised the original target of 2010.)
5. Ten percent of the gasoline used by state government's fleet vehicles will be E-85 by 2010. This percentage will grow to 25 percent by 2025.

Short Term Goals, to be achieved by the end of 2006

Electricity Generation

1. Three hundred megawatts of new wind energy resources will be developed⁷, of which 10 percent will be from community or locally owned wind energy projects.
2. Find *and implement effective* solutions⁸ to the transmission capacity bottleneck(s) between eastern and western Oregon to provide access from renewable and other resources in eastern Oregon to load centers.⁹

⁵ Currently, hydro meets about 44% of load, wind and geothermal 1%, biomass and municipal solid waste 3%. These are pre-1999 resources except for some wind. Sites of new renewables do not have to be within Oregon's borders.

⁶ This goal is dependent on funding. See discussion under Purchase of Renewable Resources by State Gov't.

⁷ PGE's 2002 Integrated Resource Plan alone targets approximately 200 MW of wind resources by the end of 2006.

⁸ Non-wire solutions can be implemented in a relatively short time frame.

⁹ Delivery of renewable resource energy from locations in eastern Oregon to the Willamette Valley will also require additional north-to-south transmission capacity on BPA's grid.

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3. All utilities in Oregon will offer customers a “stable-price” renewable energy product.¹⁰
4. Five hundred additional solar photovoltaic electric systems will be installed in the years 2005 and 2006 for a total of about one megawatt.
5. Five megawatts of new biogas generation facilities will be obtained from wastewater treatment, dairies and landfills.
6. Twenty-five megawatts of new biomass-fueled electric generation will be built or under construction, in addition to the aforementioned 5 megawatts of biogas facilities.
7. Twenty-five megawatts of new combined heat and power generation systems that are at least 10% better than the State standard for siting exemption will be built or under construction.
8. Two hundred 5-kilowatt fuel cells will be installed.¹¹
9. Twenty megawatts or more geothermal electric generation will be in the process of being developed.
10. One to four megawatts of new environmentally sustainable hydroelectric generation will be on line or in the process of being developed (primarily irrigation piping channels).
11. An assessment of the feasibility of a renewable portfolio standard (RPS) for the state will be completed.

Transportation Fuels

1. Diesel sold in Oregon will contain 2 percent biodiesel (on average). All biodiesel will meet applicable ASTM standards.
2. Fifteen million gallons of biodiesel will be produced annually from Oregon crops or products and waste oils collected in Oregon.
3. Gasoline sold in Oregon will contain 2 percent ethanol (on average).
4. One hundred million gallons of ethanol will be produced annually.

State Government

1. Ten percent of state government’s total electricity needs will be met by renewable energy sources (through green tag or “stable price” product purchases and/or direct development of renewable energy by state government).¹²
2. ~~Twenty-five percent~~ Ten percent of the diesel used by state government’s fleet vehicles will be B-20. (Note: The Governor later revised the original percentage requirement.)
3. Seventy-five percent of the gasoline used by state government’s fleet vehicles will be E-10.
4. A streamlined one-stop leasing process for state lands to develop renewable energy resources will be in effect.

¹⁰ Currently, only one Oregon utility offers such an option.

¹¹ Some fuel cells will use renewable fuels but others will use fossil fuels to reach this goal.

¹² See discussion under Purchase of Renewable Resources by State Government

Demonstration Projects

To highlight the benefits of renewable electricity generation and fuels, the following projects will be completed:

1. Five public or private energy-efficient buildings that make use of passive solar design features.
2. One biodiesel plant using mustard, other agricultural products or “waste” products.
3. One ethanol plant.
4. Projects that generate electricity either singularly or through any combination of the sun, wind, geothermal sources, irrigation district micro-hydro, biomass burning, on-farm dairy waste digesters, municipal anaerobic digesters, waste heat recovery systems and renewably fueled fuel cells.
5. Five sites that directly use geothermal energy.
6. One industrial park or renewable energy cluster that integrates renewable energy and sustainability related products or services.

Anticipated Legislative Initiatives in 2005

1. Make changes in the Small Energy Loan Program to allow more renewable energy projects to be financed.
2. Repeal the provision in state law that creates a conflict for renewable energy projects between the state Business Energy Tax Credit (BETC) and the federal production tax credit.
3. Revise the Residential Energy Tax Credits (RETC) for solar electric systems and fuel cells to be applied over several years (up to \$6,000 per system).
4. Revise the Residential Energy Tax Credit (RETC) 316.116 Statute to explicitly state that resident individuals can receive multiple tax credits in the same year for alternative energy devices, alternative fuel vehicles or alternative fuel devices.
5. Extend the 50 percent property tax exemption for ethanol production facilities until the close of the 2016 fiscal year and expand this exemption to biodiesel facilities and to grain storage and oil crushing facilities that are constructed to store harvested oil-seed crops or to extract the oil from such crops, if at least 75 percent of the crushed oil feedstock is used in the production of biodiesel that meets applicable ASTM standards.
6. Introduce a production-based tax credit for biodiesel and ethanol produced in Oregon to make Oregon-produced biofuel competitive with biofuel imports from the Midwest states. The tax credit would be phased-in and be subject to production caps per year per production facility. Phase 2 of the production credit, beginning in 2010, would maintain the rate and the cap levels of the credit but would require that the biofuel eligible for the tax credit be produced from feedstock grown or produced in Oregon.
7. Introduce a ban on MTBE¹³ in the state.

¹³ MTBE - methyl tertiary-butyl ether. It is one of a group of chemicals commonly known as "oxygenates" because they raise the oxygen content of gasoline. Oxygen helps gasoline burn more completely, reducing harmful tailpipe emissions from motor vehicles. The US Environmental Protection Agency's Office of Water has concluded that available data are not adequate to estimate potential health risks of MTBE at low exposure levels

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8. Allow biomass facilities to qualify for net metering and allow the Oregon Public Utility Commission to adopt rules to increase the 25-kilowatt limit on a net metering facility for customers of Portland General Electric and Pacific Power.
9. Authorize state agencies to develop renewable energy projects on state property where renewable energy resources, such as remote wind sites or geothermal, may not otherwise be developed by private organizations.
10. Allow state agencies to enter into long-term power purchase contracts for new, in-state, renewable electricity generation. Make budget provisions allowing agencies to pay equivalent to a regional market standard price for carbon dioxide (CO₂) emission reductions.
11. Establish funds to:¹⁴
 - Collect wind characteristics data at ten sites throughout the state, and make those data publicly available, to help community and locally-owned wind farm developments as well as large scale wind farm development and wind energy integration with the grid.
 - Collect information on the geochemistry of wells and springs, and make those data publicly available, to assist the geothermal industry, state and federal agencies and research institutions in geothermal resource target evaluation in Oregon.
 - Supplement the utilities' sponsorship of the University of Oregon's solar resource assessment work.
 - Perform feasibility studies of renewable projects.

Key Coordination Initiatives to be taken by the Governor's Office

1. Support a Renewable Energy Working Group to be coordinated through the Governor's Office and the Oregon Department of Energy to guide the **implementation** of this Plan.¹⁵
2. Coordinate this Plan with Western Governors' global warming and renewable energy efforts.
3. Play an active role in recognition of programs, projects (including the Governor's designation of specific demonstration projects as Oregon Solutions projects) or policies that help promote this Plan's objectives.

in drinking water but that the data support the conclusion that MTBE is a potential human carcinogen at high doses. Eleven states including California and Washington have banned its use as a fuel additive.

¹⁴ Additional funding support will be sought from a number of sources, including USDOE and USDOA Farm Bill grants.

¹⁵ This working group could delegate many of the action items to several smaller resource specific working groups like the Wind Working Group, but other implementation actions and policy considerations will require this higher level integrated approach.

Purchases of Renewable Energy Resources by State Government

The amount of renewable energy resources that state government purchases will depend on the funding level, source and which of the following three mechanisms the state uses to achieve these goals: green tags (or Tradable Renewable Certificates), bundled stable-price power purchases or investments in renewable resource projects. Direct investments in generating projects at state facilities, rather than simply buying green tags or Tradable Renewable Certificates, offer the potential of long-term bill savings for the state, added benefits from distributed generation, and higher value in terms of demonstration and state leadership. A number of state government sites are over 1 average megawatt (aMW) and would therefore qualify for direct access. This allows the state to select the type of renewable product it desires, while also gaining experience with direct access through the investor-owned utilities.

It would cost about \$200,000 per year to buy green tags for 10 percent of state government's electricity needs as proposed for the 2005-2007 biennium.¹⁶ Payments would go toward renewable resource projects in Oregon. A "stable-price" renewable resource product is an alternative that has the added benefit of fixing power costs over several years. However, only one Oregon utility offers such an option today. The state may want to enter a contract with an alternative electricity supplier for a term sufficient to acquire such a product, if available. Estimates of the costs of this option are not available at this time. Investments in renewable resources at state facilities could include solar electric systems on government buildings and wind turbines at government sites with favorable wind resources. The projects could meet load at the site, displacing the need for purchased power, or be sized to sell excess power to a utility or third party.

The Energy Trust could contribute toward these investments to the extent they benefit the PGE and Pacific Power customers (including state agencies) that provide the Trust's renewable resource funds.¹⁷ Investments would be tied to increasing generating capacity from renewable resources in the state and demonstrating on-site generation.

5. General Renewable Resource Actions

The following actions will be taken to enhance and expand support for development of *all* renewable resources in Oregon. Actions supporting expansion of specific renewable resources follow.

¹⁶ Assuming a cost of 0.5 cents/kWh for green tags.

¹⁷ The Trust's contributions to state government renewable purchases would reduce the Trust investments in other renewable projects, however.

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Actions:

1. The Governor's Office will:
 - Coordinate the legislative initiatives as outlined in section 3 of this Plan.
 - Support a **Renewable Energy Working Group** to oversee reaching the long and short term goals, and prepare regular progress reports to the Governor's Office and stakeholders. This group will consist of private sector citizens, renewable industry representatives, agricultural representatives, a governor's office representative, key state agencies, private and consumer-owned utilities, and others. The Oregon Department of Energy (ODOE) will provide staff support for this working group, coordinate the implementation of the action items outlined in this Plan and assist in the preparation of progress reports to the Governor's Office.

2. The Renewable Energy Working Group will consider to:
 - Set priorities on actions where Oregon has an advantage or need greater than other states, define the role of major stakeholders, and estimate the budget impact and other funds needed.
 - Assist in reaching the long and short-term goals of this Plan and coordinate the implementation of the action items outlined in this Plan.¹⁸
 - Work with the Oregon's congressional delegation to support a national renewable portfolio standard, as well as support a federal cap on CO₂ emissions or caps on the CO₂ emissions per kWh of load-serving entities (emissions portfolio standards).
 - Work with the Oregon's congressional delegation to make sure that the federal Production Tax Credit and the Renewable Energy Production Incentive are maintained.
 - Assess the feasibility and effectiveness of production-based incentives for electricity generated by small to medium scale renewable resource facilities.¹⁹
 - Assess the feasibility of a state Renewable Portfolio Standard and compare it with production-based incentives as to its effectiveness to encourage renewable energy development.
 - Work with the state's consumer and privately owned utilities, the Northwest Power and Conservation Council and Bonneville Power Administration (BPA) to develop a process and protocols for expediting interconnection requests and developing more distributed generation.
 - Work with Oregon's congressional delegation, BPA and consumer owned utilities to expand BPA's Conservation and Renewables Discount Program.

¹⁸ This Renewable Energy Working group will refine this plan and further delineate the participants not just by departments but by functions as well (a Wind Working Group, Biomass Working Group, Solar Working Group, Geothermal, etc.).

¹⁹ Production based incentives have been very successful in the Midwest and Europe. For examples of community wind projects in the Midwest, see <http://www.windustry.com/community/default.htm#Projects>. For discussion of the European incentives sometimes called "feed laws" or "minimum renewable energy tariffs or rates", see http://www.energy.state.or.us/renew/Wind/WindPubs/feed_laws_Hvelplund.pdf.

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- Work with BPA and consumer owned utilities to promote PURPA's²⁰ Qualifying Facilities using renewable resources, while avoiding financial harm to the utilities such as a reduction in a utility's "net requirements" (loss of a portion of a utility's long term allocation).
- Support research and demonstration projects that modernize the electric system by combining advanced telecommunications, information and control methods with the electricity infrastructure for more efficient (economically and environmentally) "smart" grid operation.
- Explore whether transmission constraints for community owned renewable energy projects could be overcome if: (1) a new or upgraded, privately owned transmission project were to be slightly increased in size, and (2) that this increase would be reserved for such community owned projects in exchange for a reduction in property taxes equal to the incremental costs for the transmission owner.
- Identify growing Oregon renewable energy businesses and assist them with expansion planning and workforce development.
- Help improve coordination and provide tools to attract new renewable energy businesses to build facilities in Oregon.
- Focus efforts to solidify the strength of a Brand Oregon renewable energy market for our technology services and commodities.
- Help develop a framework for valuation of environmental and other externalities.

3. The Oregon Department of Energy (ODOE) will:

- Include in its Biennial Energy Plan a section that tracks the progress towards this Plan's goals.
- Provide staff support for the Renewable Energy Working Group.
- Continue to assist households, businesses, units of local government and others to invest in renewable energy resources through the state's energy tax credit and energy loan programs, in coordination with incentives offered by the Energy Trust and BPA.
- Continue to support the state Energy Facility Siting Council's need to review an increasing number of applications for renewable resource power plants.
- Manage the fund to finance feasibility studies of renewable projects, if such a fund is established.
- Provide information on model siting standards and technical assistance to local governments, together with input from other stakeholders throughout the state, to help them plan for siting renewable resource facilities.
- Work with the Oregon Department of Fish and Wildlife and the Department of Environmental Quality to acknowledge the clear environmental benefits of renewable energy (over fossil fuel alternatives) in siting renewable energy projects.

²⁰ PURPA: Public Utilities Regulatory Policies Act of 1978. Before PURPA, only utilities could own and operate electric generating plants. PURPA required utilities to buy power from independent companies that could produce power for less than what it would have cost for the utility to generate the power, called the "avoided cost".

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- Work with the Oregon Public Utility Commission and the Building Codes Division to identify and adopt uniform technical standards, procedures and agreements for interconnecting generators, where the Federal Energy Regulatory Commission does not have jurisdiction.
4. The Oregon Economic and Community Development Department will:
- Help develop a viable renewable energy industry “cluster” by working with key stakeholders in government, business, non-governmental organizations, higher education, and local communities.
 - Create financial incentives, support regulatory streamlining, provide technical assistance, and publicly recognize businesses and communities that implement energy conservation programs, purchase renewable energy, and adopt best practices.
 - Support research and education to further development of new technologies that leverage renewable energy sources.
 - Grow Oregon’s economy by obtaining funds for the development of and facilitating the transfer of new technologies from Oregon’s University System and Research and Development centers to private enterprise.
 - Encourage and support infrastructure projects that incorporate eco-friendly design and innovative technologies that use renewable energy resources and enhance livability.
5. The Department of Administrative Services will:
- Report on the state’s purchases of renewable energy resources on an annual basis.
6. The Oregon Public Utility Commission has investigations underway or may examine for the *investor-owned* utilities the following:
- Standards to streamline the interconnection of small generators.²¹
 - Increasing the size of qualifying facilities eligible for standard purchase rates, a standard power purchase agreement with an extended contract length, and a standard method for determining avoided costs.
 - How distributed renewable and combined heat and power resources can help meet energy, capacity, distribution and transmission system needs at the lowest cost.
 - Backup service for renewable resources and other distributed generators to ensure that costs and benefits are properly reflected in rates and terms.
 - Ways to remove utilities’ disincentives for accommodating independently owned renewable resources and combined heat and power resources.
 - Standard rates and terms for retail customers to use the distribution system to sell power to other customers and marketers.

²¹ Generally less than 20 MW.

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In addition, the Oregon Public Utility Commission will continue to work with its Portfolio Options Committee, the utilities and third-party providers to improve green power options for Oregonians and increase participation.

7. The Oregon Department of Agriculture will:
 - Assist, jointly with ODOE, in planning and conducting workshops and other educational activities to inform agricultural producers about renewable energy information, technologies, resources, and programs.
 - Assist, jointly with ODOE, agricultural producers in evaluating project feasibility and eligibility for federal energy grants, ODOE tax credits, and other resources for renewable energy projects. Assist growers in applying for these resources as appropriate to the project.
8. The Oregon Department of State Lands will:
 - In close cooperation with agencies such as Fish and Wildlife, Parks, Agriculture, Forestry, Land Conservation and Development, review administrative rules that guide the leasing of state-owned lands to determine whether a one-stop leasing process can be developed for the siting of renewable energy.
 - Consider the importance of renewable energy resources when revising its Asset Management Plan.
9. The Oregon Department of Consumer and Business Services' Building Codes Division will:
 - Provide education and training materials to local governments regarding renewable energy installations.
 - Update its code and standards to reflect the new technologies and developments in renewable energy installations.
10. The Oregon University System and Community Colleges will consider to:
 - Inventory all of the renewable resource and energy efficiency research, development and curricula.
 - Further develop higher education renewable resource research and development capabilities to help Oregon businesses gain a national and international leadership role in this market.
 - Establish and/or maintain educational standards that will produce future leaders in renewable resource systems integration and resource technologies.
 - Actively participate in renewable energy policy development and implementation.
11. The Oregon Solutions team will:
 - Designate renewable resource projects as priority demonstrations.
 - Provide developers with expedited access to state incentives and resources.
 - Facilitate streamlining through the Community Governance System.

6. Resource Specific Actions

Each resource segment, listed in alphabetical order below, briefly identifies the resource and technologies currently being used and lists the main perceived barriers. Actions are listed next.

Biofuels – Biodiesel and Biolubricants

Canola, rape seed, mustard, possibly soy and other crops, along with waste grease from the food service or processing industry, can be refined into oils that can be used as lubricants or converted to biodiesel fuel suitable for use in diesel engines. Many of these feedstocks can be grown in Oregon. Biodiesel can be blended in various ways, but generally comes in B-20 (20 percent biodiesel, 80 percent petroleum diesel) or B-100 (100 percent biodiesel) forms. Currently, suppliers are rapidly developing an Oregon customer base of public and commercial fleets.

The Oregon Department of Administrative Services began buying B-20 exclusively, which amounts to about 200,000 gallons per year. The total amount of B-20 used in 2003 in Oregon was about 700,000 gallons.

There is no market-pull mechanism in place with mandated goals to support a biodiesel production industry in Oregon. There is currently a lack of feedstock. A crushing plant is needed in Oregon to separate oils from crop feedstock. Consumer awareness is low for both biodiesel and biolubricants. Better incentives are needed to facilitate market penetration.

Probably the most important element of an Oregon Biodiesel Strategy - and the most complicated to implement - is the development of a local supply of inexpensive (e.g. mustard seed) feedstock. The key is identification of an oilseed that produces a high value meal product and a generous supply of low-value oil.

Actions:

1. The Renewable Energy Working Group will consider to:
 - Help form partnerships with growers, state agencies and interested investors for building a crushing plant to separate oils from crop feedstock.
 - Assist in the completion of a demonstration project where oil seed crops are grown as a healthy rotational crop, are crushed and refined on-site, and produce all of the farm's fuel.
 - Develop a program to support school districts that use B-20 biodiesel fuel in their entire school bus fleet. The program will include public information on the public health benefits of clean-burning, renewable biodiesel fuel.
 - Support work that focuses on the identification of an oilseed that produces a high value meal product and a generous supply of low-value oil.

2. The Oregon Department Agriculture will:
 - Work with Oregon State University to evaluate and disseminate information on production of bio-fuel crops for conversion to biodiesel and biolubricants.
 - Assist growers assess the feasibility of grower-owned processing facilities, and work with parties interested in biodiesel production on business plan evaluation, plant development and siting, and identifying potential funding sources (in coordination with the Oregon Economic and Community Development Department (OECDD), ODOE, and local communities).
 - Work with OECDD, ODOE and other appropriate entities to identify methods of branding and pump labeling for Oregon produced biodiesel to encourage consumer consumption of locally produced product.

3. The Oregon Department of Energy will:
 - Work with the BPA to evaluate the potential of using biodiesel in electric generators for rural/remote areas where transmission is a problem during peak hours.

4. The Department of Administrative Services will:
 - Manage its fleet fuel use so that it will meet the short and long-term goals for the use of biodiesel.

Biofuels - Ethanol

Ethanol is a renewable fuel currently distilled primarily from corn. In the future, ethanol will be produced from lignocellulosic feedstocks such as wood waste and agricultural residue, which are abundant in Oregon. Throughout North America, ethanol is used as a gasoline additive for a wide variety of purposes, including the reduction of exhaust pollutants that become precursors to ground level ozone. The ethanol content in gasoline can be as high as 15 percent without the need to modify standard engines. Slight modifications to a vehicle's fuel system have to be made to run on E-85 (85 percent ethanol). In Oregon, ethanol is the predominant oxygenate in the gasoline supply. In 2002, up to 60 million gallons of ethanol were used to oxygenate the 1.6 billion gallons of gasoline used by Oregonians. That ethanol, which accounts for up to 4 percent of Oregon's gasoline supply, was produced in the Midwest.

The summer nighttime temperatures in Oregon are not ideal for growing the high sugar corn or hard red wheat preferred by ethanol distillers. There are currently no distillers or refiners located in Oregon. Other Oregon biomass feedstocks such as barley or cellulosic wastes (grass straw or wheat stubble) can be used to make ethanol, but at higher cost.

There is no market-pull mechanism in place with mandated goals to increase the use of ethanol. Consumer awareness is low. Better incentives are needed to make ethanol plants using Oregon grown crops economically viable.

Oregon Renewable Energy Action Plan

Actions:

1. The Renewable Energy Working Group will consider to:
 - Support Oregon university system's research on alcohol fuels produced from cellulosic materials.
 - Continue and enhance efforts to work with the national Governor's Ethanol Coalition.
 - Support policies and actions to promote government and private purchases of hybrid vehicles fueled with E-85.
2. The Oregon Department of Energy will:
 - Continue and enhance efforts to work with the national Governor's Ethanol Coalition.
3. The Department of Agriculture will:
 - Assist growers and cooperatives, in coordination with Oregon State University research and extension programs and agricultural organizations, in the development of biofuel crops for ethanol production, including varietal development, growing and harvesting practices, development of business plans, facilities for processing, siting, market development and promotion.
4. The Department of Forestry will:
 - Assist, jointly with ODOE, the forest products industry to get federal funds for biomass-to-ethanol development through demonstration of cellulose-to-glucose conversion.
5. The Department of Administrative Services will:
 - Make sure that its fleet fuel use will meet the short and long-term goals for the use of ethanol.

Biogas

Biogas facilities produce electricity and heat or steam from waste gas (methane) from landfills, sewage treatment plants and manure. Currently, three landfills tap waste methane gas to generate four megawatts of electricity and provide industrial fuel. In addition, 29 wastewater treatment plants use methane to generate three megawatts of electricity and provide heat for sewage treatment. Electricity is beginning to be generated using manure from dairy cows. For farmers, biogas is mostly a byproduct and other benefits are often the main reason for these projects.

Only the largest cities can afford landfill and waste treatment facility biogas projects. Lack of funding for feasibility studies and lack of fact sheets for best design practices for methane recovery systems have been identified as barriers.

Oregon Renewable Energy Action Plan

Actions:

1. The Oregon Department of Energy will:
 - Identify the major remaining landfill and waste treatment facility sources of biogas and provide up-to-date “best practices” information to the owners of promising sites.²²
 - Support efforts to reach the short-term goal of 5 MW of new biogas-fueled electricity production demonstration projects.

2. The Oregon Department of Agriculture will:
 - Assist livestock operations in assessing best design practices for methane recovery and related technologies.
 - Promote the development of methane production digesters - as economically feasible for producers - through industry association events, OSU Agricultural Extension Service and local economic development.
 - Support efforts to reach the short-term goal of 5 MW of biogas-fueled electricity production demonstration projects.

Biomass

Currently, there are biomass combustion boilers at more than fifty industrial sites in Oregon. These boilers supply heat and energy for industrial processes. The power generated at these facilities was about 108 megawatts in 2001.

New biomass energy markets may provide a way of disposing of otherwise problematic forest biomass residues from timber harvests, stand improvement activities, fuels treatments, and thinning in a cost-effective manner. Agricultural and urban biomass wastes (extracted from municipal solid wastes) can also be utilized as fuel for energy facilities.

The lack of certainty in biomass outputs and the high cost of gathering and transporting forest and other biomass to an energy conversion facility continue to be barriers to economic biomass energy development. However, investments in forest and other biomass conversion to energy will lead to multiple environmental, economic, and social benefits. These include:

- reduced wildfire risks to communities and wildfire suppression costs to taxpayers
- increased timber supplies
- improved forest health, water quality, wildlife habitat, and recreation areas
- reduced air pollution from wildfire and prescribed forest burning smoke
- extended landfill life with recovery of biomass
- reduced and avoided carbon dioxide emissions, and
- maintenance of family-wage jobs and a forest industry infrastructure in rural Oregon.

²² In cooperation with the U.S. EPA's Landfill Methane Outreach Program (LMOP). This is a voluntary assistance and partnership program that promotes the use of landfill gas as a renewable, green energy source.

These benefits are not properly accounted for in the energy market place.

Although electric power is the most widely used end product from biomass, integrated bio-refineries offer another opportunity. These refineries can produce liquid fuels, high-value chemicals and materials, and electric power within the same facility. With proper encouragement, integrated facilities could gasify rather than combust their feed stocks and use the synthetic gas to offset the use of natural gas for power production, while also converting that same synthetic gas to liquid fuels and/or chemicals. Such facilities could also benefit the fuel cell industry, because fuel cells are a viable consumer of these fuels.

Biomass facilities may need a production-based tax credit in addition to the fuel cost reduction incentives to be economically viable. Such combined incentives would be a reflection of the full realm of societal benefits as outlined above.

Actions:

1. The Renewable Energy Working Group will consider to:
 - Help determine whether financial support (such as a per ton transportation incentive) for forest treatment projects is needed to move biomass feedstock from the forest to renewable energy plant sites. Particular attention should be paid to 1) existing facilities for which utility contracts expire, and 2) how the cost of such projects can be spread out over a larger geographic area than the local utility's service territory.
 - Help the formation of partnerships between private companies and consumer owned utilities to develop energy systems for local communities.
 - Support efforts to develop integrated bio-refineries that produce liquid fuels, high-value chemicals and materials, and electric power within the same facility.
 - Encourage the development and utilization of small energy efficient biomass heating and electrical systems for heating and providing power to institutions, state offices, schools, etc., especially in rural Oregon.
 - Help identify and address barriers to securing stable, long-term biomass supplies from federal forestlands.
 - Promote greater public awareness of the primary and secondary benefits of biomass energy production.
 - Support efforts to develop Material Recovery Facilities (MRF) to remove the biomass from municipal solid waste and convert the biomass into fuel.
 - Investigate the feasibility and desirability of a biomass Emission Reduction Credit (ERC) initiative to encourage development of a private market for trading of Biomass ERCs.

2. The Oregon Department of Energy (ODOE) will:
 - Reach out, jointly with the Oregon Department of Forestry (ODF), to local governments and biomass energy developers and assist them in locating potential facility site locations.

3. The Oregon Department of Forestry will:
 - Expand its ongoing, statewide Forest Assessment Project to include a comprehensive assessment of forest biomass supply and demand relationships.
 - Identify federal, state, and private forestlands where proximity and non-timber biomass production potential provide long-term opportunities for biomass recovery for energy generation.
 - Cooperate with biomass energy developers in locating potential facility site locations on Board of Forestry forestlands and, consistent with other management plans for these lands, work to develop expedited leasing processes for such sites.
 - Assist in the development of long-term forest health restoration contracting mechanisms with the USDA Forest Service and USDI Bureau of Land Management to assure affordable and predictable access to forest biomass on federal forestlands in regions surrounding biomass generation sites.
 - Assess, in cooperation with federal agencies, the sustainable level of biomass generation necessary to maintain healthy forests.
 - Promote congressionally approved pilot projects in Oregon where local communities with mature, successful histories of collaboration are empowered to demonstrate their stewardship of federal forestlands.
 - Promote active fuels and vegetation management, along with aggressive fire suppression on public and private forestlands, as key tools to produce biomass for energy generation and to manage forest health.
 - Promote alternatives to prescribed burning through the administration of the Department of Forestry Smoke Management Plan.
 - Monitor, jointly with ODOE, available federal funds for biomass projects and provide this information to stakeholders. Where needed, they will provide assistance with the application process for federal funds.
 - Work with federal agencies to promote forest biomass energy opportunities through administration of the National Fire Plan, the Healthy Forests Restoration Act and the Tribal Forest Protection Act.
 - Facilitate the use of the federal Environmental Quality Incentive Program to provide matching funds for forest fuel reduction projects that will provide feedstock for biomass energy plants.
 - Investigate the benefits of reduced and avoided carbon dioxide emissions from forest fuel reduction projects in conjunction with biomass energy generation.

4. The Oregon Economic and Community Development Department will:
 - Develop, jointly with the ODF, a comprehensive forest sector economic development strategy for Oregon that will encourage continued investment in

forestlands by public and private landowners and that promotes biomass energy production along with timber and non-timber forest products.

- Work with biomass developers to identify siting opportunities especially on sites of retired or abandoned wood processing facilities in rural communities.

5. The Department of State Lands will:

- Cooperate with biomass energy developers in locating potential facility site locations on state lands where it can be accommodating taking into account the Department's Trust obligations and current lease commitments.

6. The Oregon University System and Community Colleges will consider to:

- Research and identify Oregon's potential for bio-refinery industry. Identify opportunities where bio-refineries can produce liquid fuels, high-value chemicals and materials, and electric power within the same facility.

Combined Heat and Power Systems

The combined heat and power (CHP or cogeneration) form of distributed generation is about twice as energy efficient, and produces fewer pollutants than producing heat and power separately.²³ These systems capture the waste heat produced during generation for industrial processes or for heating and cooling. Although CHP systems typically use fossil fuels, they can also use renewable energy resources, which include wood residues hogged fuel, spent pulping liquor, food processing/agriculture anaerobic digester gases and waste byproducts, wastewater gas and other manufacturing byproducts. Due to these benefits, three states²⁴ have legally recognized waste heat recovery, regardless of primary fuel source, as a renewable resource eligible to satisfy renewable portfolio standards.

CHP sited at strategic locations also has the ability to provide reliability and power quality benefits through reduced strain and congestion of the transmission system, as well as through voltage support at the 'end of the line' in a transmission or distribution system.

Recovering waste heat does not require any burning of additional fuels. Some of the benefits of this technology are:

- Minimal environmental impact, as they are located on existing industrial sites.
- Low operating and maintenance requirements.
- Base load generation.

²³ Traditional power plants waste up to two-thirds of the fuel's energy value before it reaches customers, most of it waste heat. However, new power plants are nearly 50% efficient.

²⁴ Nevada, North Dakota and South Dakota.

The current CHP resource in Oregon consists of 41 projects in Oregon with 818 megawatts of electric generation capacity.²⁵ Natural gas turbines comprise 15 of these CHP projects for 540 megawatts of capacity. The other 26 projects account for 278 megawatts and use renewable resource fuels such as wood residue (hogged fuel), spent pulping liquor²⁶ and wastewater gas. It is estimated that there is very cost-effective potential for upwards of 1,000 megawatts of new CHP resource in Oregon.

Actions:

1. The Renewable Energy Working Group will consider to:
 - Work with state agencies and others to give waste heat the same status as renewable energy in state legislation, rules and miscellaneous programs or projects that benefit renewable energy resources.

Fuel Cells

Fuel cell technology can play an important role in Oregon's renewable energy future. Fuel cell fuel reformers are able to combine water with renewable fuels including bio-methanol, biodiesel, biogas and ethanol to produce hydrogen. The renewable hydrogen can then be used in a fuel cell stack where it is converted to electricity, or the hydrogen can be used directly in commercial or industrial applications.

Oregon commercial and industrial sectors use approximately 30 million cubic feet of hydrogen per year. All hydrogen is imported since there are no commercial hydrogen generation plants in Oregon. If hydrogen used in Oregon were generated in Oregon using renewable resources, new jobs could be created.

In the short run, most fuel cells are expected to use non-renewable fuels. However, a goal of this Plan is to foster increasing use of renewable fuels as technologies become feasible.

Actions

1. The Renewable Energy Working Group will consider to:
 - Support Oregon companies in attracting funding from regionally targeted federal fuel cell and hydrogen generation programs including regional US Department of Energy and US Environmental Protection Agency (EPA) programs.
 - Encourage the Oregon University System to explore fuel cell technology and to establish a fuel cell technology center.

²⁵ Those systems range in size from 30 kilowatts at a commercial office to over 100 megawatts at a pulp and paper plant. In almost every case, the systems operate to generate electricity and thermal energy primarily for onsite use. Only a few of the largest facilities sell electricity on the market. Not all of them operate at all times.

²⁶ In chemical pulping the lignin in the wood is dissolved in a digester where the wood chips are cooked. The fibres are separated from the spent pulping liquor (so-called black liquor). The black liquor is first concentrated, and subsequently incinerated in so-called recovery boilers.

- Support a revision of the federal tax credit language for renewable fuels to include off-road and stationary uses instead of exclusively supporting transportation applications.
- Support and highlight one or more demonstration projects that generate electricity using Oregon-made fuels with energy technologies engineered and manufactured in Oregon.

2. The Oregon Department of Energy will:

- Modify its Web site and publications to identify more clearly how a fuel cell owner can apply for tax credits and to describe how the owner is using those tax credits.

Geothermal

Most areas of high heat flow are in the Cascades, central Oregon, southeast Oregon and parts of northeast Oregon. These are the locations where geothermal resources are most likely to be found. Geothermal resources include high-temperature (100 degrees C and above) for electricity generation, intermediate temperature (100 – 50 degrees C) for industrial, agricultural and municipal applications and low-temperature heat pump applications. The Oregon Department of Geology and Mineral Industries (DOGAMI) has geothermal resource maps available to the public showing both regional and site-specific information.

Currently, about 1,800 ground-source heat pumps provide space and water heating for Oregon homes. The City of Klamath Falls uses geothermal energy for a district heating system, which represents only a small portion of the direct geothermal use in the area. Geothermal sources elsewhere in Oregon supply heat for buildings, swimming pools, resorts and industrial uses. All of these applications fall into the “direct use” category.

Geothermal electric generation could provide important renewable *base load* generation. Furthermore, geothermal electricity production on federal lands requires that a resource production royalty be paid to the federal government. In Oregon, half of the royalty payment would be paid to the state, and the state is obligated to pass at least 50 percent onto the county where the electricity was produced.

Since 1975, geothermal exploration and development in Oregon has been facilitated by a successful collaboration between state and federal agencies (DOGAMI, Bureau of Land Management and the US Forest Service). Memoranda of Understanding have been useful tools and these agencies anticipate continuing this association in the future. Numerous projects - heat flow and exploratory drill holes throughout the state and the Newberry Project in central Oregon- have obtained useful results.

Geothermal experts at the state and federal level and in private industry continue to consider the area on the flanks of Newberry Volcano, outside the Newberry National Volcanic Monument, to be one of the best prospects for high-temperature geothermal electricity production in the Pacific Northwest. To date, limited exploration drilling has measured temperatures up to 315 degrees C (600 degrees F).

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The main barrier for development of geothermal electricity generation in Oregon is its above-market cost. Financial incentives similar to those for wind (about 1.5 to 2 cents per kWh) were not available for geothermal until the extension of the federal production tax credit took place in October 2004. When power sales contracts are anticipated or awarded, the geothermal industry will likely respond with building a 20 MW or larger demonstration plant. Furthermore, an important round of exploration and assessment in Oregon will likely be undertaken.

Actions to promote direct use:

1. The Oregon Department of Energy will:
 - Work with the GeoHeat Center in Klamath Falls and others to help establish training for heating, ventilation and air-conditioning (HVAC) contractors on the benefits of earth-coupled heat pumps and help develop a statewide promotion strategy.
 - Work with the GeoHeat Center and others to highlight demonstrations of homes, businesses and public buildings such as schools and correctional facilities using direct geothermal energy in the community.
2. The Oregon Department of Geology and Mineral Industries, in cooperation with the Departments of Energy, Forestry, and State Lands, will:
 - Work with the GeoHeat Center and others to provide copies of existing maps detailing the geothermal resource potential of Oregon and incorporate additional information into the data base as new information becomes available.
 - Periodically publish updated geothermal resource maps of Oregon as additional data availability and demand require.
3. The Oregon Department of Agriculture will:
 - Collaborate with ODOE and agricultural producers in identifying new and expanded uses for geothermal application in agricultural operations, and expand implementation through education, pilot projects, and existing incentive programs.

Actions to promote generation of electricity:

1. The Renewable Energy Working Group will consider to:
 - Work with the federal government and others to provide a forgivable loan or grant program for drilling exploratory holes.
 - Work with the Energy Trust, the utilities, BPA and others to expedite a Power Purchase Agreement with added incentives based on above-market costs for a 20 MW or larger demonstration project.

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- Review the royalty and tax implications of geothermal production facilities and explore funding means to help promote geothermal development.²⁷
 - Help develop a partnership plan between state and federal agencies for further development of projects on federal land or involving federal leases.
2. The Oregon Department of Geology and Mineral Industries will:
- Sample and analyze waters from wells and springs throughout the state to develop a statewide data base useful to the geothermal industry, to state and federal agencies and research institutions as a valuable component in geothermal resource target evaluation in Oregon, provided funding can be obtained.²⁸
3. The Oregon Department of Energy will:
- Continue the collaboration with the Pacific Northwest Section of the Geothermal Resources Council regarding geothermal resources within Oregon.
 - Coordinate the Oregon Geothermal Working Group, which is part of USDOE's "Geo-Powering the West" program.
4. The Oregon Department of State Lands will:
- Review and, if necessary, revise its administrative rules governing the exploration for and leasing of geothermal resources to ensure that they are easily understood and usable by persons wanting to conduct these activities on lands administered by the agency.

Hydroelectric Generation

Currently, hydropower meets about 44 percent of Oregon's electricity demands. In comparison, "new" hydro would be a small player in any likely renewable-generation growth scenario. It focuses primarily on the potential to develop micro-hydro (or "seasonal" hydro) in association with numerous irrigation piping canals. Run-of-the-river technology could also make a contribution throughout many areas of rural Oregon. There are often minimal environmental consequences of adding hydroelectric facilities on existing dams and reservoirs, as the majority of the environmental implications are already in place at the time of original dam construction. Several projects, generally ranging from under 1 MW to 12 MW, are currently in the planning and permitting stages on reservoir facilities throughout the state. Oregon has significant experience designing, financing, installing and operating these optimized water use systems.

²⁷ Geothermal electricity production on federal land requires that a royalty be paid. In Oregon, half of the royalty payment would be paid to the state, and the state is obligated to pass at least 50% onto the county where the electricity was produced.

²⁸ This has been done in Nevada with positive results. Funding support will be sought from a number of sources, including the state and US DOE grants

Actions:

1. The Renewable Energy Working Group will consider to:
 - Work with state agencies and interested stakeholders to explore the feasibility of multi-purpose upstream small storage facilities for use in micro-hydro projects in the context of ORS 536.238's "environmentally and financially feasible storage."
 - Seek funding to defray costs of water rights permitting for micro-hydro projects.
 - Identify and support generation efficiency improvements, such as those performed by the utilities, as hydro facilities come up for Federal Energy Regulatory Commission re-licensing and State of Oregon reauthorization. Support maximum generation efficiency for new projects in Oregon, while safeguarding the environment.
 - Continue to support the state's policy of re-authorizing hydroelectric projects and the development of new hydroelectric facilities on existing dams and reservoirs that are found to be in the public interest if they balance the region's generation needs with the enhancement or maintenance of the natural resources of the state.
 - Assist irrigation and water service districts as they identify sites in Oregon where untapped micro-hydro could be developed using irrigation piping channels.
 - Help develop irrigation canal systems that use pipes to reduce evaporation and percolation losses, concentrate water pressure which reduces irrigation pumping energy use, and provides sites for hydroelectric generation.
 - Help complete an environmentally enhancing hydroelectric demonstration project case study that involves multi-agency analysis and collaboration.

2. The Oregon Water Resources Department (OWRD) will:
 - Work with state agencies and interested stakeholders to develop recommendations to streamline rules and application procedures for micro-hydro projects. This will include an examination of the very small micro-hydro systems for net metering and off-grid personal use.
 - Continue to develop and enhance the coordination of micro-hydro projects consistent with state policies.
 - Identify micro-hydro resources and make them available to the public on OWRD's Web site.
 - Prepare and disseminate a "Guide to Micro-Hydro Permitting in Oregon."

3. The Oregon Department of State Lands will:
 - Revise its administrative rules governing the authorization of hydroelectric projects on state-owned waterways. The goals of this review will be to develop administrative rules that are easily understood and usable by people who currently have, or want to place such facilities on state-owned waterways. At the same time, ensure that the Common School Fund receives an appropriate amount of revenue from the use of these lands in this manner.

Ocean Energy

Generation of electricity through conversion of ocean current, swell, wave action, tidal, or thermal gradients is being successfully demonstrated. Most promising applications are offshore use of the consistent rise and fall of swells along deep-water shorelines where there is significant year-round wave action. Wave power densities in Oregon are estimated to be capable of producing between 5 and 15 megawatts per mile of coastline.

The technology is available now to construct a sizeable wave farm. Economics are likely to be in the \$3,000/kW range for smaller than 10 MW offshore systems, falling to around \$1,000/kW for a 200 MW system. Power price is in the range of 10 cents/kWh for small systems, falling to a projected 3-5 cents /kWh for the larger systems. This lower number would be competitive with current base load generation.

Currently the United Kingdom has a vibrant program of wave, ocean, and marine/tidal technologies being supported through government support. The Electric Power Research Institute (EPRI) recently began studies to build six demonstration projects in six states, including Oregon and Washington. EPRI wants to build a 500 kW demonstration project off the Oregon coast within a 2-4 year time horizon.²⁹

Actions:

1. The Renewable Energy Working Group will consider to:
 - Encourage the ongoing ocean energy research at Oregon State University to include technology cost reduction, improvement in efficiency and reliability, identification of sites, interconnection with the utility grid, and study of the impacts of the technology on marine life and the shoreline.
 - Coordinate efforts to attract one of EPRI's 500 kW demonstration projects to the Oregon coast by 2006.

Solar

Solar energy is a large untapped natural resource. Solar energy is available throughout Oregon creating job opportunities in virtually every district. Oregon's solar resources are significant with two-thirds of Oregon receiving as much or more than Florida. Solar energy can provide space heating, hot water and electricity. Solar electricity will primarily be produced with photovoltaic cells for distributed systems. For central facilities in the 100 MW range, solar thermal electric facilities may be the preferred option. Designing buildings to make the most of sunlight for lighting also can reduce energy needs. South-facing windows with overhangs to prevent overheating in summer and heat storage materials add little to the cost of a new building. Solar water heating can supply about half of the hot water for a typical Oregon home. Currently, residents have installed more than 17,000 solar water heating systems in the last 20 years. There are more than 250 solar electric systems in the state.

²⁹ At the end of 4 years, the pilot project will have generated enough data to begin determining commercial feasibility.

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Actions

1. The Oregon Economic and Community Development Department, with assistance from ODOE, will:
 - Stimulate the development of an Oregon inverter-manufacturing sector.
 - Work to attract a photovoltaic manufacturer with existing financing and tax incentives.
2. The Oregon Department of Energy (ODOE) will:
 - Demonstrate high performance energy homes that use advanced design to reduce energy demand, passive solar for space heating, active solar water heating and photovoltaic systems to produce as much or more electric energy than the home uses on an annual basis.
 - Continue to make sure that solar water heating, solar electric systems, and passive design features are considered in all new public buildings. Including simple things like orientation and making the building roof suitable for photovoltaic panels will reduce costs of installation when panel prices decline enough and electrical prices climb (i.e. plan for the future).
3. The Oregon Department of Agriculture will:
 - Collaborate with ODOE and agricultural producers in identifying new and expanded uses for solar application in agricultural operations, and expand implementation through education, pilot projects, and existing incentive programs.

Wind

Large wind farms are currently operating in Oregon with a total capacity of 259 MW, the largest of which is Stateline with 120 MW. Several of these existing wind farms are planning expansions and new plants are in the planning phase as well. Utilities have incorporated wind energy in their resource plans. The feasibility of smaller wind farms (of up to about 10 MW) owned by local communities and landowners is being investigated at several locations. Net metering is available for systems of 25 kW and smaller.

Transmission capacity between eastern and western Oregon is the main to further large-scale development of wind. Currently, all wind farms need a production based tax credit (or similar financial incentive), but this may not be needed in the future given the price trend of natural gas and the efficiency of larger turbines. Smaller project economics are more challenging due to the higher cost of installing small numbers of utility-scale wind turbines. Transmission issues are often barriers for this kind of developments as well. The lack of long-term wind speed data from different parts of the region (other than the eastern Columbia River area) impairs the marketability and development of wind.³⁰

³⁰ Data are needed by utilities to lower their risk, by network operators to solve their integration problems, and by developers who will go where the good long term data sites are and who need long term data for financing. Regional energy costs can be lowered by the availability of an extensive database.

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Actions:

1. The Renewable Energy Working Group will consider to:
 - Work with BPA to use the federal hydropower system and BPA's new wind integration services to reduce the cost of energy to customers.
 - Help develop a project to collect wind characteristics data at ten sites throughout the state, and make them publicly available, to help community and locally owned wind farm developments as well as large-scale wind farm development and wind energy integration with the grid, if funds become available. Oregon State University would manage such a program.
 - Work with BPA and others to expand the anemometer loan program that is currently offered by the Energy Trust.

2. The Oregon Department of Energy will:
 - Continue to coordinate technical and financial assistance for community and farmer-owned wind farm demonstration projects.
 - Continue to coordinate the Oregon Wind Working Group, as part of the US Department of Energy's Wind Powering America Program with the primary focus to promote small-sized wind farms to agricultural communities.

3. The Oregon Department of Forestry will:
 - Cooperate with wind energy developers and community leaders in locating potential facility site locations on Board of Forestry forestlands and state lands.
 - Work to develop expedited leasing processes for such sites, consistent with other management plans for these lands.

4. The Oregon Department of State Lands will:
 - Continue to look for opportunities on state lands administered by the agency for the placement of wind farms. Additionally, the agency will cooperate with wind energy developers and community leaders in locating facility sites while meeting its Trust and current lease obligations.

5. The Oregon Military Department will:
 - Perform a feasibility study of installing wind turbines on or near its military properties throughout the state.