State of Oregon
Oregon Department of Energy

2013-2015 Biennial Energy Plan

Oregon's population will continue to increase. A growing population translates directly to greater energy use. That growing demand will increase the role of energy conservation and efficiency and require the siting of new energy resources.

OREGON DEPARTMENT OF ENERGY

2013-2015
State of Oregon
Energy Plan

Oregon Department of Energy
625 Marion St. NE
Salem, OR 97301
503-378-4040 or toll-free in Oregon 1-800-221-8035
Hermiston Field Office
541-567-3840
www.oregon.gov/energy

Table of Contents

INTRODUCTION 4

OVERVIEW OF 2011-2012 6

ENERGY SUPPLY AND DEMAND 14

OREGON'S ENERGY PRIORITIES 33

REDUCING ENERGY COSTS 39

Appendix A – Energy Glossary 46

Appendix B – Energy Legislation 52

Appendix C – Success Stories 59

Appendix D – Government to Government 61

Appendix E – Oregon Electric Utilities 63

Appendix F– Carbon Reduction Efforts 64

Appendix G – Power Plants in Oregon 66

INTRODUCTION

Oregonians spend about $13 billion annually on energy; most of that money leaves the state. The mission of the Oregon Department of Energy is to reduce the long-term costs of energy—including environmental and public health.

The Oregon Department of Energy was established in 1975 to:

- Provide leadership on energy conservation, renewable energy and protection of the Columbia River from radioactive waste at Hanford
- Engage in energy planning and siting of energy facilities
- Promote conservation and renewable energy projects through a variety of programs
- Research emerging energy technologies
- Provide educational and technical assistance to industry professionals and the public

The mission of the Oregon Department of Energy is to reduce the long-term costs of energy—including environmental and public health.

Decisions made by the agency directly and indirectly affect the social, economic and environmental aspects of energy.

Oregon's population will continue to increase. A growing population translates directly to greater energy use. That growing demand will increase the role of energy conservation and efficiency and require the siting of new energy resources.

Energy conservation is the cornerstone of Oregon energy policy. Through its divisions, the Oregon Department of Energy works together to reduce all the long-term costs of energy, including the expense of cleaning up the Hanford Nuclear site. Other efforts include streamlining the energy facility siting process, designing incentives to stimulate energy efficiency, and implementing energy policies passed by the legislature such as the State Energy Efficient Design program.

When it created the Oregon Department of Energy, the legislature noted that “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.”

This plan will:

- Provide an overview of the last few years
- Highlight Oregon’s energy supply and consumption
- Look at Oregon’s energy priorities
- Show how long-term energy costs have been reduced

The Roles of the Oregon Department of Energy

1. **Energy Leadership**

   - Maximize energy efficiency from core programs and technical assistance. Analyze renewable resources to understand their technical feasibility as well as social, economic and environmental issues.
   - Support businesses and communities through administration of statutory programs and significant policies.

2. **Planning and Policy**

   - Identify market obstacles and opportunities through planning, research and analysis of energy policy, exploration of energy technologies and project development.
   - Centralize energy expertise and information, sharing it with state, regional and national organizations to ensure Oregon remains competitive and is viewed as cutting edge.

3. **Program Implementation and Technical Assistance**

   - Deliver more money to the classroom by increasing the efficiency in K-12 public schools. Through partnerships with utilities and non-profits, the agency conducts outreach to school districts about the Cool Schools program.
   - Efficiently and effectively provide services to Oregonians by leveraging a variety of funds.

4. **Emerging Technologies and Innovative Practices**

   - Identify and address technological, informational, cost or other barriers to the adoption of selected high-promise technologies.
   - Partner with others to effectively demonstrate technologies, practices and applications that can be readily replicated.

5. **Education, Outreach and Stakeholder Involvement**

   - Provide basic education and raise awareness of key or strategic energy issues. Develop and maintain a comprehensive overview of statewide energy information, programs, activities and results.
   - Form and maintain partnerships to inform Oregonians about the importance, value and role of energy in their lives.

Overview of 2011-2012

Energy Efficient Schools

The passage of SB 1149 (1999) by the Oregon legislature created the three percent public purpose charge, first assessed in 2002 on PGE and Pacific Power customers. School districts in the service territory of these utilities receive 10 percent of these funds (about $7.5 million annually), which may be used to conduct energy audits or implement energy efficiency measures such as lighting, insulation, or heating system retrofits. This Energy Efficient Schools program covers about 393,000 students in 835 K-12 public schools. Program results to date include more than 1,616 energy audits conducted and 2,311 energy efficiency measures installed.

Schools are very budget-constrained and face challenges in keeping aging facilities operating. Energy efficiency retrofits save energy, the second highest operating expense for most districts. Less money spent on utility bills translates to more money available for teacher salaries and other expenses.

The Oregon legislature passed the Cool Schools initiative as HB 2960 (2011). This four-year-pilot is designed to expand technical and business services for K-12 public schools, giving them greater access to energy expertise as they plan for energy efficiency upgrades. The Oregon Department of Energy provides:

- Energy efficiency project analysis and implementation
- Business and financial consulting
- Connections with local vendors
- Access to incentives, rebates, grants and more

The Cool Schools initiative was broken into phases, combining it with the ongoing Energy Efficient Schools program. Cool Schools Phase 1 signed up 28 school districts, leading to energy efficiency projects in 28 buildings. Eight districts took out loans through the Small-scale Energy Loan Program. Total project costs in Phase 1 were $5,512,606 and SELP loaned $4,819,676. Phase 2 of Cool Schools saw 27 school districts participate, covering 60 buildings. Ten of those 27 districts took out $4,944,525 in SELP loans to help cover $14,933,183 in project costs. Phase 3 is underway.

Oregon Department of Energy staff has supported schools many ways, including:

- Energy audit reviews, site visits to schools and consultation with district officials
- Establishing qualification standards for audit and commissioning firms
- Tracking school energy usage and project implementation

Small-scale Energy Loan Program

In 1979, the Oregon legislature created the Small-scale Energy Loan Program. In 1980, voters approved an amendment to the Oregon Constitution authorizing sale of general obligation bonds to finance small scale, local energy projects. SELP made its first loan in 1981.

SELP's purpose is to promote energy conservation and renewable energy resource development. Renewable resources include solar, geothermal, biomass, hydro, wind, and waste heat. SELP also can fund projects that use alternative fuels. The Small-scale Energy Loan Program serves individuals, businesses, nonprofit organizations, Oregon state government agencies and local government municipalities, schools, tribes, and agencies of the federal government.

The Small-scale Energy Loan Program issues three types of bonds:

- Governmental Purpose, for energy projects in publicly owned and operated facilities.
- Private Activity, for projects that use renewable resources to produce energy or for energy projects for non-profit organizations.
- Federally Taxable, for energy-saving projects in homes and businesses.

Loan due diligence includes such things as:

- Borrowers undergoing technical and business reviews.
- The Small-scale Energy Loan Program being in first position on the loan.
- The borrower meeting benchmarks before any money is released.
- Large loans coming with loan guarantees, such as from USDA or USDOE.

As of Dec. 31, 2012, the Small-scale Energy Loan Program has disbursed 861 loans totaling $581 million. These projects save or produce substantial energy savings each year. Between Jan. 1, 2011 and Dec. 31, 2012, SELP made 30 loans totaling $60.5 million. There are currently 217 loans open for $243 million. Small-scale Energy Loan Program savings equal enough energy to meet the needs of about 65,534 Oregon homes.

Below are examples of projects financed during that period.

School Loans

SELP loaned $10 million to 17 school districts in more than a dozen counties throughout the state as part of the Cool Schools initiative. The initiatives' goal is to install cost-saving energy measures and controls that allow students to be cool in the summer and warm in the winter thereby improving their learning environment. The resultant energy savings from installed measures reduce the overall cost of the improvements to the school districts.

Corbett was one of eight school districts in the state that signed up in the fall of 2011 for Phase 1 of Cool Schools. Five district buildings in Corbett will benefit from a new boiler and a new control system that will allow building managers to adjust the heating remotely. The Corbett School District took out a SELP loan to help pay for the $679,937 project. Energy savings during the life of the loan are estimated at $20,000 each year.

The Klamath County School District is looking forward to a minimum annual energy-savings of $214,000 and that's only between two schools: Bonanza School (grades K-12) expects a savings of $143,000 a year and Lost River (grades 7-12) expects an annual savings of $71,000. These savings are what the district anticipates from current energy projects, funded through the Cool Schools program.

Colleges

SELP loans supported the following Oregon university system projects:

- Oregon University System – $23.7 million for deferred maintenance and energy projects.
- University of Oregon – $11.3 million for energy efficiency retrofits at Fenton Hall and for the cogeneration turbine at the Central Power Station.
- Eastern Oregon University – $2.7 million related to critical energy efficiency upgrades to Zabel Hall.
- Southern Oregon University – $2.7 million for upgrades to energy systems at Churchill Hall.
- Oregon State University – $6.8 million for energy system upgrades to Strand Ag Hall.

The Small-scale Energy Loan Program loaned the University of Oregon $8.2 million for its central power station cogeneration project. The new plant will allow them to generate and distribute enough electricity to meet most of the campus' load on a daily basis. With this combined cycle cogeneration turbine, the U of O can reclaim and redirect waste heat to provide for the university's steam needs for heating, sterilizing, cooking and hot water, and do it with greatly reduced emissions.

Many campus building renovations are being built to Leadership in Energy and Environmental Design (LEED) certification standards. In addition, the deferred maintenance retrofit projects undergo a review by the State Energy Efficiency Design program. SEED ensures that all new and renovated public buildings include cost-effective energy conservation measures and construction exceeds Oregon building code energy conservation standards by at least 20 percent, saving the state millions of dollars in energy costs.

Private Sector Loans

During 2011-2012 SELP loaned more than $2.1 million for energy conservation projects. These loans were for energy efficiency upgrades to heating and cooling systems, upgraded lighting and conversion of steam heat to electric heat. These upgrades provide added benefits of improved comfort and reduced utility costs for the occupants and reduced facility maintenance and increased property value for the building owners.

SELP also disbursed loans for renewable energy projects, including a commercial solar array in Jackson County and a 3-megawatt wind farm in Baker County.

In 2013 the program will:

- Put more funding into the K-12 Energy Efficient Schools program and increase money-saving installations in every corner of Oregon.
- Use public-private partnerships to build energy efficiency into publicly owned structures, lowering energy costs for the state, counties, cities and taxpayers.

American Recovery and Reinvestment Act Concludes

Congress enacted and the President signed federal stimulus legislation in February 2009 to help jump-start the economy. The Oregon Department of Energy received four ARRA awards to pass-through during the 2009-11 biennium totaling approximately $56 million:

- $42.1 million through the State Energy Plan, to improve energy efficiency in private and public buildings (K-12 schools, colleges, universities, governments) plus transportation and industry.
- $9.5 million in Energy Efficiency and Conservation Block Grant formula. Federal criteria required that at least 60 percent of the funds the state received be distributed to the smaller cities and counties ineligible for a direct allocation under this program. Two major projects were also funded: a biomass boiler project with energy efficiency upgrades and a feedstock study at a Vernonia school; and a solar project in Christmas Valley at a military complex.
- $3.6 million through the State Energy Efficient Appliance Rebate Program, which provided eligible low-income Oregon homeowners with a 70 percent instant rebate (up to $2,000) for energy-efficient ENERGY STAR heating systems, water heaters, refrigerators, dishwashers and clothes washers. ODOE partnered with the Oregon Department of Housing and Community Services to replace and recycle approximately 1,800 nonfunctioning or low-efficiency furnaces and heat pumps and other appliances across the state for eligible low-income households.
- $547,749 in Energy Assurance Grants to leverage the combined capabilities of the Oregon Department of Energy, Oregon Public Utility Commission and the Oregon Department of Geology and Mineral Industries to identify opportunities to improve energy resilience through the design and integration of distributed renewable energy investments into the existing energy network.

Business Energy Tax Credit Program Ends

The Business Energy Tax Credit, called the longest-running tax incentive program in the country, helped schools, tribes, nonprofits, businesses, industries, farms and ranches save energy and invest in renewable energy. From 1979 to the end in 2012, BETC:

- Received 34,539 applications
- Processed 31,141 preliminary certificates
- Awarded 24,635 final certificates for $3.1 billion in certified project costs

Perhaps the largest expansion of the program came in 2001 when the pass-through option was opened to non-profits, public entities, tribes and others. Until that time, those groups could not use the Business Energy Tax Credit program because they had no tax liability.

Business Energy Tax Credit Chronology

1979	The Business Energy Tax Credit program becomes law. This credit is an incentive for Oregon businesses to invest in energy conservation, renewable energy resources, rental weatherization and less-polluting transportation fuels.
1985	The "pass-through" option begins when the legislature approves allowing investor-owned utilities assume tax credits for rental housing projects in return for a cash payment incentive to the rental housing owners. The idea is to stimulate more rental housing energy conservation projects, which were infrequent during the early 80s.
1989	The legislature approves an expansion of the utility pass-through to commercial and industrial projects. The conclusion was the market needed stimulation to initiate energy conservation projects.
1999	The legislature eliminates the program limit of $40 million in tax credits and raises the cap for individual projects from $2 million to $10 million per project.
2001	The BETC Pass-through Option Program expands when the legislature allows nonprofit organizations and public entities without tax liability to participate in BETC.
2007	The Business Energy Tax Credit increases from 35 percent to 50 percent for renewable energy projects and adds tax credits for renewable energy resource equipment manufacturing facilities and homebuilders of high performance homes. The legislature also increases the limit for renewable energy facilities, renewable energy resource equipment manufacturing facilities and high efficiency combined heat and power projects to $20 million (all other projects have a $10 million cap per project).
2008	A special February session of Oregon legislature increases the maximum amount of BETC for renewable energy resource equipment manufacturing facility to $40 million per facility; the law also requires due diligence and performance contracts.
2009	House Bill 2180 directs the Oregon Department of Energy, in consultation with the Public Utility Commission and the Business Development Department, to prepare a financial analysis of representative energy projects receiving the Business Energy Tax Credit (BETC). The purpose of the analysis is to identify the economic benefits and costs of the BETC program.
2010	House Bill 3680 extends the renewable energy manufacturing BETC to a sunset date of Jan. 1, 2014. BETC for all other projects sunsets on July 1, 2012. There is a $300 million cap for preliminary certifications of all renewable resource projects for the biennium ending June 30, 2011. The tax credit for a wind projects over 10 MW is also reduced. The bill also imposes a tier system with criteria for awarding preliminary certifications for renewable resource projects.
2011	House Bill 3672 from 2011 replaced the Business Energy Tax Credit program with three separate credits: a conservation credit, a renewable energy contribution credit and grant program, and a transportation credit.
2012	HB 4079 made technical clarifications to the new energy tax credit programs. December ends the BETC.

Energy Incentives Program Begins

The 2011 legislature passed HB 3672, which ended the Business Energy Tax Credit program and replaced it with the energy incentives program for businesses. The legislation created three separate incentives--a renewable energy grant program, a conservation tax credit and a transportation tax credit.

The Energy Incentives Program resulted from the merger of Business Energy, Residential Energy and Biomass Producer/Collector Tax Credit programs. This merger was to leverage the expertise across the tax credit programs and allow for more efficiency in processing work.

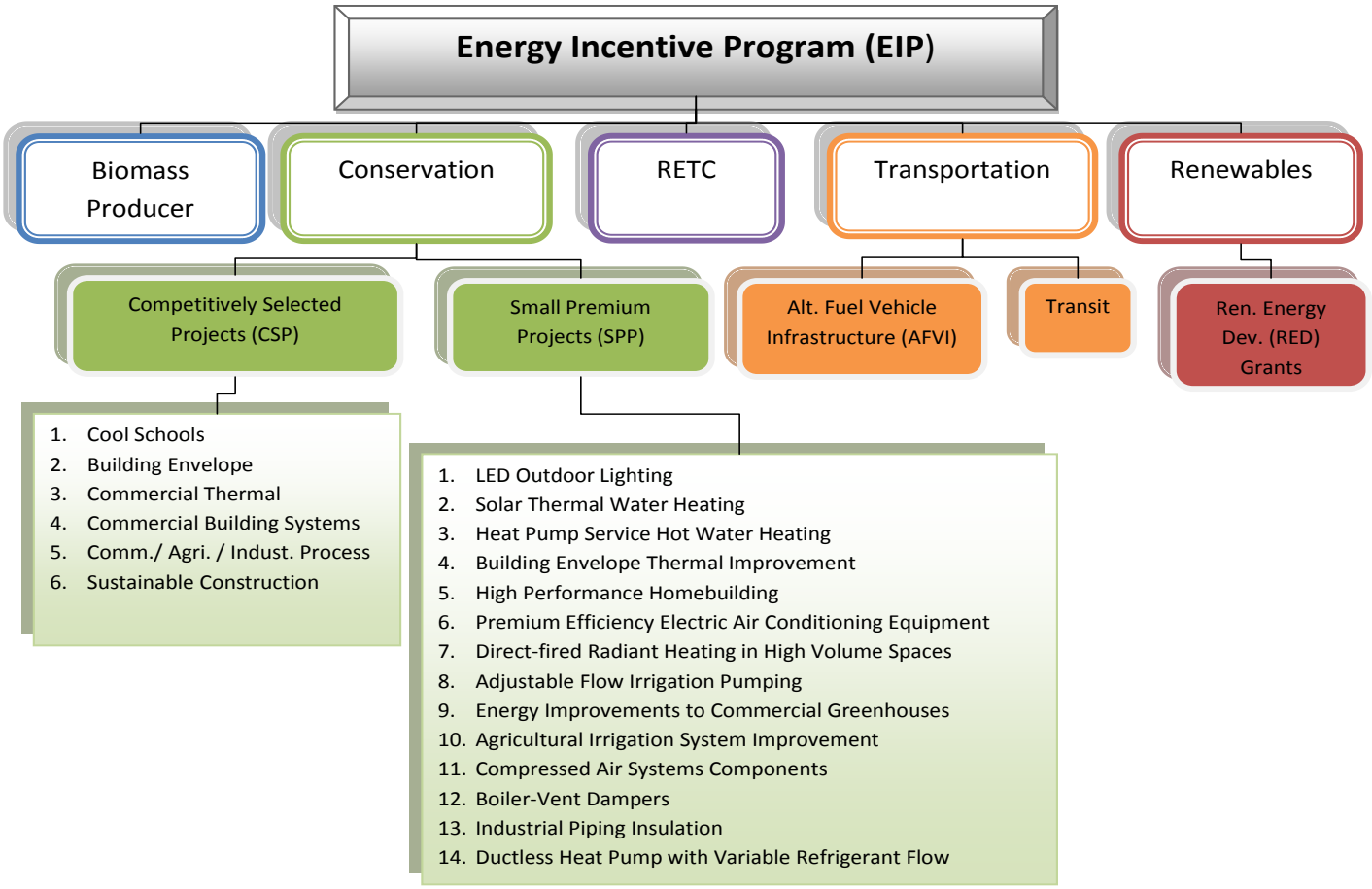


Figure 1: An illustration of the increased complexity of the new Energy Incentives Program

The structure above shows the new program's components, including the capped incentives that replaced the Business Energy Tax Credit. Despite the caps, the new program has levels of complexity that did not exist before. Not only are there caps for conservation, transportation and renewable projects, but each type of incentive has its own handling needs to accommodate the statutory mandate of having projects compete.

Opportunity	Distribution Method	Notes
Conservation – Small Premium Projects	First in, first out	Part of $28 million cap Projects under $20 K in project cost, prescriptive
Conservation – Commercial Building	Competitive	Part of $28 million cap
Conservation – Commercial, Agricultural and Industrial Processes	Competitive	Part of $28 million cap
Conservation – Cool Schools	Competitive	Part of $28 million cap; one time offering
Conservation – Thermal	Competitive	Part of $28 million cap
Conservation – Sustainable Building	Competitive	Part of $28 million cap
Conservation – Building Envelope	Competitive	Part of $28 million cap
Transportation – Transit	Allocation of credits among projects based on formula	Part of $20 million cap
Transportation – Alternative Fuel Vehicle Infrastructure	First in, first out	Part of $20 million cap
Renewable Energy Development Grants	Competitive	Amount available depends on Department of Revenue auction; capped at $3 million per biennium

Figure 2: The various components of the new Energy Incentives Program that replaced the Business Energy Tax Credit.

To date, ODOE has received 257 informational filings from project owners using the small premium project path and has issued 34 final tax credits. Most of the projects are for building envelope improvements, such as new windows, improved insulation and other such measures.

In addition, other project owners have used this process as well. Examples include:

- Persephone Farms, which is an organic farm in Lebanon. Persephone Farms installed a solar thermal water heating system for use in the worker kitchen and shower, and received a tax credit for this project.
- Jackson's Food Stores used the program to install LED outdoor lighting at its Corvallis, Springfield and Eugene stores, which replaced its metal halide and high pressure sodium fixtures.
- Rentals that installed ductless heat pumps with variable refrigerant flow to improve heating and cooling capability.

Other projects that have competed and received preliminary certification for projects include:

- A cold storage facility in Eugene that is retrofitting existing metal halide and high pressure sodium lights with LED and fluorescent fixtures with occupancy sensors. This project, when complete, is expected to save about $15,000 per year in electricity.

- An apartment building in Portland is installing two Electric Vehicle charging stations that will provide charging for four vehicles in the parking area of a new transit-oriented mixed use development. This installation, if used to capacity, is expected to displace about 1,300 gallons of gasoline usage each year.

- A Eugene-based fueling company is installing a fast-fill Compressed Natural Gas facility in Eugene. This is a CNG fueling station that will be open to the public and one of the first in the Eugene/Springfield area. Once open, the owner anticipates displacing 40,000 diesel gallon equivalents the first year, about 80,000 diesel gallon equivalents the second year and 175,000 diesel gallon equivalents the third year.

- A Woodburn company is installing four energy-efficiency measures and an ammonia refrigeration control system at a meat processing facility. The energy efficiency measures include installation of variable frequency drives on cold storage evaporator coils, variable frequency drives on air handling units, and a solenoid valve run time defrost clock. All of the measures will be controlled by the control system to allow greater efficiency and easier operation. The project is estimated to save 953,345 kWh per year.

- A Beaverton jewelry store is replacing case lighting with LED lighting to achieve an 87 percent reduction in electricity consumption.

- The Oregon Military Department is installing a highly insulated envelope, high efficiency lighting and heating, ventilation and air conditioning for its readiness center in The Dalles in an effort to achieve “net zero ready” status. Some of the measures include occupancy sensors, night purge cooling, condensing boilers and ground source heat pumps. The project is expected to save 1,134,496 kWh per year and 49,009 therms per year.

The compliance team authorized under HB2180 in (2010) has been crucial in evaluating projects prior to the issuance of a final certificate.

- So far the team has audited nearly 800 projects with an estimated total value of at least $690 million, as measured by project costs.

- As a result of their audit work the team has found compliance issues with over 100 projects – this resulted in a direct savings to the state of more than $20 million of tax credit dollars.

- This also saves small businesses energy and money. In a Salem lighting project designed to upgrade lighting components with energy efficient ones, the compliance team wondered why the lighting seemed worse than before the project started. It turned out the contractor installed fewer fixtures than originally contracted, but charged the same price. The discrepancy was pointed out to the owner and he had the contractor complete the job as originally contracted.

Energy Supply and Demand

Overview

Energy lights and heats our homes, powers our phones and computers, enables business to move goods and services and consumes about seven percent of our annual income. Oregonians annually spend more than $13 billion on all forms of energy. Most of that money goes out of state. Energy expenditures are expected to rise as the population and demand for energy increases. Oregon's Office of Economic Analysis says the state had about 3.8 million residents in 2010, a number which is predicted to grow to 4.3 million by 2020.

Over the years, the Oregon Department of Energy has worked to reduce the long-term costs of energy for Oregon's growing population by focusing on energy conservation and efficiency. The dollar value of the energy savings of ODOE's programs since 1978, adjusted for the life of the measures installed, equated to nearly $195 million in 2011.

Conservation

Energy conservation is the foundation of Oregon's energy policy and traditionally its first "fuel" of choice to meet energy demand. The Oregon Department of Energy provides information, evaluates new technologies and offers a variety of programs to assist Oregonians in conserving energy.

Renewable Energy

Oregon is rich in renewable energy resources. Solar, wind, geothermal, hydroelectricity, biomass (wood and organic solid waste), and wave energy, along with alternative fuels can provide Oregon with a diversified energy portfolio, stronger regional economies and cleaner air.

Oregon is one of the leading generators of conventional hydroelectric power in the country, second only to Washington in 2011. The Energy Information Administration also notes that Oregon's hydroelectric power contributed to below-average residential electricity prices in 2010 and 2011.

Energy Use and Trends

Consumption

The most current EIA data (2010) shows that total Oregon energy use (electricity, petroleum, natural gas) was 977 trillion British thermal units (Btu), a decline from 2008 of 1,105 trillion Btu. That use ranks Oregon 40th in the country on a per capita energy consumption basis. Wyoming residents and businesses consume the most energy and Rhode Island the least.

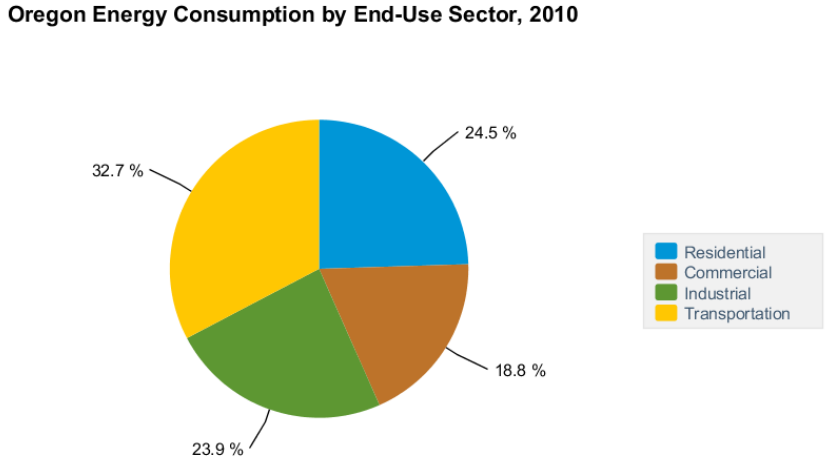


Figure 3: This shows the most current Energy Information Administration (EIA) data related to energy use by sector in Oregon. Most of the energy used in 2010 was petroleum for transportation.

The transportation sector uses the most energy in Oregon at 319.5 trillion Btu, followed by the industrial (234 trillion Btu), residential (239.5 trillion Btu) and commercial (184.2 trillion Btu) sectors. In 2010, gasoline use made up 54 percent of transportation energy, down slightly from 58 percent in 2008.

Production

Oregon produced about 390 trillion Btu of energy in 2010 (ranking it 35th), or 0.5 percent of the total energy produced in the U.S. Most of Oregon's energy is classified as renewable energy, with the majority of that being hydroelectricity. Texas and Wyoming are the top two energy producers in the country, with the sources being mainly coal and natural gas.

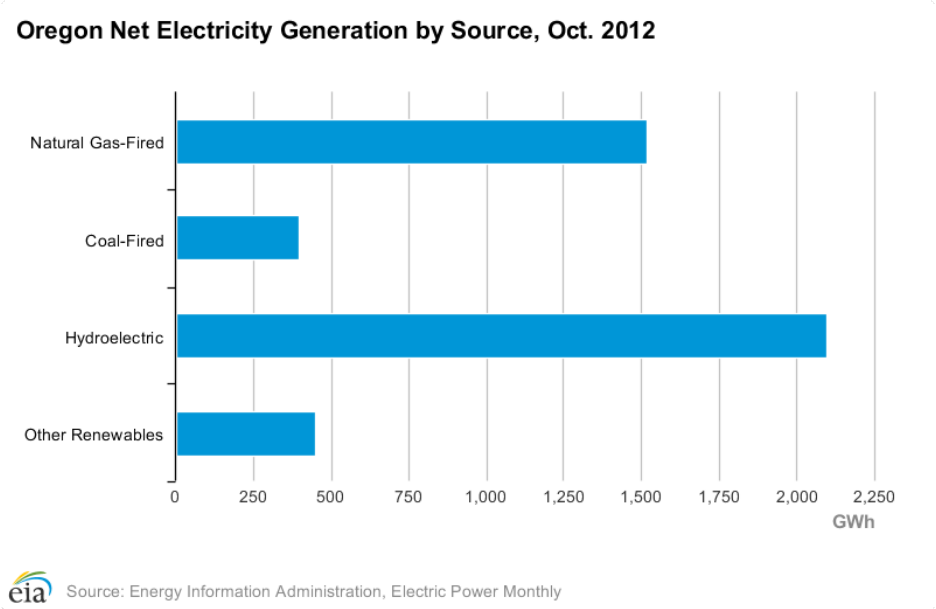


Figure 4: Hydropower generates most of the electricity in Oregon.

Fuel Supply, Use and Pricing

Petroleum

The October 2012 retail price of gasoline in Oregon (excluding taxes) was $3.44 per gallon, while the average nationwide retail price of gasoline was $3.28 per gallon.

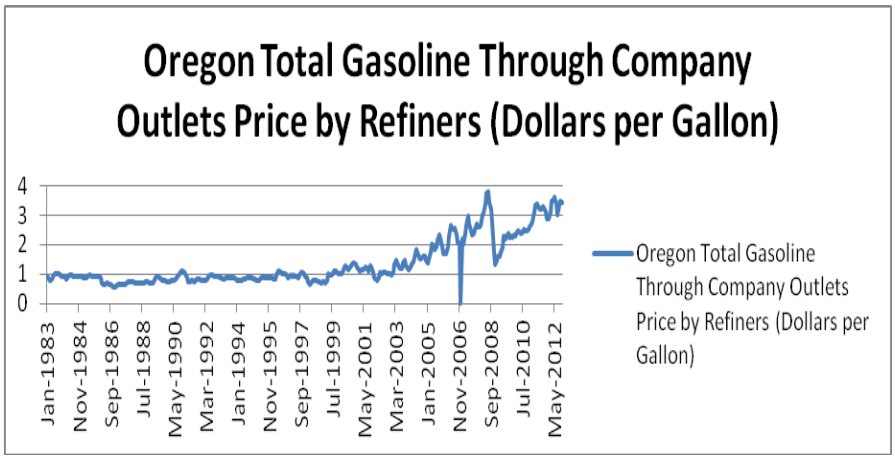


Figure 5: EIA information shows the volatility in Oregon gasoline prices.

In October 2010, Oregon's average gasoline price was $2.48 per gallon. As Figure 5 shows, gasoline in 1983 was selling for about 97 cents per gallon.

Oregon's three million registered drivers spent more than $5.3 billion dollars on gasoline in 2011. Oregon has about 3.25 million registered passenger cars and trucks, which used more than 35 million barrels of gasoline.

Oregon has few fossil fuel resources, imports 100 percent of its petroleum, and unlike other Western states, does not have refineries or internal crude oil resources. Oregon, along with Alaska, Arizona, California, Hawaii, Nevada and Washington form a nearly self-contained system of petroleum production and consumption, referred to by the federal government as Petroleum Administration Defense District Five. Although the system is relatively stable, a major disruption in any part of the supply and distribution chain could create a severe and prolonged petroleum shortage, and/or significant price volatility.

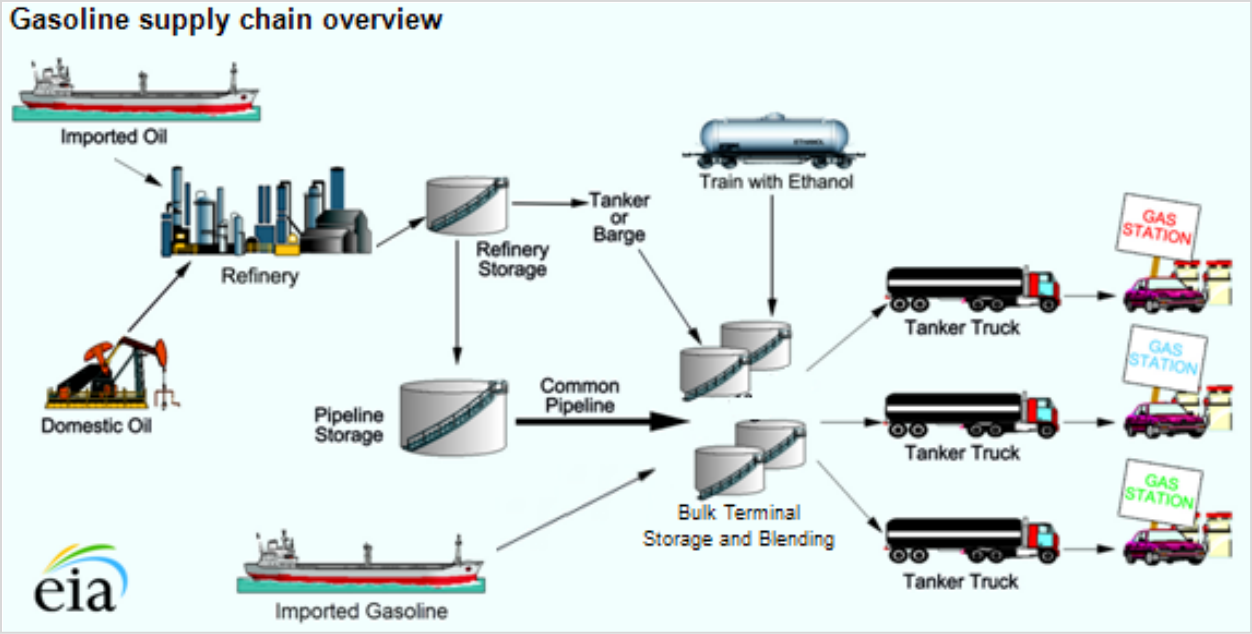


Figure 6: The Energy Information Administration diagram shows the five main parts of the gasoline supply chain.

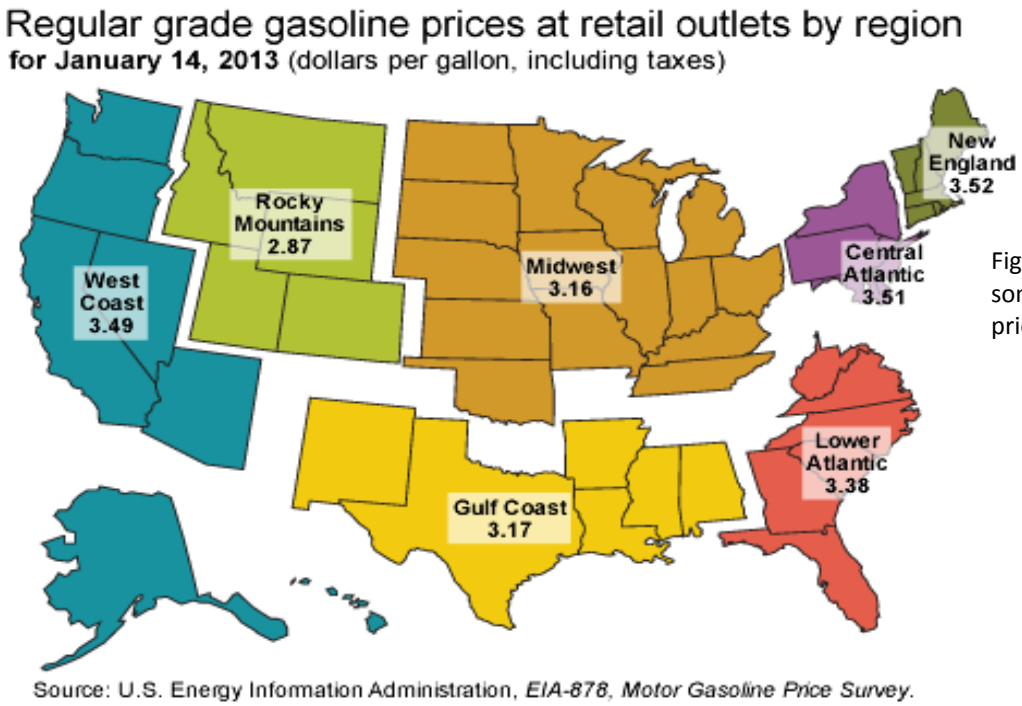


Figure 7: The West Coast had some of the highest gasoline prices at the start of 2013.

Petroleum Sources

Four refineries in the Puget Sound area of Washington provide more than 90 percent of Oregon's refined petroleum products. The Washington refineries transport their products to Oregon and Washington markets via the Olympic Pipeline and barges.

The bulk of Oregon's oil enters through Port of Portland, to eight petroleum delivery stations located on the Willamette River near Swan Island. While the current system of supplying and distributing petroleum products in Oregon is effective, the state has virtually no refining capacity and no crude oil reserves; therefore, Oregon faces unique challenges in the event of a petroleum shortage.

Some specialty petroleum products (jet fuel, lubricants, ultra-low sulfur diesel) enter Oregon on tankers from California Bay Area refineries.

More than 80 percent of the crude oil the Puget Sound refineries export to Oregon originates in the Alaska North Slope oil fields. The Trans Alaska Pipeline transports crude oil 800 miles from the oil fields on the state's northern coast to the Valdez terminal on its southern coast. From there, barges and tankers ship the crude oil to the Washington refineries and other destinations.

The Western Canada Sedimentary Basin is another significant source of crude oil for the refineries. The remaining crude, less than five percent, comes from the continental U.S., Mexico, Indonesia or the Middle East.

In addition to Washington, refineries in Salt Lake City and British Columbia provide nearly 10 percent of Oregon's refined petroleum products. Under normal conditions, only minor amounts arrive on tanker ships from California and the Pacific Rim countries of Indonesia, South Korea and Japan.

In northeastern Oregon, some portion of all petroleum products enters by truck or rail from Pasco, Washington. The Pasco delivery station receives refined product from a pipeline that starts in Salt Lake City, travels through southern Idaho and crosses through northeastern Oregon along Interstate 84. In southeastern and southern Oregon, a portion of petroleum products is trucked from Idaho and northern California respectively.

Petroleum contingencies

Oregon law (ORS 176.809) authorizes the Oregon Department of Energy to prepare for and respond to potential petroleum shortages or disruptions that threaten the health and safety of Oregonians.

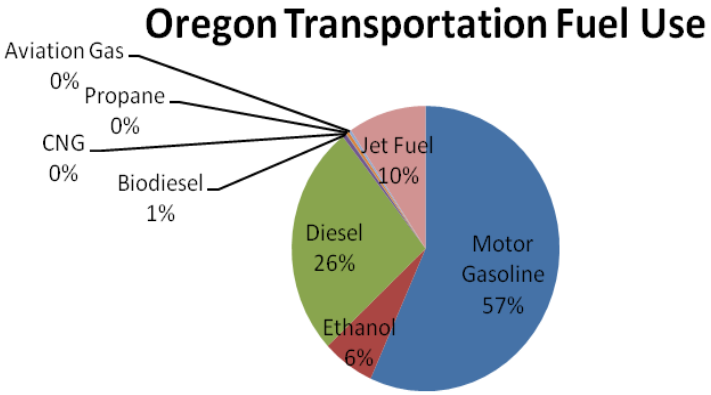


Figure 8: Gasoline makes up the bulk of Oregon's transportation fuel use.

The Oregon Department of Energy develops and maintains a statewide contingency plan in response to severe or long-term petroleum shortages or disruptions that affect the state. Oregon's Petroleum Contingency Plan includes a fuel allocation program that provides gasoline and diesel to state emergency services such as law enforcement, fire and medical services. Essential service providers including utilities, telecommunications, public works, public transit and sanitation services are also covered. An ODOE official or a state designee (as appropriate) would implement the plan by coordinating a rapid response from industry, federal, state and local organizations with a goal to restore the fuel supply and distribution system while minimizing the effect to Oregonians.

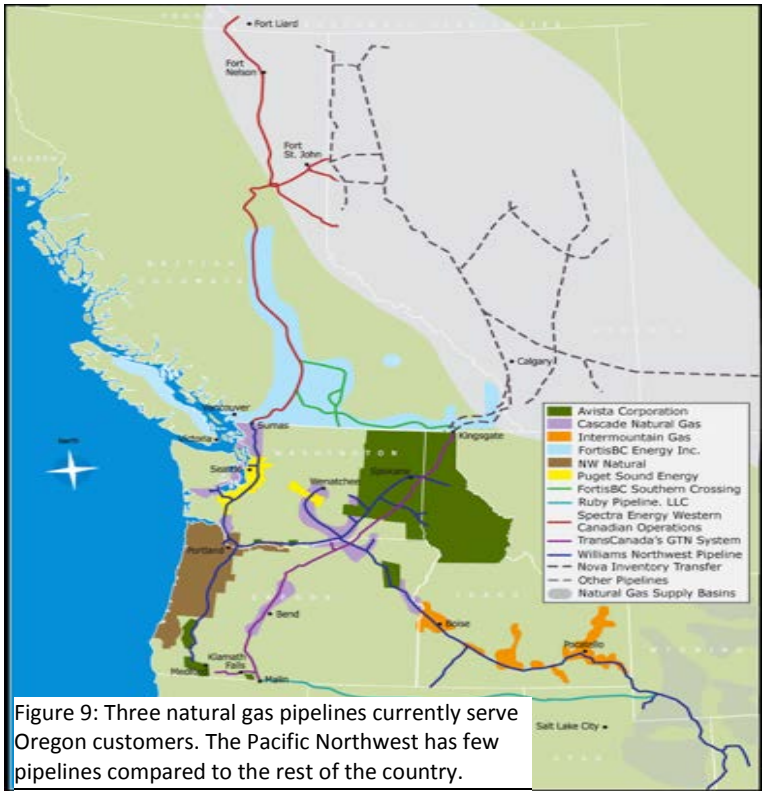


Figure 9: Three natural gas pipelines currently serve Oregon customers. The Pacific Northwest has few pipelines compared to the rest of the country.

Natural Gas

Oregon imports 100 percent of its natural gas from British Columbia, Alberta, Wyoming, Colorado and New Mexico. Three connected interstate pipelines deliver the natural gas.

The Williams Company's Northwest Pipeline brings natural gas to Portland from British Columbia and the U.S. Rocky Mountains. The British Columbia gas enters the U.S. near Sumas, Washington and roughly follows Interstate 5. Gas from the Rocky Mountains comes into Oregon near Ontario. One lateral pipeline transports gas from Washougal, Washington to the Portland area and another from the Willamette Valley to Grants Pass.

Natural gas from Alberta arrives in a Gas Transmission Northwest pipeline. It enters the U.S. near Kingsgate, Idaho and moves through eastern Oregon, leaving the state near Malin, before traveling on to California and Nevada. A lateral line transports natural gas from Klamath Falls to Medford. The GTN pipeline is owned by TransCanada and connects with the Williams Northwest pipeline at Stanfield, Oregon.

The Ruby Pipeline, which crosses four states, has been in operation since July 2011. About 75 miles of the 675-mile, 42-inch natural gas pipeline are in Lake and Klamath counties. The pipeline transports domestic natural gas from Opal, Wyoming to Malin, Oregon.

Three natural gas utilities serve Oregon:

- Northwest Natural serves 80 about percent of Oregon's retail customers, including the Willamette Valley and the coast.
- Avista Corporation serves parts of southern Oregon and La Grande.
- Cascade Natural Gas serves parts of central and eastern Oregon.

Northwest Natural receives natural gas from the Williams pipeline. Northwest Natural owns underground gas storage facilities in Mist, Oregon and liquefied natural gas storage facilities in Newport and Portland. Northwest Natural also has contracts to use liquefied natural gas storage at Plymouth, Washington.

Avista obtains natural gas from the Williams Company's Grants Pass lateral as well as the TransCanada's GTN pipeline and the Medford lateral. Cascade customers from Madras to Chemult receive natural gas from TransCanada's GTN pipeline. The Williams Northwest pipeline serves Cascade customers from Umatilla to Ontario. Cascade and Avista either own or have contracts to use natural gas storage facilities.

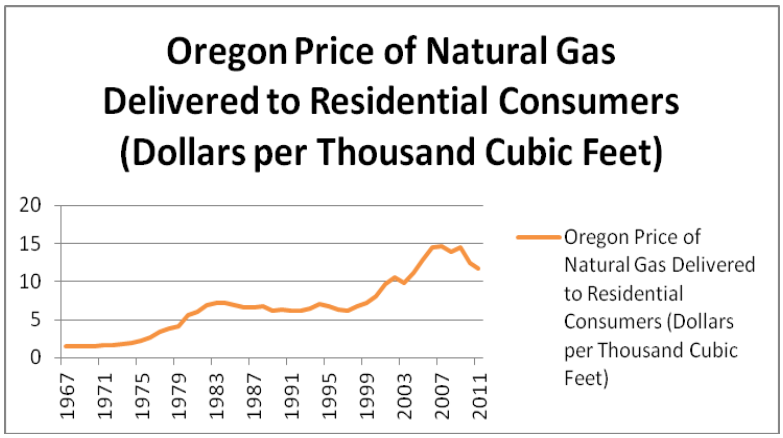


Figure 10: Energy Information Administration data shows the annual residential price of natural gas in Oregon through 2011.

Natural Gas	Oregon	U.S Average	Timeframe
Residential	$12.35/TCF	11.74	Oct. 2012
Commercial	9.67	8.00	Oct. 2012
Industrial	6.47	3.90	Oct. 2012

Figure 11: Energy Information Administration data for natural gas price per thousand cubic feet.

Liquefied Natural Gas

As part of the current and future energy mix, the U.S. is looking to export natural gas in its liquefied form. This is a reversal of federal policy as recently as 2011 which emphasized importation. In either case, the natural gas is super-cooled and liquefied for ocean transport. In its liquid state, the natural gas is called Liquefied Natural Gas or LNG.

The Oregon LNG Export Project (Clatsop County) has changed from a proposed import to a "bi-directional" terminal. OLNG is also planning a very different route for the associated Oregon pipeline than it had – traveling from Warrenton through primarily Clatsop and Columbia counties, crossing the Columbia River near Columbia City. The Federal Regulatory Energy Commission is preparing one Environmental Impact Statement for both the terminal and the pipeline.

Further south, FERC is preparing an Environmental Impact Statement analyzing the proposed Jordan Cove Energy Project/Pacific Connector Gas Pipeline. The 234-mile, 36-inch pipeline would cross Coos, Klamath, Jackson and Josephine counties, running from Malin to Coos Bay. FERC is developing one EIS for both the pipeline and the terminal. The EIS will also include effects from the proposed South Dunes power plant (an Energy Facility Siting Council site certificate is required for this power plant).

The Bradwood Landing Liquefied Natural Gas facility, proposed near Astoria, received approval to build from the Federal Energy Regulatory Commission, but later filing for bankruptcy in May 2010.

As part of its emergency preparedness obligations, the Oregon Department of Energy prepares plans to protect the health and safety of Oregonians in the event of a LNG emergency along the transport channel as well as at any potential facility.

Regulation

The Federal Energy Regulatory Commission regulates siting of interstate natural gas pipelines as well as prices for the use of pipelines. The Oregon Energy Facility Siting Council sites and regulates large in-state pipelines.

The Oregon Public Utility Commission regulates the rates Oregon's natural gas utilities charge their retail customers. Wholesale natural gas prices are not regulated.

Retail natural gas rates generally include pass-through of the wholesale cost of natural gas to retail customers. The Oregon Public Utility Commission sets retail rates so utility companies have the opportunity to earn a fair rate of return on their investments.

Natural gas utilities must prepare integrated resource plans for the PUC. These plans outline ways to meet natural gas demand, proposed pipeline expansions, new storage facilities and energy conservation budgets and programs.

Electricity

Electricity Mix

Figure 12 shows the mix of resources for Oregon's investor and consumer-owned utilities. The nuclear power comes to Oregon's consumer-owned utilities through the Bonneville Power Administration from the Columbia Generating Station at Hanford, Washington.

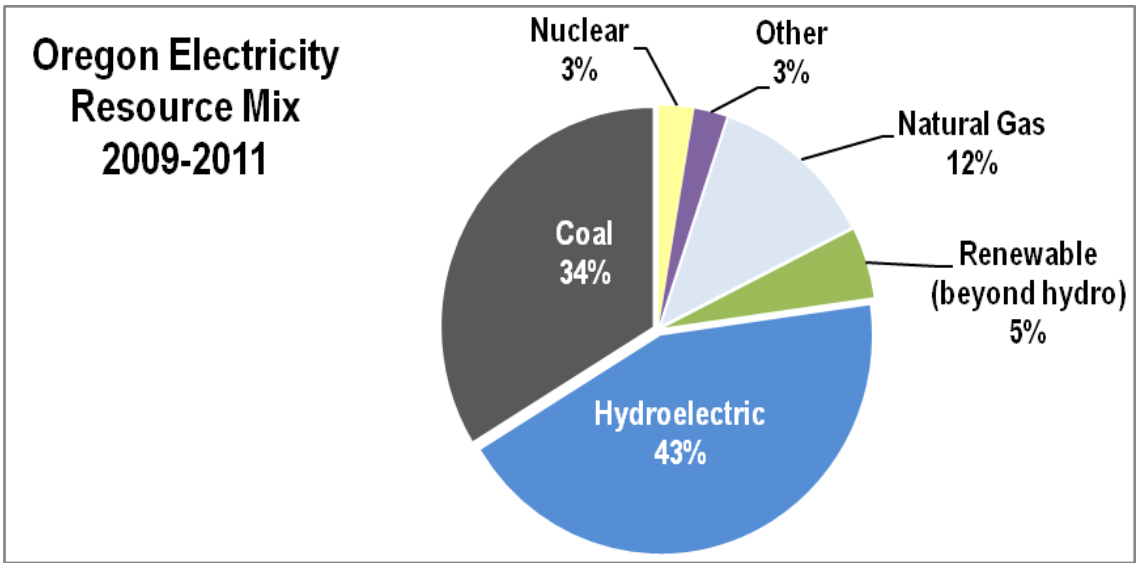


Figure 12: Where Oregon gets its electricity. Oregon's 2009-2011 fuel mix shows that electricity comes mainly from hydropower plus instate and out-of-state coal.

Coal power comes from Portland General Electric's (PGE) Boardman plant in Oregon and from plants in Utah, Wyoming, and Montana. Significant new wind facilities have been added since 2001, but they still make up a small portion of the overall electricity mix. PGE plans to end the use of coal at Boardman, the state's only coal-fired power plant, by Dec. 31, 2020.

The West depends on natural gas-fired power plants, but Renewable Portfolio Standards across the country mean more states are trying to meet new electricity needs with renewable energy, mainly wind power at this time. However, Oregon's top electricity producers are still hydroelectric facilities.

Facility	Type	Owner	MW
John Day	Hydroelectric	US Army Corps of Engineers	2,160
The Dalles	Hydroelectric	US Army Corps of Engineers	1,823
Bonneville	Hydroelectric	US Army Corps of Engineers	1,093
McNary	Hydroelectric	US Army Corps of Engineers	991
Hermiston Power Partnership	Natural Gas	Hermiston Power Partnership	615
Boardman	Coal	PGE	585
Beaver	Natural Gas	PGE	487
Klamath Cogeneration Plant	Natural Gas	Pacific Klamath Energy Inc.	470
Hermiston Generating Plant	Natural Gas	Hermiston Generating Co. LP	464
Biglow Canyon Wind Farm	Wind	PGE	450

Figure 13: According to the U.S. Department of Energy's Energy Information Administration, the top four electricity generators in Oregon are hydroelectric.

Electricity Rates

The Energy Information Administration lists the Oregon residential electric rate at 10.04 cents per kilowatt-hour (kWh) in 2012. Oregon ranks 42nd in the country in terms of the average retail price of residential electricity. Hawaii has the most expensive rates (36.87 cents/kWh) and Louisiana has the cheapest (8.67 cents/kWh).

Commercial rates have increased from 7.57 cents per kWh in 2010 to 8.43 cents per kWh in 2012. Oregon's industrial electric rates rose slightly to 5.79 cents per kWh from 5.65 cents per kWh in 2010.

Electricity	Oregon	U.S Average	Timeframe
Residential	10.04 cents/kWh	12.03 cents/kWh	Oct. 2012
Commercial	8.43 cents/kWh	10.11 cents/kWh	Oct. 2012
Industrial	5.79 cents/kWh	6.65 cents/kWh	Oct. 2012

Figure 14: 2012 Oregon Electricity Prices compared to the U.S. average—Source: Energy Information Administration

Electricity Transmission and Distribution

The U.S. consists of three major electricity transmission grids; the Western Grid, Eastern Grid and Texas. Information and communication technologies are being used to improve these systems through an effort known as the smart grid.

The U.S. electric grid is made up of electricity generation, distribution and transmission. More than 9,200 electric generating units are connected to about 300,000 miles of transmission lines.

The Bonneville Power Administration, a federal power agency, operates about 75 percent of the high voltage transmission in the Pacific Northwest. Most of the rest is operated by PacifiCorp and other investor-owned utilities.

Smart Grid

The federal Smart Grid Investment Grant program, authorized by Congress in 2007 and funded in 2009 through the American Recovery and Reinvestment Act, is a $3.4 billion initiative to encourage deployment of smart grid technologies and systems.

One project is the Western Electricity Coordinating Council synchrophasor effort that includes 18 transmission owners in 14 states. The WECC says this project will increase system reliability and performance and could mean about 100 megawatts of additional capacity on the California-Oregon intertie.

Smart Grid Efforts in Oregon

In Oregon, a number of utilities (investor-owned and consumer-owned), along with the BPA are testing smart grid control technologies through grants offered by the American Reinvestment and Recovery Act. The pilot projects are underway and plan to be completed in 2013. The OPUC has added requirements that the three Investor-Owned Utilities issue smart grids plans. Portland General Electric and Idaho Power have installed advanced meters for most of their customers. These meters measure hourly use and send the information to the utility. This capability should help customers better understand how they use electricity.

Electricity Transmission

Ongoing projects to site transmission lines are occurring at the state, federal and local levels. Federal projects include Bonneville Power Administration transmission upgrades:

- Big Eddy to Knight – (Wasco County). Federal environmental review is complete; East Alternative was chosen. BPA estimates that the line will be energized in winter 2014. The line goes through the Columbia Gorge Scenic Area and crosses the Columbia River near Celilo Village.
- I-5 Corridor Reinforcement Project – (Multnomah County). A 79-mile 500 kV line between Castle Rock, Washington and a new substation in Troutdale. BPA released the Draft Environmental Impact Statement in November 2012 naming the Central Alternative as the preferred alternative (Columbia River crossing near Troutdale). The Final Environmental Impact Statement is expected in 2014.
- Pacific Direct Current Intertie – (Wasco County). Improvements will boost the 846-mile line's capacity (from 3,100 to 3,700 MW) and reliability between the Northwest and California. Most of the upgrades will happen at the Celilo Substation in The Dalles, with the yearlong construction beginning in 2015. BPA plans to release the Environmental Assessment Fall 2013.

Projects involving the Energy Facility Siting Council

- Boardman to Hemingway is approximately 298 miles of single circuit 500-kilovolt (kV) transmission line proposed to connect the power plant near Boardman and the planned Hemingway substation near Murphy, Idaho. This project, proposed by Idaho Power, requires the approval of Oregon's Energy Facility Siting Council. ODOE received the Preliminary Application Feb. 27, 2013.

- Cascade Crossing from Portland General Electric is undergoing changes in 2013. PGE and BPA are looking at modifying the proposed project, including reducing the length of the line. First proposed as a 215-mile transmission project from Boardman to Salem, the revised project would cut off about 101 miles and terminate at a new Pine Grove substation about 18 miles southwest of Maupin. Besides federal involvement this project requires the approval of the Energy Facility Siting Council.

Developing Energy Resources

Energy Facility Siting Council

The Oregon Department of Energy serves as staff to the Governor-appointed and Senate-confirmed Energy Facility Siting Council. A large number of applications and amendments to site certificates are being reviewed, continuing a trend that began in 2007.

The Energy Facility Siting Council Process

EFSC makes siting decisions for large energy facilities. ODOE reviews an application for site certificate, coordinates the review of other state agencies and governments and issues a proposed decision for public comment and Energy Facility Siting Council consideration.

The Energy Facility Siting Council has the authority to exempt proposed developments if certain criteria are met. High-efficiency cogeneration power plants, grain-based ethanol plants and temporary power plants are among those the Energy Facility Siting Council has exempted from siting standards.

EFSC uses all relevant state and local criteria in making its siting decisions. In addition to its own standards, it applies applicable requirements from the Oregon Departments of Environmental Quality, State Lands, Fish and Wildlife, and Water Resources, along with local land use requirements. Only DEQ's federally delegated water and air quality permits are excluded from EFSC review.

The Energy Facility Siting Council affords the public a single review and set of hearings in which to participate. Developers have one process for all state and local government requirements. A siting decision can only be appealed to the Oregon Supreme Court.

Proposals Under Review

The Energy Facility Siting Council is actively reviewing site certificates applications for renewable energy and fossil fuel plants.

At present, ODOE is reviewing site certificate applications for:

- 500 megawatts (MW) of wind generation known as Baseline Wind in Gilliam County
- 399 MW called the Saddle Butte Wind Park; Gilliam and Morrow counties
- 653 MW of natural gas at the Troutdale Energy Center
- 300 MW of wind called Antelope Ridge; Union County (on hold pending big game studies)
- 500 MW of wind, Brush Canyon Wind Facility; Wasco and Sherman counties

Also under review are two large, bulk electricity transmission lines, the Boardman to Hemingway line proposed by Idaho Power, and the Cascade Crossing Line proposed by Portland General Electric.

Nuclear Power Plants

For reasons such as increased prices for oil and natural gas, a streamlined licensing process, and greenhouse gas emissions, interest in nuclear energy has been growing nationally, with several utilities exploring licensing and building new nuclear power plants.

Oregon voters approved an initiative in November 1980 that establishes – in law – limits on the licensing of a new nuclear power plant. The plant may be licensed only with voter approval and only if a permanent repository exists for disposal of high-level waste produced by the plant. Below is the text of the Oregon Revised Statutes established by voters:

- **469.595 Condition to site certificate for nuclear-fueled thermal power plant.** Before issuing a site certificate for a nuclear-fueled thermal power plant, the Energy Facility Siting Council must find that an adequate repository for the disposal of the high-level radioactive waste produced by the plant has been licensed to operate by the appropriate agency of the federal government. The repository must provide for the terminal disposition of such waste, with or without provision for retrieval for reprocessing.

- **469.597 Election procedure; elector approval required.** (1) Notwithstanding the provisions of ORS 469.370, if the Energy Facility Siting Council finds that the requirements of ORS 469.595 have been satisfied and proposes to issue a site certificate for a nuclear-fueled thermal power plant, the proposal shall be submitted to the electors of this state for their approval or rejection at the next available statewide general election. The procedures for submitting a proposal to the electors under this section shall conform, as nearly as possible to those for state measures, including but not limited to procedures for printing related material in the voters' pamphlet. (2) A site certificate for a nuclear-fueled thermal power plant shall not be issued until the electors of this state have approved the issuance of the certificate at an election held pursuant to subsection (1) of this section.

Clean Transportation

Oregon uses about 2 billion gallons of gasoline every year. This costs Oregon households almost seven percent of their disposable income, nearly double what it was 10 years ago. Almost all the gasoline and diesel consumed in Oregon is produced out of state, meaning nearly all those fuel expenditures leaves the state.

Using alternative forms of transportation helps reduce energy use, improve air quality and ease traffic congestion. The anticipated increased use of electric, natural gas (Compressed Natural Gas and Liquefied Natural Gas) or propane vehicles is creating a new role for Oregon's utilities as they become fuel providers for the transportation sector. This paves the way for innovation, technology, data collection and a rise in public-private partnerships. Oregon Revised Statute 469.010 says "That energy-efficient modes of transportation for people and goods shall be encouraged, while energy-

inefficient modes of transportation shall be discouraged." Oregon is home to about 51,000 hybrid vehicles and nearly 2,000 plug-in electric vehicles.

There are about 2,000 all-electric vehicles registered in Oregon. One hurdle for drivers making the transition to EVs is the absence of a broad network of charging facilities. This leads to a fear of "running out of juice." The Oregon Departments of Energy and Transportation, using American Recovery and Reinvestment Act funding, helped improve the electric fuel infrastructure. As of January 2013, there are more than 650 electric vehicle charging stations in Oregon, up from 36 public stations in October 2010.

In July 2012, Oregon U.S. Senator Jeff Merkley traveled the length of the Oregon segment of the West Coast Electric Highway completing a 340-mile trip using an all-electric car.

U.S. Senator Jeff Merkely on completing his electric vehicle road trip.

The U.S. Department of Energy's Clean Cities program advances energy security by supporting local actions to reduce transportation petroleum use. There are about 100 Clean Cities Coalitions across the country. In 2011, the Columbia-Willamette Clean Cities stakeholders displaced more than 11 million gallons of gasoline and reduced greenhouse gas emissions by more than 106,000 tons. ODOE chairs the Columbia-Clean Cities initiative.

Oregon's Energy Resources

Since 1975, the Oregon Department of Energy provides technical and business assistance for the use of Oregon's energy resources. Renewable energy facilities may also qualify for federal incentives.

With the 2009 passage of the federal stimulus American Recovery and Reinvestment Act, energy projects across the country received tax credits, grants and/or loan guarantees. Some of those recipients include Oregon wind farms, biomass, solar, geothermal exploration and wave energy development.

All renewable energy sources can be used to generate electricity. Solar, geothermal and biomass also can supply heat. In addition, biomass can be used to fuel vehicles.

The U.S. Department of Energy's Energy Information Administration reports that the total U.S. renewable energy consumption declined by 2.5 percent in 2012 over 2011 levels. This was due primarily to a decrease in hydropower production in the Pacific Northwest. Forecasting for 2013, EIA predicts renewable energy consumption will increase 3.6 percent. Growth of 1.7 percent is anticipated in hydropower and 4.4 percent in non-hydropower renewable energy.

Hydropower

Hydropower dominates Oregon's electricity portfolio. The Bonneville Power Administration markets power from 31 hydropower facilities in the Northwest, 14 of which are located in Oregon. These facilities account for 82 percent of all power that BPA markets.

New growth in the hydropower sector is most likely to occur in three areas: irrigation systems, pumped storage, and the addition of power facilities on existing dams, especially federal dams.

Figure 15: The Northwest Power and Conservation Council map of Columbia and Snake River dams and fish protection facilities.

Biomass/Biofuels/Bioenergy

Oregon has large amounts of biomass resources including agricultural residues, forest slash and mill residuals. For decades, Oregon has been using these resources to provide fuel for the generation of electricity, production of heat, and manufacturing of fuels.

In Oregon, biomass is used to produce thermal heat for the forest products industry, heat and electricity at wastewater treatment facilities and wood pellets that heat homes, schools and hospitals.

Forest Biomass Working Group

Established in November 2005, the Forest Biomass Working Group is a statewide forum for information sharing and problem-solving relating to forest biomass. The FBWG provides education, strategic recommendations and advice to state agencies, policy makers, the biomass industry and other stakeholders. Made up of a wide range of stakeholders in the private, public and nonprofit sectors working to advance sustainable biomass utilization in Oregon, participation is open to the public.

The Forest Biomass Working Group released their forest biomass strategy in November 2012. The strategy recommends four market development initiatives that target specific growth opportunities and industry sectors, supports and enhances existing forest industries, and creates additional market opportunities for forest landowners and forest-based businesses. The initiatives are:

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

Biogas

A growing area of the bioenergy sector is in the production and use of biogas. Biogas is produced through the breakdown of biomass into methane that is used to produce electricity. The Oregon Department of Energy has helped grow the anaerobic digester industry in Oregon. On-farm digesters have increased from less than 0.5 MW of capacity just five years ago to over 6 MW currently operational at six locations around the state, with another three under construction as of January 2013. These digesters provide important nutrient management services, help improve water quality, integrate a new revenue source, while generating a local, renewable energy source.
Oregon's dairies, water treatment plants, municipal solid waste collectors and food processors have the potential to develop over 100 MW of biogas energy from anaerobic digesters. Landfills in Oregon have installed methane capture systems and use the gas to produce electricity and where possible, capture the heat for thermal applications such as food processing or heating greenhouses.

Biomass Thermal

The Oregon Department of Energy is leading an effort to develop efficient and local sources of thermal energy for industrial process, space heat and hot water in our residential, commercial and industrial sectors. ODOE has provided technical assistance, feasibility studies, grants and incentives to spur the development of biomass thermal installations in Oregon.

In 2009, there were two schools in Oregon using biomass to provide heat. In January 2013 there are 19 facilities around the state that are saving between $20,000 and $100,000 per year on their heating bills. In addition many of the boilers installed in hospitals, schools and offices are manufactured in Oregon. These projects save money, keep energy dollars local and support value-added manufacturing in Oregon.

Future of Biofuels

Boardman is now home to a 250,000 gallon per year cellulosic ethanol bio-refinery. Colorado-based ZeaChem Inc. completed construction of its facility in October 2012. Using its "grow where you go" philosophy, the feedstock for the facility includes hybrid poplar growing in eastern Oregon. This demonstration project produces advanced ethanol and fuels, along with its core products – chemicals to be used in paints, lacquers and consumer goods. ZeaChem received a $25 million investment from the U.S. Department of Energy's Integrated Bio-refinery program.

Geothermal

Oregon is rich in geothermal resource availability. Geothermal has been used for space heating since the turn of the century and for a variety of uses including heating homes, schools, businesses, swimming pools and for snow melt systems for sidewalks. In addition, geothermal provides the Oregon Institute of Technology campus all of its heating needs. Geothermal energy is being used in

Oregon to dry agricultural products, for aquaculture (raising fish), to heat greenhouses, and at a number of spas and resorts. When used to generate electricity, geothermal provides a consistent source of power.

The first Oregon commercial geothermal electricity production is at U.S. Geothermal's Neal Hot Springs facility in Malheur County. Idaho Power is purchasing the electricity. The Geothermal Energy Association has ranked Oregon the third busiest in the country in terms of geothermal project activity.

Electricity Production

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. The Oregon Department of Geology and Mineral Industries has geothermal resource maps available to the public showing both regional and site-specific information.

Development 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, which is obligated to pass at least 50 percent onto the county where the electricity was produced. However, the main barriers for development of geothermal electricity generation in Oregon are the cost and the risks of finding quality resources.

Geothermal work in the Newberry area near Bend is being conducted by AltaRock Energy on what is called Enhanced Geothermal Systems. The U.S. Department of Energy is supporting EGS, which it calls "engineered reservoirs created to produce energy from geothermal resources that are otherwise not economical due to lack of water and/or permeability." The project is on leased federal land outside the Newberry Volcanic Monument. Seattle-based AltaRock Energy reported in early 2013 that it has found a way to potentially reduce the costs of geothermal energy production by up to 50 percent.

Other projects include Surprise Valley Electric Co-op, which is working with ranchers on geothermal wells near Paisley. The Co-op plans to develop a 2-to-4 megawatt geothermal electric plant on the Colahan property near Paisley. Spent geothermal fluids will be available for other businesses, such as aquaculture, greenhouse heat and community heating.

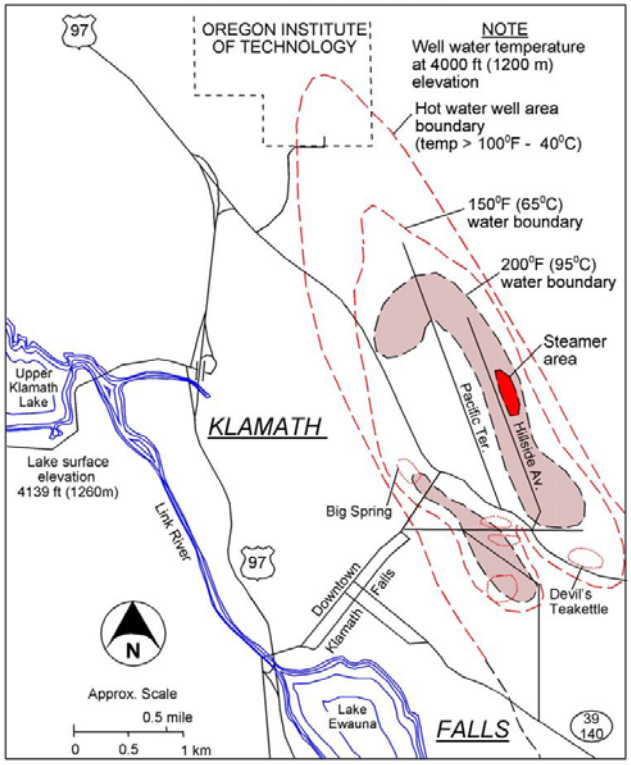
Nevada Geothermal Power and Ormat Nevada are developing a potential power plant at Crump Geyser in Lake County.

Direct Use

Geothermal in the City of Klamath Falls has been used since the turn of the century for a variety of uses including heating homes, schools, businesses, swimming pools and for sidewalk snow melt systems.

The Oregon Institute of Technology in Klamath Falls heats its 11-building campus with geothermal energy. Oregon has been a leader in geothermal energy, in part because of the long-term work of the

Geo-Heat Center at OIT. The center provides geothermal information and technology transfer and is internationally recognized for its work.



Klamath Falls has more than 500 geothermal wells ranging from 100 to 2,000 feet deep.

The city's district heating system serves 20 buildings and is used for snow melting.

The Oregon Institute of Technology's proposed projects include both a low temperature and high temperature power plant.

Klamath Basin Geopower is exploring the potential for a power plant on 2,500 leased acres near Olene. The company would like to develop a 20-megawatt power plant.

Figure 16: A U.S. Department of Energy illustration of the Klamath Falls known geothermal resource area.

Wave Energy

Oregon's significant ocean energy potential and marine resources have made the State a leader in promoting wave energy development while protecting coastal communities and fisheries.

Oregon has invested in this wave energy effort. Created by the Oregon Innovation Council, the non-profit Oregon Wave Energy Trust has received more than $10 million to fund independent research, evaluation and development of wave energy development potential on Oregon's shores.

The National Northwest Marine Renewable Energy Center, one of three centers nationwide, was founded in 2008 to facilitate technology development, inform regulatory and policy decisions and close key gaps in understanding. The Oregon State University branch is exclusively responsible for wave energy. The National Northwest Marine Renewable Energy Center deployed the first wave energy test system In the U.S. off the coast of Newport.

Newport will also be the future location of the first utility-scale, grid-connected wave energy test site in the U.S. Called the Pacific Marine Energy Center, devises will be tested about five miles offshore. Funding for the project is coming in part from a $4 million grant from the U.S. Department of Energy.

In July 2010, a settlement was reached with Ocean Power Technologies for the Reedsport project. Stakeholders along with state and federal agencies approved resource study plans and conditional placement of 10 wave energy buoys off the mouth of the Umpqua River, more than two miles from shore. Ocean Power Technologies plans to deploy the first federally licensed commercial wave energy device off Reedsport in spring of 2013.

O.H. Hinsdale Wave Research Lab at Oregon State University

With the Reedsport project, Oregon has built a coordinated regulatory pathway for the next generation of marine energy developments. In January 2013, the Land Conservation and Development Commission adopted an amendment to the Territorial Sea Plan, setting the course for future wave energy development in the state waters (out three miles from the shoreline). The document identified four "Renewable Energy Suitability Study Areas" that encourage the initial development of wave energy. Projects proposed in other areas would have to meet more restrictive standards. The Territorial Sea Plan took about three years to develop and attempts to balance renewable energy potential with the concerns of the fishing industry and environmental issues.

Solar

Solar energy is Oregon's largest renewable energy resource. Northwestern Oregon receives roughly the same annual solar resources as the U.S. and Europe. The eastern and southern parts of Oregon receive roughly the same annual solar resource as that of northern Florida. Using solar directly in buildings as daylight and heat can improve occupant comfort and reduce energy needs by 10-to-30 percent. The life-cycle cost can be lower than conventional energy sources if solar is installed when the building is constructed.

Solar Electricity—Photovoltaics in the Residential Market

The residential PV market experienced significant growth in the last several years. There are many factors that can be attributed to the expansion in the residential PV market in Oregon. The combination of state, federal and Energy Trust of Oregon incentives has helped accelerate demand. However, the primary factor increasing the number of PV systems installed in the state is declining system cost.

Christmas Valley

The Oregon Department of Energy awarded $1 million in American Recovery and Reinvestment Act funding to the Oregon Military Department for a solar photovoltaic project on part of the 2,622-acre U.S. Air Force Backscatter Radar Base property. Located east of Christmas Valley in Lake County, the

Backscatter property originally belonged to the Bureau of Land Management before being used by the U.S. Air Force during the Cold War. The Oregon Military Department acquired 326 acres of the site in 2009 to use as an Emergency Management Response and Training Facility.

The Christmas Valley solar project includes rooftop solar panels on three existing facilities.

As it sat vacant, local residents, Oregon elected officials and nonprofit groups, discussed what to do with the vacant property. Feasibility studies offered ways to potentially use the site as an area for developing renewable energy.

This project is a cooperative effort between multiple agencies and funding sources to help reach a common goal of generating renewable energy. Additional partners on the project include the Oregon Institute of Technology and Treasure Valley Community College.

Wind

By 2012 wind energy production in Oregon made up nearly six percent of Oregon's total net generation and over 75 percent of the total "non-hydroelectric" sources of renewable energy. Oregon has good wind resources and access to transmission. The U.S. Department of Energy defines wind resources this way: wind is classified by wind power classes, which are based on wind speed frequency distributions and air density. These classes range from class 1 (the lowest) to class 7 (the highest). The National Renewable Energy Lab says the Columbia Gorge area provides a corridor of wind resources at class 4 and higher.

More than 4,000 MW of large-scale wind farms are in different phases of the Energy Facility Siting Council process (notice of intent, application for a site certificate) at the start of 2013.

Most of Oregon's large-scale wind development takes place primarily in the central and eastern Columbia River area and in northeastern Oregon. Wind farm proposals of 105 megawatts and above go through Oregon's Energy Facility Siting Council, a one-stop process with a direct appeal of decisions to the Oregon Supreme Court. Developers of less than 105 MW may also choose to go through EFSC. Of the operational wind farms in Oregon, about 75 percent have a capacity below the state's 105 megawatt threshold and were approved at the county level through the land use process.

Oregon's Energy Priorities

Oregon's energy priorities focus on strategies outlined in the next few pages. These include focusing on energy efficiency, reducing carbon emissions, cleaning up nuclear waste at Hanford and preparing for potential energy emergencies.

Energy Efficiency Reduces Costs for Oregonians

Oregonians spend $13 billion a year on energy and much of that money leaves the state. To reduce costs Oregon can maximize acquisition of cost-effective energy efficiency, and plan for electric, thermal and transportation energy supplies to meet future needs.

Energy efficiency is the cheapest resource, because it is cheaper to save energy than to buy or produce it. Energy efficiency costs about 3 cents per kilowatt-hour compared to 6-to-9 cents per kilowatt-hour to build or buy from power plants.

When it comes to maximizing cost-effective energy efficiency, the Oregon Department of Energy is the lead agency for assisting schools and state buildings. This work includes offering technical help and financial tools for K-12 public schools statewide. State agencies receive assistance to reduce energy bills in existing buildings and designing savings into new facilities. ODOE also provides information, technical and financial assistance for residents and businesses.

Recognizing industrial efficiency

Oregon is ranked as the third most industrial state. Whether it's wood products, clean technology or food processing, Oregon has proved to be the place for industrial innovation and leadership. The industrial sector has quietly shown leadership in energy efficiency for years. The Oregon Leaders Awards for Industrial Energy Efficiency in 2012 included:

- Winner of the Governor's Award for Leadership in Innovation – Myers Container LLC and Container Management Services LLC.
- Winner of the Governor's Award for Leadership in Energy Performance – Stimson Lumber Company, Clatskanie Operations.
- Winner of the Governor's Award for Leadership by Example – Metropolitan Wastewater Management Commission, Eugene/Springfield Water Pollution Control Facility.
- Winner of the State Award for Leadership in Innovation – Elkay Wood Products Company.
- Winner of the State Award for Leadership in Energy Performance – NORPAC Foods, Inc., Brooks Plant #5.
- Winner of the State Award for Leadership by Example – Gunderson LLC.

Reducing Carbon Emissions

The average American generates about 15,000 pounds of carbon dioxide every year from personal transportation, home energy use and from the energy used to produce all of the products and services purchased.

Oregon became the first state in the nation to regulate emissions of greenhouse gases with the passage of the Oregon Carbon Dioxide Emissions Standard in 1997 for newly sited energy facilities. This standard helped to establish the marketplace for carbon as companies were required to help fund greenhouse gas reduction or removal projects called "offsets" to meet the standard.

Some of the nation's first carbon market companies and organizations emerged locally as a result and another law passed in 2001 helped facilitate a growing market for forestry offsets in the state. In 2003 Oregon joined with Washington and California to form the West Coast Governor's Global Warming Initiative, beginning a trend toward approaching climate change policy at a regional level.

Greenhouse Gas Emissions in Oregon

The Oregon Department of Energy has been providing an inventory of greenhouse gas emissions in Oregon for more than 20 years and continues to conduct a greenhouse gas inventory for the state. These results show that carbon dioxide (CO_2) dominates Oregon's anthropogenic (human-caused) greenhouse gas emissions, typically responsible for about 85 percent of these emissions. Methane, nitrous oxide and an array of fluorinated industrial gases comprise the remaining portion (in order of abundance, normalized to CO_2). Greenhouse gas emissions in Oregon rose steadily in the 1990s to about 25 percent above 1990 levels but have leveled off in recent years.

Most of Oregon's greenhouse gas emissions are energy-related, mirroring the CO_2 proportion of emissions at roughly 85 percent. In terms of economic sectors of activity, the transportation of goods and people accounts for the largest share of emissions at about 37-to-38 percent in recent years.

Residential and commercial activity (homes, offices, stores, municipal solid waste, etc.) is a close second, at around 34 percent, while the industrial sector has been stable in recent years at around 20 percent of emissions. Agricultural activities have remained around 8-to-9 percent recently, representing the smallest share of emissions in Oregon.

Over time, the transportation sector has remained the largest sector, but the fastest growing sector has been residential and commercial activities. In contrast, emissions from the industrial sector have decreased considerably, a reflection of both the changing portfolio of Oregon's economy and efficiency increases. The agricultural sector has remained relatively constant over time relative to the other sectors.

Oregon's Greenhouse Gas Reduction Goals

In 2007 the legislature approved goals designed to arrest the growth of Oregon's greenhouse gas emissions and to reduce greenhouse gas emissions by 2010. By 2020, greenhouse gas levels are to be 10 percent below 1990 levels. By 2050 Oregon is to achieve greenhouse gas levels that are at least 75

percent below 1990 levels. The Oregon Global Warming Commission issued its *Roadmap to 2020*, a plan that identifies policies, practices and programs that can help the state meet its 2020 and 2050 emission reduction goals.

Maintaining Hanford Cleanup Progress

More than 40 years of plutonium production for America's nuclear weapons program extensively contaminated the Hanford Site in southeastern Washington State. As plutonium production was winding down in the late 1980s, Oregon joined with Washington State, federal and local governments, Native American Tribes, and citizen groups to advocate for and compel Hanford cleanup. Hanford Site workers are now engaged in the world's largest environmental cleanup project. The cleanup encompasses more than 1,900 waste sites, ranging from small areas of surface contamination to million-gallon underground storage tanks containing about 55 million gallons of highly radioactive and chemically hazardous waste.

Columbia River

Hanford cleanup is necessary to prevent further contamination of the Columbia River; to comply with environmental laws and restore the damaged environment; and to eliminate or reduce risks to people who live in, work in, or visit the area. While significant cleanup progress has been made, success is still far from assured. A number of challenging technical issues remain to be solved and public and regulatory agreement on and acceptance of some cleanup strategies is still needed. Successful cleanup will require a sustained, candid dialogue and substantial agreement and cooperation among stakeholders, regulators and governments. It will also require significant federal funding for the remaining four decades or more needed to complete the work.

Oregon's involvement with the Hanford cleanup focuses on work needed to protect the Columbia River. During Hanford's operating years, an estimated 444 billion gallons of contaminated liquids were disposed to the soil, resulting in extensive contamination of the groundwater. The U.S. Department of Energy, which owns and operates Hanford, recently expanded treatment systems to contain and clean-up the contaminants.

Construction continues on a $12 billion dollar Waste Treatment Plant to immobilize Hanford's most toxic wastes, which are currently stored in 177 underground tanks. These treatment facilities are not scheduled to begin operations until 2019 and be fully operational in 2022. Major technical design problems have yet to be fully addressed, which could further delay start-up of these facilities. In the meantime, DOE recently discovered that one of Hanford's 28 double-shell tanks – the newest and most robust of the tanks – is leaking from its inner shell. Given that the double-shell tanks were counted on to safely hold the waste for several decades until treatment could be complete, this raises serious concerns about the potential failure of more tanks and the possibility that cleanup funding may end up being diverted to construct new storage tanks.

Oregon strongly supports efforts to accelerate treatment of Hanford's tank wastes. As long as the wastes remain in these aging tanks, it poses a threat to the groundwater and eventually to the Columbia River.

Waste Shipments

As part of the Hanford cleanup, a specific type of radioactive waste (called transuranic) has been trucked to a disposal site in New Mexico. Hanford has been shipping transuranic waste to this disposal facility since 2000. Some waste is first shipped to a federal facility in Idaho for treatment. Through Jan. 1, 2013, Hanford has sent 649 truckloads of this waste to New Mexico and Idaho. The waste travels along Interstates 82 and 84 in northeast Oregon. No shipments occurred during 2012, and they likely will not resume until 2014 or 2015. Once they do resume, shipment numbers are likely to be in the neighborhood of 200-330 each year. Oregon will continue to ensure these shipments are conducted safely, and do not travel when the road or weather conditions are unsafe.

Emergency Preparedness

The Oregon Department of Energy is responsible for preparing and responding to nuclear emergencies, handling petroleum disruptions or shortages, improving the resiliency of critical energy infrastructure and preparing for emergencies related to the operation of a liquefied natural gas import facility.

Nuclear Emergency Preparedness

About 29,000 Oregonians live in the communities of Boardman, Irrigon, Hermiston and Umatilla, which are located within the 50-mile nuclear emergency planning zone for both Hanford and the Columbia Generating Station nuclear power plant in Washington. A fire, explosion, or other accident involving Hanford's contaminated facilities or underground waste storage tanks could cause an airborne release of radioactive materials. Similarly, an accident at the Columbia Generating Station could also cause an airborne radioactive material release.

Oregon's primary concern with a radioactive material release from Hanford or the Columbia Generating Station reaching Oregon is protecting people from consuming contaminated water or food products and restricting movement of these products into the marketplace. ODOE works with Morrow and Umatilla counties and several other state agencies to regularly test the nuclear emergency preparedness program. In 2012, both counties lost federal funding for emergency preparedness planning due to completion of the incineration of the last of the nerve agents at the Umatilla Depot. These funding cuts have reduced both counties' overall emergency preparedness programs, though both remain involved with ODOE's nuclear emergency planning.

Oregon Department of Energy staff prepare every year for a nuclear emergency by holding drills and planning exercises.

Petroleum

The Oregon Department of Energy is responsible for protecting public health and safety in the event of a fuel crisis in Oregon. ODOE develops and maintains a statewide contingency plan in response to severe or long-term petroleum shortages or disruptions that impact the state. Oregon's Petroleum Contingency Plan includes fuel allocation procedures to ensure adequate fuel is provided to the state's emergency and essential services providers in case of a fuel shortage or crisis. The purpose of the plan is to provide an effective response, well coordinated with industry, governments and local organizations. The plan is also designed to ensure a rapid recovery of the fuel supply and distribution system while minimizing impacts to Oregonians. The Oregon Department of Energy will implement the plan, as appropriate, if it anticipates a potential or actual fuel emergency situation in the state.

Energy Assurance

To protect public health and safety, the environment, and the region's economy, ODOE is and has been working to improve the resiliency of critical energy infrastructure. This will ensure Oregon is prepared to respond to and recover from catastrophic events. This includes assessing seismic vulnerabilities of the petroleum, natural gas, and electricity infrastructures; evaluating the interdependencies of the energy sectors; and considering the use of renewable resources and smart grid technologies to supplement emergency response efforts. This work, which was done in coordination with the Oregon Public Utility Commission, helps ensure a rapid recovery of energy systems in the event of an energy emergency.

Liquefied Natural Gas

As part of its emergency preparedness obligations, the Oregon Department of Energy is responsible for protecting the health and safety of Oregonians in the event of a liquefied natural gas emergency along the transport channel as well as at any potential facility. There are two proposed LNG export/import terminals in Oregon currently in the federal siting process, one near Astoria and the other near Coos Bay. Each is at a different stage in the process.

The Oregon Department of Energy works with LNG developers, the U.S. Coast Guard and local emergency response organizations to develop a comprehensive emergency response plan to be completed prior to construction. ODOE, in conjunction with the U.S. Coast Guard, assesses waterway suitability for the transportation of LNG shipments. The agency also reviews facility security plans to ensure federal and state requirements are met and evaluates the Liquefied Natural Gas Vessel Transit Management Plan so that foreign vessels follow federal and state protocols when entering LNG transit corridors in Oregon.

Natural Gas

Oregon's gas utilities maintain emergency procedures. The utilities have systems in place to address interruptions. The Public Utility Commission regularly visits utilities to address emergency requirements related to excavation-caused line breaks, leaks, storage problems and other disruptions.

Abandoned Uranium Mines

During the 1950s, two uranium mines were developed in Lake County in southern Oregon. The White King and Lucky Lass mines were abandoned in the 1960s. In the mid-1980s, the U.S. Department of Energy and State of Oregon completed a cooperative cleanup of the uranium mill site near Lakeview. The mines themselves, however, were never cleaned up.

Governor Kitzhaber, in his first term, petitioned the U.S. Environmental Protection Agency to list the mines on the National Priorities List for federal Superfund cleanup. The EPA issued a record of decision adding the mines to the list in September 2001. Besides the EPA, others involved include the Oregon Department of Energy, the U.S. Forest Service and the Oregon Department of Environmental Quality.

The EPA, DEQ and ODOE negotiated a consent decree in which Kerr-McGee Corp. agreed to perform the cleanup work. Final site design included consolidating and stabilizing about one million tons of mine overburden (rock waste) and neutralizing the acidic water in the White King mine pit. The actual cleanup work occurred during the 2005 and 2006 construction seasons.

Following the winter of 2006-2007 corrective action was taken to repair excess erosion on the White King site, and "liming" of the White King pond was completed. Additional actions taken to restore the meadows and develop wetlands are progressing well.

The Oregon Department of Energy continues to monitor the clean-up work and performs annual inspections with DEQ, the EPA and U.S. Forest Service to ensure the protective measures are working.

Reducing Energy Costs

The 1975 Oregon legislature set as state goals the promotion of "the efficient use of energy resources" and the development of "permanently sustainable energy resources." Oregon is recognized for its efforts of being on the leading edge of energy efficiency and clean energy development for years.

The 2012 U.S. Clean Energy Leadership Index issued by Clean Edge listed Oregon as the number two national leader (behind California) in clean-energy states. The Index evaluated states based on incentives, regulations and mandates, financial and human capital and clean-energy technology.

In its 2012 ranking, the American Council for an Energy-Efficient Economy placed Oregon fourth in the nation. The scoring is based on state government incentives, appliance efficiency standards, transportation, building codes, public benefits fund and combined heat and power.

Conservation is a cornerstone of Oregon's energy policy because it is the most environmentally clean resource and, over the long run, it is the cheapest. The Oregon Department of Energy provides information, analyzes new technologies, and offers a variety of programs to encourage Oregonians to use energy more efficiently and to use Oregon's energy resources.

What follows is a snapshot in time of energy savings and energy generation; a look at what Oregonians have achieved over the years.

Below are the cumulative energy savings, generation, production and displacement from all projects completed from the start of ODOE programs in 1978 through the end of 2011. These estimated savings are adjusted for the life of the measures, excluding savings from projects assumed to have reached the end of their useful life by 2010.

Electricity	30,201,195 million Btu
Natural gas	11,898,020 million Btu
Oil	858,785 million Btu
Wood and other fuels	6,079,889 million Btu
Gasoline & Diesel	16,507,966 million Btu
Biofuels	9,845,858 million Btu
Thermal	2,883,153 million Btu

Altogether, the yearly energy savings and electricity generated are more than 78 trillion Btu or enough to meet the energy needs of about one million Oregon homes.

Energy Efficient Schools

This consists of both the SB 1149 (Public Purpose Charge) schools program and the more recent Cool Schools effort. Since there were not yet any savings from Cool Schools in 2011, only the PPC school savings are counted. From the start of the Energy Efficient Schools program in 2002 through the end of 2011, savings total about 1.2 trillion Btu.

Oregon's electric industry restructuring law (SB 1149) sets aside money for improving the energy efficiency of schools in the service areas of Portland General Electric and Pacific Power; the funds go directly to 112 school districts. Funds must first go to energy audits, then to measures recommended by those audits. The Oregon Department of Energy provides business and technical oversight for the energy audits and projects to ensure consistency with the program guidelines.

For schools outside PGE and Pacific Power territory, ODOE provides technical assistance and training for school staff and contractors on building highly efficient, productive and environmentally sound buildings. ODOE provides lists of qualified energy auditors and commissioning agents to facilitate contracting for energy efficiency improvements in schools.

Energy savings as of 2011:

Electricity	379,359 million Btu
Natural gas	715,107 million Btu
Oil	75,209 million Btu
Other	23,246 million Btu

Value of savings as of 2011: $17.6 million

The savings equal enough energy to meet the needs of about 15,676 Oregon homes.

Business Energy Tax Credits

The BETC program ended Dec. 31, 2012. The program, which had operated since 1979, offered tax credits for energy efficiency and conservation, clean transportation and renewable energy.

The numbers below represent cumulative savings in British thermal units (Btu) from the Business Energy Tax Credit program as of 2011. The calculations are adjusted to exclude savings from projects that are assumed to have reached the end of their useful live by 2010.

Energy saved as of 2011:

Electricity	9,419,850 million Btu
Natural gas	10,093,679 million Btu
Oil	406,361 million Btu
Wood/other	1,365,295 million Btu
Gas/Diesel	16,146,068 million Btu
Recycling	43 million Btu
Total	**37,431,296 million Btu**

Energy produced as of 2011:

Electricity	18,576,572 million Btu
Biofuels energy	8,065,526 million Btu
Thermal energy	2,853,651 million Btu
Total	**29,495,749 million Btu**

Value of savings/generation as of 2011:
$1.15 billion

The savings equal enough energy to meet the needs of about 879,000 Oregon homes.

Residential Energy Tax Credit

As new energy-saving technologies have come on the market, the legislature expanded the Residential Energy Tax Credit to encourage their adoption.

Highly efficient appliances, including heating ducts and certain water heating systems, were added in 1997. The program expanded in 2000 to include fuel cells and in late 2001 to include high-efficiency furnaces, boilers, heat pumps, ventilation systems and air conditioning systems.

In 2005, the legislature increased the solar electric tax credit to $6,000, which is $1,500 taken over four years. In 2007, wind systems and fuel cells also went to $6,000 taken over four years and very highly efficient wood and pellet stoves were added.

On Dec. 31, 2009 the tax credit for new gasoline-electric hybrid vehicles, such as the Toyota Prius, Honda Civic and Ford Escape, came to an end (HB 2078). Alternative fuel vehicles such as those powered by electricity, natural gas and propane lost their RETC eligibility on Jan. 1, 2012 under HB 3672 (2011).

Systems and equipment that are still eligible for a Residential Energy Tax Credit include:

- Solar and wind
- Ground source heat pumps; highly efficient furnaces and heat pumps
- Premium-efficiency wood stoves
- On-demand gas water heaters

RETC Energy savings as of 2011:

Electricity	644,880 million Btu
Natural gas	663,002 million Btu
Oil	3,466 million Btu
Gas/Diesel	311,253 million Btu
Total	**1,622,601 million Btu**

Value of savings/generation as of 2011: $32.7 million

The savings equal enough energy to meet the needs of about 21,300 Oregon homes.

State Home Oil Weatherization Program

For households that heat primarily with oil, propane or wood, the Oregon Department of Energy's State Home Oil Weatherization Program offers homeowners an Energy Audit Checklist and rebates for weatherization and heating measures. Oil companies doing business in Oregon fund the program.

About 100,000 Oregon homes are heated with oil or propane. Most of them were built before energy standards were part of the building code and are often in need of weatherization and heating measures. Since 2004, homeowners have been able to conduct their own audits.

Energy savings as of 2011: 861,000 gallons of oil

Value of savings as of 2011: $2.74 million

The savings equal enough energy to meet the needs of about 1,571 Oregon homes.

Large Electric Consumer Public Purpose Program

Under Senate Bill 1149 (1999), Portland General Electric and Pacific Power must collect a public purpose charge from both residential and business consumers within their service areas. The public purpose charge, three percent of the total electric costs on customers' bills, went into effect on March 1, 2002.

Large electric consumers (over one average megawatt or 8,650,000 kilowatt-hours a year) may be eligible to self-direct portions of their public purpose charges. The Oregon Department of Energy reviews and certifies applications by large electric consumers for conservation projects and renewable energy resources. ODOE administers the program through an interactive website.

Energy savings as of 2011:
Electricity 561,438 million Btu

Value of savings as of 2011: $8.8 million

The savings equal enough energy to meet the needs of about 7,378 Oregon homes.

Energy-efficient state buildings

An Oregon law enacted in 1990 requires that new state buildings and major renovations be as energy-efficient as possible, within cost-effectiveness guidelines. In response to the electricity crisis of 2001, legislation established a standard that is 20 percent better than the energy building code.

The Oregon Department of Energy, through its State Energy Efficient Design program, recommends energy savings measures to consider in the design and reviews the plans to ensure targets are achieved. Typical measures adopted include energy efficiency improvements for windows, lighting, controls and heating, ventilation and air conditioning equipment.

Energy savings as of 2011:

Electricity	187,386 million Btu
Natural gas	135,338 million Btu
Other	251,452 million Btu

Value of savings as of 2011: $11 million

The savings equal enough energy to meet the needs of about 7,545 Oregon homes.

Biomass Producer/Collector Tax Credit

The State of Oregon provides tax credits for the production, collection and transportation of biomass that is used for energy production.

To be eligible for this credit, an applicant must be an agricultural producer or biomass collector and the biomass material must be sourced from within Oregon. In addition, the biomass must be used as biofuel or to produce biofuel in Oregon. Applications for tax credits must be received no later than 45 days following the end of the tax year.

The tax credit was initially created by HB 2210 (2007) with authority for the program later moving from the Oregon Department of Revenue to the Oregon Department of Energy.

A University of Oregon study (2011) of the tax credit found that it:

- Helped prices in the wood fuels market remain competitive
- Created more economic activity than the program costs in foregone tax revenue

Energy Loans

Approved by the voters in 1980, the State Energy Loan Program has made more than 861 loans totaling about $581 million. One loan can fund multiple projects. SELP is a revolving loan program, designed to promote energy conservation and renewable energy development.

The program offers fixed-rate, long-term loans for projects that:

- Save energy
- Produce energy from renewable resources such as water, wind, geothermal, solar, biomass, waste materials or waste heat
- Use recycled materials to create products
- Use alternative fuels

The Loan Program serves individuals, businesses, tribes, schools, cities, counties, special districts, state and federal agencies, public corporations, cooperatives, and nonprofits. The loans are funded by the sale of state general obligation bonds. Borrowers pay the costs of administering the program.

SELP issues three types of bonds:

- Federally Taxable, for projects that save energy for businesses and homeowners.
- Governmental Purpose, for projects in publicly-owned and operated facilities.
- Private Activity, for private projects that use renewable resources to produce energy.

Loans

- SELP loans are required to be fully secured with good and sufficient collateral per ORS 470.150.
- Loan terms vary and are set to match the term of the bonds that funded the loans.
- Loan interest rates are set to reflect project/borrower risk, pay the costs of issuing bonds, funding reserves for loan losses, and operating the loan program.

Current Program Procedures

- Detailed financial analysis of the project and the borrower.
- Credit review information, borrower's financial status, projections of future worth and stability.
- SELP energy analyst reviews feasibility, and determines if the project will meet the savings or income stream.
- Staff recommends loan approval based on the soundness of the energy project and the borrower's ability to repay.
- SELP's loan advisory committee must review applications of more than $100,000.
- SELP services all its loans and performs ongoing monitoring of borrowers' financial strength.

Energy saved as of 2011:

Electricity	107,578 million Btu
Natural gas	506,948 million Btu
Oil	391,944 million Btu
Wood/other	40,278 million Btu
Gas/Diesel	68,754 million Btu
Total	**1,178,501 million Btu**

Energy produced as of 2011:

Electricity	1,351,572 million Btu
Biofuels energy	2,416,960 million Btu
Thermal energy	40,052 million Btu
Other	40 million Btu
Total	**3,808,624 million Btu**

Value of savings as of 2011: $108 million

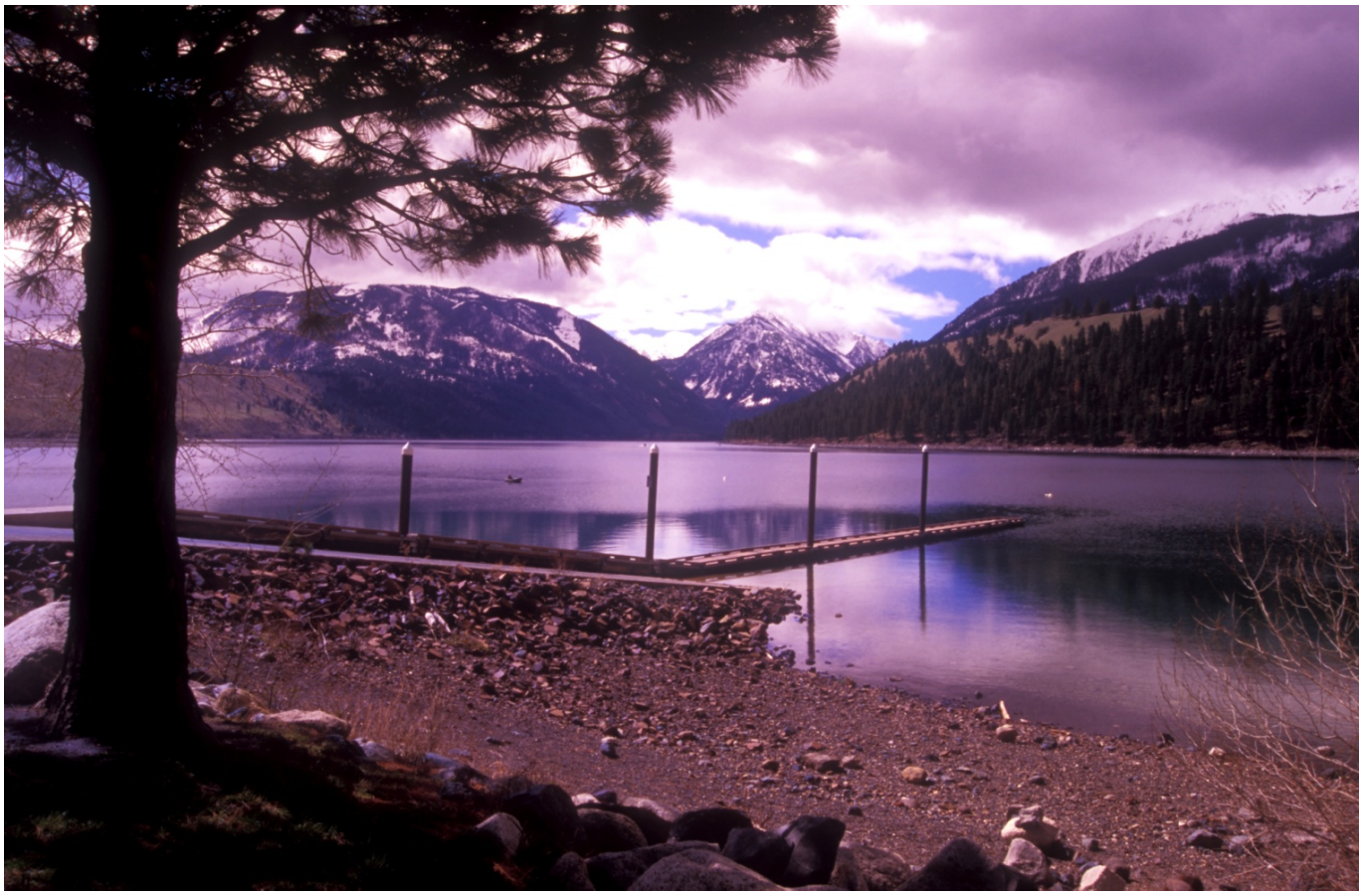
The savings equal enough energy to meet the needs of about 65,534 Oregon homes.

Energy Efficiency and Sustainable Technology Act

The 75th Legislative Assembly created the Energy Efficiency and Sustainable Technology Program with House Bill 2626. EEAST provides authority to finance residential and commercial energy efficiency and renewable energy projects by allowing consumers to repay energy loans as a line item charge on their monthly utility bill. SELP received lottery bond proceeds to carry out the EEAST pilot program in May 2010.

EEAST provisions amended ORS Chapter 470 establishing the Loan Offset Grant Fund and the Supplemental Fund. Lottery bond proceeds and any other funds directed by gift, grant or donation to the EEAST program are deposited into the Loan Offset Grant Fund.

In June, 2011 the Loan Offset Grant Fund (ORS 470.575) was renamed the Jobs Energy and Schools Fund. The use of grants available through the Jobs Energy Schools Fund was expanded to support public K-12 schools across the state.



Wallowa Lake in eastern Oregon—Photo by D.A. Black.

Appendix A—Energy Glossary

ARRA—The American Recovery and Reinvestment Act, also called the federal stimulus program. The authorizing legislation was signed on Feb. 17, 2009 and sent millions of dollars to states for energy efficiency, renewable energy and alternative fuel projects.

ASTM standards—Formed in 1898, the American Society for Testing and Materials (ASTM), develops international voluntary consensus standards. About 12,000 ASTM standards are used around the world to enhance safety and product quality.

Average megawatt—An aMW is 8,760 megawatt hours. This is the continuous output of a resource with one megawatt of capacity over a full year.

Avoided costs—The costs the utility would incur but for the existence of an independent generator or other energy service option. Avoided cost rates have been used as the power purchase price utilities offer independent suppliers.

Base Load—The minimum amount of electric power or natural gas delivered or required over a given period of time at a steady rate. A facility that produces energy at a constant rate.

Biofuels—Alcohols, ethers, esters, and other chemicals made from raw biological material such as herbaceous and woody plants, agricultural and forestry residues, and a large portion of municipal solid and industrial waste.

Biomass—Organic waste from agricultural, livestock, and lumber industry products, dead trees, foliage, etc., and is considered a renewable energy source. Biomass can be used as fuel and is most often burned to create steam that powers steam turbine generators. It is also used to make transportation fuels like ethanol and biodiesel.

Btu—British thermal unit; the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit under stated conditions of pressure and temperature (equal to 252 calories, 778 foot-pounds, 1,005 joules and 0.293 watt hours). It is the U.S. customary unit of measuring the quality of heat, such as the heat content of fuel.

Building Envelope—Outer walls, windows, doors, etc. of a building or the building shell.

Carbon Offset—A mechanism by which the impact of emitting a ton of CO2 can be negated or diminished by avoiding the release of a ton elsewhere, or absorbing a ton of CO2 from the air that otherwise would have remained in the atmosphere.

Carbon Sequestration—The fixation of atmospheric carbon dioxide in a carbon sink through biological or physical processes, such as photosynthesis.

Carbon sink—A reservoir that absorbs or takes up released carbon from another part of the carbon cycle. Vegetation and soils are common carbon sinks.

Cellulosic ethanol—alternative fuel made from such things as grain straw and poplars, using plant fibers instead of the soft starch of corn.

CO—Carbon Monoxide

CO2—Carbon Dioxide

Cogeneration—(also Combined Heat and Power)
Production of electricity from steam, heat, or other forms of energy produced as a by-product of another process.

cf—cubic foot; the U.S. customary unit of measurement of gas volume. It is the amount of gas required to fill a volume of one cubic foot under stated conditions of temperature, pressure and water vapor. One cubic foot of natural gas equals 1,000 British thermal units under standard conditions of atmosphere (one) and temperature (60 degrees Fahrenheit).

Cooperative electric association or utility—utility owned and operated by its members.

Demand—The rate at which electric energy is delivered to or by a system or part of a system, generally expressed in kilowatts (kW), megawatts (MW), or gigawatts (GW), at a given instant or averaged over any designated interval of time. Demand should not be confused with Load or Energy.

Deregulation—The elimination or restructuring of regulation from a previously regulated industry or sector of an industry.

Distillate Fuel Oil—Light fuel oils distilled during the refining process and used primarily for space heating, on-and-off highway diesel engine fuel (including railroad engine fuel and fuel for agricultural machinery), and electric power generation.

Distribution—The delivery of electricity to the retail customer's home or business through low voltage distribution lines.

DOE—U.S. Department of Energy, also called USDOE.

Electric Energy—The generation or use of electric power by a device over a period of time, expressed in kilowatt-hours (kWh), megawatt-hours (MWh), or gigawatt-hours (GWh).

Electric System Losses—Total electric energy losses in the electric system. Losses are primarily due to electric resistance within transmission system lines and transformers.

End-Use Energy—Energy consumed by end-users in the end-use sectors.

End-Use Sector—The residential, commercial, industrial, and transportation sectors of the economy.

Energy Conservation—Using less energy, either by greater energy efficiency or by decreasing the types of applications requiring electricity or natural gas to operate.

Energy Efficiency—Using less energy (electricity and/or natural gas) to perform the same function at the same level of quality. Programs designed to use energy more efficiently — doing the same with less.

EPA—U.S. Environmental Protection Agency.

Federal Energy Regulatory Commission (FERC)—The Federal Energy Regulatory Commission regulates the price, terms and conditions of power sold in interstate commerce and regulates the price, terms and conditions of all transmission services. FERC is the federal counterpart to state utility regulatory commissions.

Fossil Fuels—Sources of energy from the earth, primarily crude oil, natural gas, and coal.

Fuel Switching—The substitution of one type of fuel for another, either temporary or permanent. Permanent might include someone who replaces gasoline-powered fleet vehicles with electric cars.

Geothermal Energy—The energy from the internal heat of the Earth, which may be residual heat, friction heat, or a result of radioactive decay. The heat is found in rocks and fluids at various depths and can be extracted by drilling or pumping.

GWh—gigawatt-hour; the unit of energy equal to that expended in one hour at a rate of one billion watts. One GWh equals 1,000 megawatt-hours.

Green Tags—are created when a renewable energy facility generates electricity. Each certificate or tag represents all of the environmental attributes or benefits of a specific quantity of renewable generation. Those include the benefits that everyone receives when conventional fuels, such as coal, oil, or gas, are displaced.

Greenhouse gases—Greenhouse gases are water vapor, carbon dioxide, tropospheric ozone, nitrous oxide, methane, and chlorofluorocarbons.

Grid—A system of interconnected power lines and generators that is managed so that power from generators is dispatched as needed to meet the requirements of the customers connected to the grid at various points.

Investor owned utility—Common term for a privately owned (shareholder owned) gas or electric utility regulated by the Oregon Public Utilities Commission.

Interconnected System—A system consisting of two or more individual electric systems that have connecting tie lines and whose operations are synchronized.

Integrated Resource Plan (IRP)—A utility's complete look at future energy demands and how it plans to meet them.

KV—A kilovolt equals 1,000 volts.

Kilowatt (kW)—This is a measure of demand for power; the rate at which electricity is used during a defined period (usually metered over 15-minute intervals). Utility customers generally are billed on a monthly basis; therefore, the kW demand for a given month would be the 15- minute period in which the most power is consumed.

Kilowatt-hour (kWh)—This is a measure of consumption. It is the amount of electricity that is used over some period of time, typically a one-month period for billing purposes. Customers are charged a rate per kWh of electricity used.

Load—An end use device or customer that receives power from an energy delivery system. Load should not be confused with Demand, which is the measure of power that a load receives or requires.

Load Shifting—A type of load management that shifts use from peak to off-peak periods.

Liquefied natural gas (LNG)—Natural gas (primarily methane) that has been liquefied by reducing its temperature to -260 degrees Fahrenheit at atmospheric pressure.

Microturbines—Small, combustion turbines used for small-scale power generation.

MW—A megawatt equals 1,000 kilowatts or 1 million watts.

MWh—megawatt-hour; the unit of energy equal to that expended in one hour at a rate of one million watts. One MWh equals 3,414,000 Btus.

Nameplate Capacity—The maximum rated output of an electric power plant under specific conditions designated by the manufacturer. It is commonly expressed in megawatts (MW).

NERC—The North American Electric Reliability Corporation is a nonprofit corporation that develops and maintains mandatory reliability standards for the bulk electric system. Their goal is to maintain and improve the reliability of the system.

NOx—Nitrogen Oxides

PV—Photovoltaic or solar electricity

Peak Load or Peak Demand—The electric load that corresponds to a maximum level of electric demand within a specified time period, usually a year.

Pulping liquor—A substance primarily made up of lignin, other wood constituents and chemicals that are by-products of the manufacture of chemical pulp. It can be burned in a boiler to produce steam or electricity through thermal generation.

Reliability—Electric system reliability has two components—adequacy and security. Adequacy is the ability of the electric system to supply the aggregate electric demand and energy requirements of the customers at all times, taking into account scheduled and unscheduled outages of system facilities. Security is the ability of the electric system to withstand sudden disturbances such as electric short circuits or unanticipated loss of system facilities. Reliability also refers to the security and availability of natural gas and petroleum supply, transportation and delivery.

Renewable Resources—Renewable energy resources are naturally replenished, but flow-limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time. Some (such as geothermal and biomass) may be stock-limited in that stocks are depleted by use, but on a time scale of decades, or perhaps centuries, they can probably be replenished. Renewable energy resources include biomass, hydro, geothermal, solar and wind. In the future they could also include the use of ocean thermal, wave, and tidal action technologies.

RTO—A regional transmission organization designed to operate the grid and its wholesale power market over a broad region and with independence from commercial interests. An RTO would also have a role in planning and investing in the grid, though how it would conduct these activities remains unresolved. An RTO would also coordinate with other RTOs.

Ship Bunker C—A very heavy, residual fuel oil left over after other fuels have been distilled from crude oil. Also called No. 6 Fuel, it is used in power plants, ships and large heating installations.

Site Certificate—A site certificate is a consolidated license for energy facilities. "Site certificate" means the binding contractual agreement between the State of Oregon and the applicant, authorizing the applicant to construct and operate a facility on an approved site, incorporating all standards imposed by the council on the applicant. A site certificate brings together all state and local government permit requirements into a single decision by the Energy Facility Siting Council, a seven member citizen Commission appointed by the Governor. A decision of the Council is appealable only to the Oregon Supreme Court. The Oregon Department of Energy serves as staff to the Council.

Substation—A facility for switching electric elements, transforming voltage, regulating power, or metering.

Telework—A program allowing an employee, with training, permission and the technology, to work part-or full-time in a location other than their employer's main office. The alternate location is often the teleworker's home. It conserves fuel, relieves traffic congestion and improves air quality

Therm—One hundred thousand (100,000) British thermal units (1 therm = 100,000 British thermal units). This is approximately the energy in 100 cubic feet of natural gas.

Transmission—Transporting bulk power over long distances.

Utility—A regulated entity that exhibits the characteristics of a natural monopoly. For the purposes of the electric industry, "utility" generally refers to a regulated, vertically integrated monopoly electric company. "Transmission utility" refers to the regulated owner/operator of the transmission system

Watt—The unit of measure for electric power or rate of doing work. The rate of energy transfer equivalent to one ampere flowing under pressure of one volt.

WECC— The Western Electricity Coordinating Council is the Regional Entity responsible for coordinating and promoting bulk electric system reliability in the Western Interconnection. In addition, WECC assures open and non-discriminatory transmission access among members, provides a forum for resolving transmission access disputes, and provides an environment for coordinating the operating and planning activities.

Wholesale Power Market—The purchase and sale of electricity from generators to resellers (who sell to retail customers and/or other resellers) along with the ancillary services needed to maintain reliability and power quality at the transmission level.

Appendix B—Energy Legislation

Summary of Energy Legislation
Passed by the 2011 and 2012 Legislative Sessions
2011 Energy-Related Bills

HB 2960 Cool Schools
Effective Date: June 24, 2011
Last Action: June 24, 2011 Governor Signed
Oregon Laws 2011 Chapter 467

HB 2960 establishes the Clean Energy Deployment Program and the Clean Energy Deployment Fund to provide grants and loans to support energy efficiency or clean energy projects in Oregon; directs the Oregon Department of Energy to establish criteria for qualifications of projects and defines the types of projects that can be financed through the program; directs ODOE to establish and administer a four-year high performance schools pilot program within the Clean Energy Deployment Program; renames the Loan Offset Grant Funds to the Jobs, Energy and Schools Fund; and, directs the Public Utility Commission to report on feasibility, cost effectiveness, and potential ratepayer costs associated with power purchase agreements by Dec. 1, 2012. The bill changes the existing distribution of SB 1149 funds from educational service districts to school districts.

HB 2622 Boardman Biomass Conversion
Effective Date: Jan. 1, 2012
Last Action: June 2, 2011 Governor Signed
Oregon Laws 2011 Chapter 225

HB 2622 revises Oregon's Renewable Portfolio Standard (RPS) to include electricity generated from a renewable energy source, provided the generating facility previously burned coal as fuel source, ceased to do so, and converts to renewable energy source after the effective date of measure.

HB 3606 Business Energy Tax Credit Legislative fix
Effective Date: Sept. 28, 2011
Last Action: Aug. 2, 2011 Governor Signed
Oregon Laws 2011 Chapter 693

HB 3606 requires that federal grants obtained by a facility applying for a BETC reduce the total costs rather than certified costs and changes the timing of when a tax credit can be claimed for large renewable projects. For example, for large renewable projects with costs over $10 M, the five-year period starts the tax year after the department has received a completed application or when the transferee purchases the credit, whichever is later. HB 3606 also considers an application complete without the identification of a transferee. This provision applies to final certificates issued on or after Jan. 1, 2010.

HB 3672 Tax Credit Extension Bill
Effective Date: Sept. 28, 2011
Last Action: Aug. 5, 2011 Governor Signed
Oregon Laws 2011 Chapter 730

HB 3672 amends, sunsets and creates a number of tax credit programs administered by the Oregon Department of Energy. The bill is effective on Sept. 28, 2011 and most changes take effect at that time, although some key changes are retroactive. Changes to the Residential Energy Tax Credit and the Biomass Producer and Collector Tax Credit are effective beginning Jan. 1, 2012.

- **Business Energy Tax Credit—Sunsets (Section 1)** HB 3672 sunsets the BETC program effective July 1, 2011.
- **Renewable Energy Development—New provisions (Sections 22-33a)** This program allows the auction of tax credits, taxpayer contributions or direct appropriation by the legislature, to provide funds to award grants to renewable energy production systems. The Oregon Department of Energy may establish criteria and standards to choose between project applicants. A renewable energy production system means a system that uses biomass, solar, geothermal, hydroelectric, wind, landfill gas, biogas or wave, tidal or ocean thermal energy technology to produce energy.
- **Energy Conservation Projects—New provisions (Sections 34-51)** This program allows tax credits for any capital investment for which the first year energy savings yields a simple payback period of greater than three years with listed exceptions. Cogeneration facilities are eligible beginning Jan. 1, 2013. The Oregon Department of Energy may establish criteria and standards to choose between project applicants. Total tax credits for the program are limited to $28 million per biennium, and individual projects may receive up to 35 percent of costs or $3.5 million in tax credits to be taken over five years.
- **Transportation Projects—New Provisions (Sections 52-66)** This program allows tax credits for a public or nonprofit entity that provides transit services to members of the public and that receives state or federal funding for those services, or an alternative fuel vehicle infrastructure project. Total tax credits for the program are limited to $20 million per biennium; the credit may be taken in one year, or carried forward up to five succeeding years.
- **Residential Energy Tax Credit (RETC)—Amends existing program (Sections 67-77)** The measure extends the RETC program to Jan. 1, 2018, except for the alternative fuel vehicle credit (including electric vehicles) which retains its existing sunset of Jan. 1, 2012. Amendments to the program are effective beginning Jan. 1, 2012. HB 3672 eliminates some appliances such as dishwashers, clothes washers, refrigerators, air conditioners and boilers. The measure caps tax credits for third party alternative energy device installations.
- **Biomass Producer or Collector Tax Credit—Amends existing program (Sections 2-3)** HB 3672 extends the BPC program to Jan. 1, 2018. Changes to the program are effective Jan. 1, 2012. The credit is reduced for woody biomass and biomass from agricultural crops by changing the tax credit from $10 per *green ton* to $10 per *bone dry* ton. Yard debris and municipally generated food waste are now excluded from the program.

HB 2523 Transfers Renewable Energy Resource Equipment Manufacturing BETC to Business Oregon

Effective Date: Sept. 28, 2011
Last Action: June 23, 2011 Governor Signed
Oregon Laws 2011 Chapter 474

HB 2523 transfers administration of the Renewable Energy Resource Equipment Manufacturing Tax Credit from the Oregon Department of Energy to the Oregon Business Development Department. The measure maintains the existing sunset date of Jan. 1, 2014 as well as maintains the existing limits on pre-certification credits that may be issued; $200 million in 2011-2013 biennium and $50 million for the six months from July 2013 to December 2013. HB 2523 expands standards related to job creation for certified projects.

SB 862 State Forester Biomass Contracts

Effective Date: Jan. 1, 2012
Last Action: June 7, 2011 Governor Signed
Oregon Laws 2011 Chapter 247

Senate Bill 862 makes important updates to state forestry laws and accomplishes a number of objectives. This bill highlights the Department of Forestry's ability to issue contracts for woody biomass removal and makes it explicit that this activity is a forest practice regulated by the Forest Practices Act. The bill also clarifies the definition of woody biomass. Senate Bill 862 directs the State Forester to conduct an assessment of the types of woody biomass available.

HB 2700 Linear Removal-Fill Permitting

Effective Date: June 16, 2011
Last Action: June 16, 2011 Governor Signed
Oregon Laws 2011 Chapter 370

HB 2700 establishes that when a permit is issued to a person that proposes removal or fill activities for the construction or maintenance of a linear facility, and they are not the landowner or acting on behalf of the landowner, they may not conduct such activities on that property until they obtain one of the following: the landowner's consent, the right, title, or interest with respect to the property that is sufficient to undertake the removal or fill activity; or a court order or judgment that authorizes the use of the property. The measure requires the Department of State Lands, when the permit application process is deemed complete, to notify all landowners whose land is identified in the application, and landowners whose land is adjacent to the property of a landowner whose land is identified in the permit application.

HB 3538 Carbon Dioxide Equivalents
Effective Date: June 9, 2011
Last Action: June 9, 2011 Governor Signed
Oregon Laws 2011 Chapter 298

HB 3538 expands the types of greenhouse gases that are eligible for emission reduction projects to help meet the existing carbon dioxide standard for new energy facilities. Carbon dioxide, methane, and nitrous oxide are now eligible gases for these projects. The bill provides an "exchange rate" for methane and nitrous oxide and establishes that, unless set or modified by rule, the global warming potential of methane is 23 times that of carbon dioxide, and the global warming potential of nitrous oxide is 296 times that of carbon dioxide.

HB 2840 Green Jobs Growth Initiative Expansion
Effective Date: Jan. 1, 2012
Last Action: June 21, 2011 Governor Signed
Oregon Laws 2011 Chapter 452

House Bill 2840 changes the term "timber" to "forest products" and expands the definition to include businesses that grow, manage, harvest, transport, or process wood and paper products. House Bill 2840 instructs the Oregon Workforce Investment Board to analyze the key growth factors for green jobs in the forest products industry and the educational and skill standards required for these green occupations. Additionally, the measure requires the Board to use this analysis, in consultation with the Governor's education and workforce policy advisor, to identify those forest industries that create high- demand green forest products.

HB 3170 Tax Credit for Diesel Engines
Effective Date: Sept. 28, 2011
Last Action: Aug. 2, 2011 Governor Signed
Oregon Laws 2011 Chapter 674

HB 3170 moves the sunset date for the tax credit for new diesel engines forward from Dec. 31, 2013 to July 1, 2011.

SB 57 Business Development Energy Bonds
Effective Date: Jan. 1, 2012
Last Action: May 16, 2011 Governor Signed
Oregon Laws 2011 Chapter 27

SB 57 authorizes the Oregon Business Development Commission to use revenue bonds to finance economic development projects that provide for generation, transmission, sale or distribution of electrical energy.

Industrial Development Bonds are tax-exempt conduit bonds issued by the state to help Oregon companies by providing long-term financing for land, buildings and equipment for economic development purposes. Current statute (ORS 285B.323) makes facilities that are

designed primarily for the generation, transmission, sale or distribution of electrical energy ineligible for Industrial Development Bonds. This language has restricted Oregon Business Development Department's ability to issue Industrial Development Bonds to finance economic development projects. Removal of this language should allow OBDD to expand its support of clean energy and technology projects.

HJM 28 Hanford National Disposal Site
Last Action: June 28, 2011 Filed with the Secretary of State.

HJM 28 urges United States Department of Energy to remove Hanford Nuclear Reservation from the list of candidate sites for national permanent disposal of radioactive waste.

HB 2563 Property Tax Exemption for Energy Systems
Effective Date: Sept. 28, 2011
Last Action: Aug. 2, 2011 Governor Signed
Oregon Laws 2011 Chapter 656

Amongst other property tax changes, HB 2563 extends the sunset on property tax exemptions for solar, geothermal, wind, water, fuel cell, or methane gas energy systems from July 1, 2012 to July 1, 2018. The bill exempts actual alternative energy system as opposed to only the property to which it is attached and provides that portions of exempt property leased for alternative energy system installation do not become taxable as a result of this installation.

HB 3571 Ownership of RECs
Effective Date: June 7, 2011
Last Action: June 7, 2011 Governor Signed
Oregon Laws 2011 Chapter 248

HB 3571 specifies that the owner of a qualifying facility is the owner of a renewable energy certificate created pursuant to ORS 469A.130 for generation during the term of the contract where the contract was executed pursuant to 16 U.S.C. 2601 et. seq. and was in effect prior to Nov. 20, 2005. The provisions apply only to qualifying facilities located in Oregon, certified as qualifying small power production facilities or qualifying cogeneration facilities under 16 U.S.C. 796, and producing electricity priced under ORS 758.525. Under ORS 469A.130, the Oregon Department of Energy is required to establish a system of renewable energy certificates that can be used by an electric utility or electricity service supplier to establish compliance with the State's Renewable Portfolio Standard. The Department codified this system in Oregon Administrative Rules, Part 330, Division 150. These rules do not currently address ownership of renewable energy certificates for facilities built prior to 2005. House Bill 3571 establishes ownership rules for those certificates.

HB 3516 Solar PV Zoning
Effective Date: Jan. 1, 2012
Last Action: June 21, 2011 Governor Signed
Oregon Laws 2011 Chapter 464

HB 3516 establishes that installation and use of solar photovoltaic energy systems or solar thermal energy systems on residential or commercial buildings is an outright permitted use in any zone where such structures are an allowed use. HB 3516 establishes that approval of permit is a ministerial function if the installation can be accomplished without increasing the footprint of the structure or the peak roof height and that the plane of the system is parallel to the slope of the roof. HB 3516 prohibits cities and counties from collecting land use permit application fees or requiring extensive surveys or site evaluations in connection with such solar energy system permit applications. The bill exempts from provisions related to ministerial function and application fees, surveys and evaluations of those systems located on residential or commercial structure that is federally or locally designated as historic building, landmark or conservation landmarks; located in historic districts; or located in an area designated as significant scenic resource unless the material used is designated anti-reflective or 11 percent or less reflective.

HB 2827 Diesel Fuel Additives
Effective Date: March 1, 2011
Last Action: June 7, 2011 Governor Signed
Oregon Laws 2011 Chapter 243

Under current law (ORS 646.922), the sale of biodiesel containing additives to prevent congealing or gelling is permissible only until March 1, 2011. House Bill 2827 would remove the sunset on this provision of law and permits, between Oct. 1 and Feb. 28, the sale of biodiesel containing additives to prevent congealing or gelling.

The composition and cold flow properties of diesel fuels can vary. These characteristics are influenced by a number of factors, including the crude oil source and how it's refined and blended. Similarly, the cold flow properties of B20 or higher biodiesel blends can vary based on the feedstock from which they are made.

HB 2748 Wave Project Exemption
Effective Date: May 27, 2011
Last Action: May 27, 2011 Governor Signed
Oregon Laws 2011 Chapter 152

HB 2748 extends wave energy exemptions adopted by SB 195 (2009) through Dec. 31, 2021. The bill maintains provisions in existing statutes which establishes minimum standards relating to the development of hydroelectric energy power. The Department of Energy is party to a provision requiring an agreement between wave energy projects and seven state agencies to generally lessen or eliminate the impact of the project on the environment, fish and wildlife resources and commercial fishing and recreation.

2012 Energy-Related Bills

HB 4079 EIP amendments Bill

Effective Date: June 4, 2012
Last Action: Governor Signed March 16, 2012
Oregon Laws 2012, Chapter 45 2012 Laws

HB 4079 makes amendments to the programs created by HB3672 during the 2011 session, these changes clarified a number of issues remaining from the implementation of the new program. These included:

- Reduction in the burden of job reporting for participants in all programs
- Provided department direction and authority to allocate available credits within the transportation program, and changed to a 5-year credit for transportation
- Clarified various terms and definitions
- Codified current practice of establishing pass-through rate at time of preliminary certification
- Affirmed sunset of BETC program: all preliminary certifications expire on July 1, 2014
- Requires reporting for new programs through the transparency website
- Provides public record disclosure exemptions for grant applicants

SB 1533 1.5% for Public Building Green Technology

Effective Date: Jan. 1, 2013
Last Action: Governor Signed March 27, 2012
Oregon Laws 2012, Chapter 83

SB 1533 requires a contracting agency to include an amount in a contract for construction, reconstruction or major renovation of a public building equivalent to 1.5 percent of the total contract price for the inclusion of appropriate green energy technology. This is an expansion on the existing requirement for solar technology in that it adds geothermal technology under the definition of “green energy technology.”

Appendix C—Energy Success Stories

Cool Schools and the Pine Eagle School District

The Pine Eagle School District in the eastern Oregon town of Halfway has a long history of trying to keep its students warm. How else would you explain the fireplace in the school, which was built in 1968?

“Our school is probably the only one in the country that has a fireplace in the lobby,” says district superintendent Mike Corley.

The climate in Halfway is one of the most extreme in Oregon. The average low temperature for the coldest month (January) is minus 16 degrees. The average high temperature for the hottest month (August) is 100 degrees. Those fluctuations can put quite a strain on a building and its energy systems.

The fireplace hasn’t been used for about 20 years, largely due to safety concerns. However, school officials are looking into a pellet stove insert that would bring the fireplace back to life and – hopefully – by using locally made pellets in the process.

“We’ve been a very energy-conscious program for the last several years,” adds Corley. “We’ve gone through a number of improvements.”

In 2010, the school district was awarded $86,693 in federal stimulus funds for a major lighting upgrade. Less than a year later, Pine Eagle officials heard about Oregon’s new Cool Schools program that encourages schools to take on energy upgrades at below-market interest rates. Pine Eagle, realizing an opportunity to increase the insulation in the school’s attic, jumped in with both feet.

“We did not qualify for any grants at the time and when this (Cool Schools) came around, we decided to jump at it,” says Corley. “The return on investment was within the five- to six-year range, which was very agreeable to us.”

The district’s lone school building upgraded its attic insulation (going from R-19 to at least R-42) in mid-December at a cost of about $13,000. After receiving four bids from contractors in the region, the district went with Rouse Custom Homes & Insulation from Joseph.

“The project went very well,” says Corley. “We’re very satisfied.”

Like all eight Cool Schools Phase I projects, Pine Eagle’s insulation work was financed through the Oregon Department of Energy’s Small Scale Energy Loan Program.

“The interest rate was very low,” says Corley. “I think the payback is probably going to be coming in quicker than we had planned.”

Not only will the added insulation stabilize temperatures within the building, it will also prevent further damage to the flat roof. Prior to the installation, so much heat escaped the building that it would melt the snow on the roof. As the snowmelt drained to the edges of the building, it would refreeze once it reached the colder soffit and the expanding ice would damage the roof.

“Our building was cold,” Corley says. “The immediate impact will be a warmer building. The longer term impact will be freeing up resources for learning instead of heat.”

But now that the insulation job is done, that doesn’t mean Corley and Shawn Thatcher, the district’s maintenance supervisor, will be sitting on their hands. In addition to the potential fireplace insert, the district is working with Idaho Power – its electricity provider – on installing a solar system next spring. A new control system is also on the blackboard and Thatcher says he’s investigating the possibility of adding a groundsource heat pump.

Says Corley: “We’ll continue to look for energy conservation projects in the future.”

Appendix D—2010 Government to Government Report
Oregon Department of Energy—2012 Summary

Key Contact:
Diana Enright, Division Administrator
Phone: (503) 378-8278
Fax: (503) 373-7806
diana.enright@state.or.us

The mission of the Oregon Department of Energy (ODOE) is to reduce the long-term costs of Energy for Oregonians. To achieve that mission, ODOE works to ensure Oregon has an adequate supply of reliable and affordable energy and is safe from nuclear contamination, by helping Oregonians save energy, develop clean energy resources, promote renewable energy, and clean up nuclear waste.

Ongoing Efforts

Energy Infrastructure Siting

The Oregon Department of Energy, as staff to the Energy Facility Siting Council, works with tribes regarding the proposed siting of new energy facilities and pipelines. Some of the proposals include wind farms, natural gas-fired power plants and electric transmission lines.

The Boardman to Hemingway transmission line is being proposed by Idaho Power and the Cascade Crossing transmission line by Portland General Electric. The projects involve state, federal and tribal governments. ODOE siting officers reviewing the projects have been attending meetings of state and federal cultural resource experts to determine a common basis of information, how the information feeds into the Energy Facility Siting Council process and keeping the cultural information confidential.

For other proposed energy projects, ODOE has received Notices of Intent from:

- Heppner Wind in Morrow and Umatilla counties. This proposed 500 MW wind energy facility from Invenergy would consist of 335 turbines on 61,000 acres. A 39-to-46 mile long 230 kV transmission line would also be included. ODOE issued a project Order on Sept. 10, 2012.
- The Perennial Wind Chaser Station in Hermiston. This is a planned 400 MW natural gas facility proposed by Perennial Power Holdings, LLC. It would consist of up to four natural gas-fired turbines on 20 acres. Umatilla Electric has identified two new routes for the transmission line for this facility.
- Rock Creek Wind Facility in Gilliam County. The EFSC has approved an extension of the NOI expiration date to Aug. 23, 2013. Rock Creek is a 550 MW wind generation facility proposed by Rock Creek Wind Power LLC.
- South Dunes is a gas-fired thermal combustion plant planned for Coos County. Jordan Cove Energy would use this facility to provide power to the proposed Jordan Cove LNG export facility. The applicant filed an NOI on Aug. 1, 2012, and a public information meeting was held on Sept. 11, 2012 in North Bend. A supplement to the public notice of the NOI, issued in October 2012.

Protecting the Columbia River

The Hanford Site in southeastern Washington State used to produce plutonium for nuclear weapons. The production process resulted in large amounts of chemical and radioactive waste. These wastes pose a long-term threat to the Columbia River. The Oregon Department of Energy is responsible for the technical review of the Hanford cleanup and assessment of potential impacts on the Columbia River and Oregon.

The State of Oregon continues to work closely with the Confederated Tribes of the Umatilla Indian Reservation regarding Hanford policy and technical issues. This is done under a Memorandum of Understanding coordinating efforts related to the Columbia River, groundwater protection, radioactive material transport, public information and emergency preparedness. The CTUIR is also represented on the Hanford Cleanup Board.

ODOE staff consults and coordinates with CTUIR staff regularly on Hanford technical and policy issues. ODOE also works with the CTUIR as a member of the Hanford Natural Resource Trustee Council.

Agency Participation

The agency attends the Natural Resource Working Group meetings, the Government-to-Government Summits and Tribal Information Day at the Capitol.

Working on Innovation

The State Energy Loan Program is working with the Coquille Economic Development Corporation, the business arm of the Coquille Indian Tribe, on a loan application. The requested financing would be for Perpetua Power, a company that manufactures Perpetua's Power Pucks. The devices harvest energy from common temperature differences found on steam pipes, and waste heat from pumps, motors, fans, and other industrial equipment to provide power and eliminate battery replacements.

American Recovery and Reinvestment Act funds that ODOE provided to ODOT for the Electric Highway, led to electric vehicle charging stations being installed at the Cow Creek's Seven Feathers Truck and Travel Center. ODOE is also working with ODOT on a similar charging station set- up for the Confederated Tribes of Grand Ronde.

Appendix E—Oregon Electric Utilities

Baker	Oregon Trail Electric Cooperative, Idaho Power Company
Benton	Consumers Power Inc., Pacific Power
Clackamas	Canby Utility Board, Portland General Electric
Clatsop	West Oregon Electric Cooperative, Clatskanie People's Utility District, Pacific Power
Columbia	West Oregon Electric Cooperative, Columbia River Public Utility District, Clatskanie People's Utility District, Portland General Electric
Coos	Coos-Curry Electric Cooperative, Central Lincoln People's Utility District, City of Bandon Electric Department, Pacific Power
Crook	Central Electric Cooperative, Pacific Power
Curry	Coos-Curry Electric Cooperative, Central Lincoln People's Utility District
Deschutes	Midstate Electric Cooperative, Central Electric Cooperative, Pacific Power
Douglas	Coos-Curry Electric Cooperative, Douglas Electric Cooperative, Central Lincoln People's Utility District, City of Drain, Pacific Power, Umpqua Indian Utility Co-op
Gilliam	Wasco Electric Cooperative, Columbia Basin Electric Cooperative
Grant	Oregon Trail Electric Cooperative, Central Electric Cooperative, Columbia Power Co-op
Harney	Oregon Trail Electric Cooperative, Harney Electric Cooperative, Idaho Power Co.
Hood River	Hood River Electric Cooperative, City of Cascade Locks, Pacific Power
Jackson	City of Ashland Electric Department, Pacific Power
Jefferson	Central Electric Cooperative, Wasco Electric Cooperative, Pacific Power
Josephine	Pacific Power
Klamath	Midstate Electric Cooperative, Pacific Power
Lake	Midstate Electric Cooperative, Central Electric Cooperative, Surprise Valley Electric Cooperative, Harney Electric Cooperative, Pacific Power
Lane	Blachly-Lane Electric Cooperative, Consumers Power Inc., Lane Electric Cooperative, Midstate Electric Cooperative, Central Lincoln People's Utility District, Emerald People's Utility District, Eugene Water & Electric Board, Springfield Utility Board, Pacific Power
Lincoln	Central Electric Cooperative, Consumers Power Inc., Central Lincoln People's Utility
Linn	Consumers Power Inc., Pacific Power
Malheur	Harney Electric Cooperative, Idaho Power Company
Marion	Consumers Power Inc., Salem Electric Cooperative, Pacific Power, PGE
Morrow	Umatilla Electric Cooperative, Columbia Basin Electric Cooperative
Multnomah	City of Cascade Locks, Pacific Power, Portland General Electric
Polk	Consumers Power Inc., Salem Electric Cooperative, City of Monmouth Power & Light, Pacific Power, Portland General Electric
Sherman	Wasco Electric Cooperative, Columbia Basin Electric Cooperative
Tillamook	Tillamook People's Utility District
Umatilla	Umatilla Electric Cooperative, Columbia Basin Electric Cooperative, Columbia Power Cooperative, Milton-Freewater City Light & Power, Hermiston Energy Services, Pacific Power
Union	Oregon Trail Electric Cooperative, Umatilla Electric Cooperative
Wallowa	Pacific Power
Wasco	Central Electric Cooperative, Wasco Electric Cooperative, Northern Wasco County PUD
Washington	West Oregon Electric Cooperative, City of Forest Grove Power & Light Dept. Portland General Electric
Wheeler	Wasco Electric Cooperative, Columbia Basin Electric Cooperative, Harney Electric Cooperative, Columbia Power Cooperative
Yamhill	West Oregon Electric Cooperative, McMinnville Water & Light, Portland General Electric

Appendix F—Reducing Carbon Emissions

Besides saving and generating energy over the years, the Oregon Department of Energy's programs have also helped to reduce greenhouse gas emissions.

Oregon's recent climate change activities are a continuation of policies and measures that the state has pursued since the 1980s. The main greenhouse gas is carbon dioxide (CO_2) and the other five include: nitrous oxide, methane, hydrofluorocarbon gases, perfluorocarbons, and sulfur hexafluoride.

A Chronology of Oregon's Climate Change Efforts

1988	The Oregon Task Force on Global Warming recommended creating a permanent Global Warming Management Group, reducing net greenhouse gas emissions, and having state agencies build climate change work into their plans and programs.
1992	Oregon adopted a benchmark to hold the state's carbon dioxide (CO_2) emissions to 1990 levels.
1995	An Oregon Department of Energy *Report on Reducing Oregon's Greenhouse Gas Emissions* outlined a short- and long-term climate change strategy. Some of the actions included capturing all cost-effective energy efficiency and renewable resources and increasing the efficiency of Oregon's transportation system.
1997	Oregon became the first state to control emissions of carbon dioxide. The Oregon legislature gave the Energy Facility Siting Council authority to set carbon dioxide emissions standards for new energy facilities. The bill came from a recommendation made by a seven-member task force. House Bill 3283 required developers to reduce the overall amount of carbon dioxide emitted from new power plants.
2003	Governor Kulongoski joined the California and Washington governors to establish the West Coast Governors' Global Warming Initiative. The Initiative provided the three states a forum for interstate cooperation on reducing greenhouse gas emissions.
2004	A 28-member Advisory Group on Global Warming was appointed by the governor to create a climate action plan for Oregon. This diverse group of stakeholders completed the *Oregon Strategy for Greenhouse Gas Reductions* in December. The *Strategy* recommended policies and measures in several areas including Energy Efficiency, Electric Generation and Supply, Transportation, Biological Sequestration, and State Government Operations.
2005	The Carbon Allocation Task Force in August 2005 was established to develop a carbon allowance program designed to meet the State's greenhouse gas reduction goals.
2006	Governor Kulongoski's Executive Order on Sustainability for the 21st Century incorporates greenhouse gas emissions accounting into state agency decisions and reporting. Executive Order 06-02 calls for the Department of Administrative Services to coordinate an interagency team to lay the foundation for agency greenhouse gas inventories.
2006	The Climate Change Integration Group was convened to oversee implementation of the recommendations from the 2004 Advisory Group; to assess the current state of

	knowledge about the sensitivity, adaptive capacity and vulnerability of natural and human systems to global warming; and to prepare recommendations about how the state can adapt to unavoidable changes.
2007	The Governor's carbon dioxide goals became law when the 2007 legislature passed HB 3543: • By 2010, arrest the growth of Oregon's greenhouse gas emissions (including, but not limited to CO_2) and begin to reduce them, making measurable progress toward meeting the existing benchmark for CO_2 of not exceeding 1990 levels. • By 2020, achieve a 10 percent reduction below 1990 greenhouse gas levels. • By 2050, achieve a "climate stabilization" emissions level at least 75 percent below 1990 levels. That legislation also created the Global Warming Commission and the Oregon Climate Change Research Institute.
2007	The governors of the five Western states sign a joint memorandum of understanding to form the Western Regional Climate Action Initiative (later shortened to the Western Climate Initiative, or WCI). The WCI later expanded to other states and most of Canada.
2008	The CCIG issued their report *A Framework for Addressing Rapid Climate Change* in January 2008.
2009	The legislature passed and Governor Kulongoski signed into law further greenhouse gas reduction efforts. These included SB 101 to prevent new conventional coal plants, HB 2186 to reduce the average carbon intensity of fuels and HB 2078 that provides incentives for the transition to zero-emission vehicles.
2009	The Oregon Global Warming Commission issued its first report to the legislature. Recommendations included moving forward with the Western Climate Initiative's proposed framework for cap and trade, promoting more energy efficiency and renewable energy, preparing for and adapting to the impacts of climate change, and supporting land use planning that addresses climate change.
2010	The Global Warming Commission creates its Interim Roadmap to 2020. The Oregon Sustainable Transportation Initiative gets underway when SB 1059 is passed by the Oregon legislature. Designed to reduce greenhouse gas emissions from transportation, the Oregon Department of Transportation and the Oregon Department of Land Conservation and Development are named as the lead agencies. The two supporting agencies are the Oregon Department of Energy and the Oregon Department of Environmental Quality.
2011	The second biennial report to the legislature is issued by the Oregon Global Warming Commission. The report says that progress toward Oregon's 2020 and 2050 goals – to reduce greenhouse gas emissions by 10 percent and at least 75 percent below 1990 levels, respectively – remains challenging.
2012	The Oregon Department of Energy used federal Recovery Act funds to commission a Greenhouse Gas Foundational Analysis and Modeling study. This third-party study modeled a wide variety of potential energy and climate measures.

Appendix G—Power Plants in Oregon

Source: EPA eGrid 2012 using 2009 data

Plant name	Plant operator name	Plant county name	Plant primary fuel generation category	Plant nameplate capacity (MW)
Albany Paper Mill	International Paper	Linn	GAS	96.0
Alden Bailey Power Plant	Clatskanie Peoples Util Dist	Clatsop	GAS	10.9
Arlington Wind Power Project	Arlington Wind Power Project LLC	Gilliam	WIND	103.0
Beaver	Portland General Electric Co	Columbia	GAS	610.7
Bend	PacifiCorp	Deschutes	HYDRO	1.1
Big Cliff	USCE-North Pacific Division	Marion	HYDRO	18.0
Big Top LLC	Big Top LLC	Morrow	WIND	1.7
Biglow Canyon Wind Farm	Portland General Electric Co	Sherman	WIND	274.9
Biomass One LP	Biomass One LP	Jackson	BIOMASS	40.0
Boardman	Portland General Electric Co	Morrow	COAL	601.0
Bonneville	USCE-North Pacific Division	Multnomah	HYDRO	1,092.9
Butter Creek Power LLC	Butter Creek Power LLC	Umatilla	WIND	5.0
Carmen Smith	Eugene Water & Electric Board	Linn	HYDRO	114.3
Clearwater 1	PacifiCorp	Douglas	HYDRO	15.0
Clearwater 2	PacifiCorp	Douglas	HYDRO	26.0
Co-Gen II LLC	Co-Gen II	Douglas	BIOMASS	7.5
Co-Gen LLC	Co-Generation Co	Grant	BIOMASS	7.5
Coffin Butte	Power Resources Cooperative	Benton	BIOMASS	5.6
Columbia Ridge	WM Renewable Energy LLC	Gilliam	BIOMASS	6.4
Combine Hills I	Eurus Combine Hills I LLC	Umatilla	WIND	41.0
Condon Windpower LLC	AES Wind Generation Inc	Gilliam	WIND	49.8
Copper Dam Plant	Farmer's Irrigation District	Hood River	HYDRO	3.0
Cougar	USCE-North Pacific Division	Lane	HYDRO	26.0
Covanta Marion Inc	Covanta Marion Inc	Marion	BIOMASS	13.1
Coyote Springs	Portland General Electric Co	Morrow	GAS	266.3
Coyote Springs II	Avista Corp	Morrow	GAS	287.0
Detroit	USCE-North Pacific Division	Marion	HYDRO	100.0
Dexter	USCE-North Pacific Division	Lane	HYDRO	15.0
Dillard Complex	Roseburg Forest Products Co	Douglas	BIOMASS	51.5
Dry Creek Landfill Gas to Energy	Oregon Environmental Industries LLC	Jackson	BIOMASS	3.2
Eagle Point	PacifiCorp	Jackson	HYDRO	2.8
East Side	PacifiCorp	Klamath	HYDRO	3.2
Elkhorn Valley Wind Farm	Telocaset Wind Power Partners	Union	WIND	100.7
Evergreen BioPower LLC	Evergreen BioPower LLC	Linn	BIOMASS	21.0
Falls Creek	Falls Creek Hydropower LP	Linn	HYDRO	4.1
Faraday	Portland General Electric Co	Clackamas	HYDRO	36.6

Fish Creek	PacifiCorp	Douglas	HYDRO	11.0
Foster	USCE-North Pacific Division	Linn	HYDRO	20.0
Four Corners Windfarm LLC	Four Corners Windfarm LLC	Umatilla	WIND	10.0
Four Mile Canyon Windfarm LLC	Four Mile Canyon Windfarm LLC	Morrow	WIND	10.0
FPL Energy Vansycle LLC (OR)	FPL Energy Vansycle LLC	Umatilla	WIND	122.8
Galesville Project	Douglas County	Douglas	HYDRO	1.6
Green Peter	USCE-North Pacific Division	Linn	HYDRO	80.0
Green Springs	U S Bureau of Reclamation	Jackson	HYDRO	17.2
Hay Canyon Wind Power LLC	Iberdrola Renewables Inc	Sherman	WIND	108.0
Hells Canyon	Idaho Power Co	Wallowa	HYDRO	391.5
Hermiston Generating Plant	Hermiston Generating Co LP	Umatilla	GAS	621.2
Hermiston Power Partnership	Hermiston Power Partnership	Umatilla	GAS	689.4
Hills Creek	USCE-North Pacific Division	Lane	HYDRO	30.0
IP Springfield Oregon	International Paper Corporation	Lane	BIOMASS	65.0
John C Boyle	PacifiCorp	Klamath	HYDRO	98.7
John Day	USCE-North Pacific Division	Sherman	HYDRO	2,160.0
Klamath Cogeneration Plant	Pacific Klamath Energy Inc	Klamath	GAS	501.5
Klamath Expansion Project	Pacific Klamath Energy Inc	Klamath	GAS	117.6
Klondike Wind Power	Iberdrola Renewables Inc	Sherman	WIND	24.5
Klondike Windpower II	Iberdrola Renewables Inc	Sherman	WIND	75.0
Klondike Windpower III	Iberdrola Renewables Inc	Sherman	WIND	297.5
Lacomb Irrigation District	Lacomb Irrigation Dist	Linn	HYDRO	1.0
Leaburg	Eugene Water & Electric Board	Lane	HYDRO	13.5
Leaning Juniper	PacifiCorp	Gilliam	WIND	100.5
Lemolo 1	PacifiCorp	Douglas	HYDRO	32.8
Lemolo 2	PacifiCorp	Douglas	HYDRO	33.0
Lookout Point	USCE-North Pacific Division	Lane	HYDRO	120.0
Lost Creek	USCE-North Pacific Division	Jackson	HYDRO	49.0
McNary	USCE-North Pacific Division	Umatilla	HYDRO	990.5
Medford Operation	Boise Cascade Wood Products LLC	Jackson	BIOMASS	8.5
Michell Butte Power Project	Owyhee Irrigation District	Malheur	HYDRO	1.8
Middle Fork Irrigation District	Middle Fork Irrigation Dist	Hood River	HYDRO	3.3
North Fork	Portland General Electric Co	Clackamas	HYDRO	40.8
North Fork Hydro	HDI Associates V	Klamath	HYDRO	1.2
Oak Grove	Portland General Electric Co	Clackamas	HYDRO	51.0
Opal Springs Hydro	Deschutes Valley Water District	Jefferson	HYDRO	4.3
Oregon Trail Windfarm LLC	Oregon Trail Windfarm LLC	Umatilla	WIND	9.9
Owyhee Dam Power Project	Owyhee Irrigation District	Malheur	HYDRO	4.3
Oxbow	Idaho Power Co	Baker	HYDRO	190.0
Pacific Canyon Windfarm LLC	Pacific Canyon Windfarm LLC	Morrow	WIND	8.3
Pebble Springs Wind LLC	Iberdrola Renewables Inc	Gilliam	WIND	98.7
Pelton	Portland General Electric Co	Jefferson	HYDRO	109.8
Peters Drive Plant	Farmer's Irrigation District	Hood River	HYDRO	1.8
PHP 1	Portland General Electric Co	Multnomah	HYDRO	23.7
PHP 2	Portland General Electric Co	Clackamas	HYDRO	11.8

Port Westward	Portland General Electric Co	Columbia	GAS	483.0
Prospect 1	PacifiCorp	Jackson	HYDRO	3.8
Prospect 2	PacifiCorp	Jackson	HYDRO	32.0
Prospect 3	PacifiCorp	Jackson	HYDRO	7.2
Prospect 4	PacifiCorp	Jackson	HYDRO	1.0
R & R Lumber	Rough and Ready Lumber Company	Douglas	WSTHTOTPUR	1.5
River Mill	Portland General Electric Co	Clackamas	HYDRO	18.8
Round Butte	Portland General Electric Co	Jefferson	HYDRO	246.9
Sand Ranch Windfarm LLC	Sand Ranch Windfarm LLC	Morrow	WIND	9.9
Short Mountain	Emerald People's Utility Dist	Lane	BIOMASS	3.2
Siphon Power Project	Central Oregon Irrigation Dist	Deschutes	HYDRO	5.4
Slide Creek	PacifiCorp	Douglas	HYDRO	18.0
Soda Springs	PacifiCorp	Douglas	HYDRO	11.0
SP Newsprint- Newberg Cogen	SP Newsprint Company	Yamhill	BIOMASS	109.3
Stone Creek	Eugene Water & Electric Board	Clackamas	HYDRO	12.0
Sullivan	Portland General Electric Co	Clackamas	HYDRO	15.4
The Dalles	USCE-North Pacific Division	Wasco	HYDRO	1,819.7
The Dalles Fishway	Northern Wasco County PUD	Wasco	HYDRO	6.5
Threemile Canyon Wind I LLC	Threemile Canyon Wind I LLC	Morrow	WIND	9.9
Toketee Falls	PacifiCorp	Douglas	HYDRO	42.6
Tunnel 1 Power Project	Owyhee Irrigation District	Malheur	HYDRO	7.0
U of Oregon Central Power Station	University of Oregon	Lane	GAS	4.0
Vansycle	ESI Vansycle Partners LP	Umatilla	WIND	25.0
Wagon Trail LLC	Wagon Trail LLC	Morrow	WIND	3.3
Wallowa Falls	PacifiCorp	Wallowa	HYDRO	1.1
Walterville	Eugene Water & Electric Board	Lane	HYDRO	8.0
Ward Butte Windfarm LLC	Ward Butte Windfarm LLC	Umatilla	WIND	6.6
Warm Springs Forest Products	Warm Springs Forest Prod Indst	Jefferson	BIOMASS	9.0
Warm Springs Power Enterprises	Warm Springs Power Enterprises	Jefferson	HYDRO	19.6
Wauna Mill	Fort James Operating Company	Clatsop	GAS	36.0
Wheat Field Wind Power Project	Wheat Field Wind Power Project LLC	Gilliam	WIND	97.0
Willow Creek Energy Center	Invenergy Services LLC	Morrow	WIND	72.0