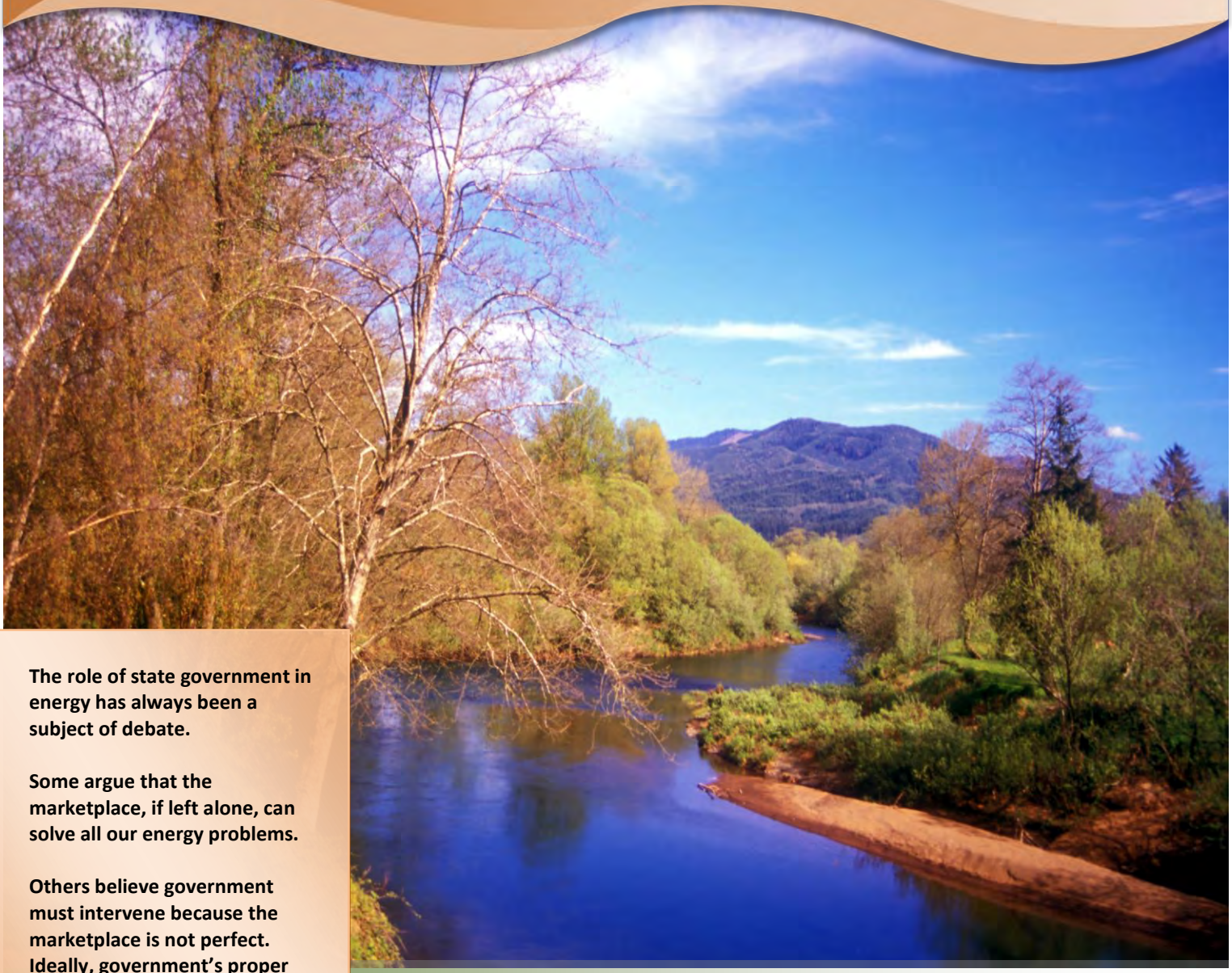
2011-2013
State of Oregon Energy Plan



The role of state government in energy has always been a subject of debate.

Some argue that the marketplace, if left alone, can solve all our energy problems.

Others believe government must intervene because the marketplace is not perfect. Ideally, government's proper role is to ensure that the free market can work.

State of Oregon First Biennial Energy Plan, Prepared by the Oregon Department of Energy, 1985

OREGON
DEPARTMENT OF
ENERGY

2011-2013
State of Oregon

Energy Plan

625 Marion Street, NE
Salem, OR 97301

(503) 378-4040
1-800-221-8035 in Oregon
www.oregon.gov/energy
energyweb.incoming@ state.or.us

Photos: D.A. Black and the Oregon Department of Energy

2011-2013 Biennial Energy Plan

Table of Contents

INTRODUCTION

Oregonians spend more than $14 billion annually on energy; most of that money leaves the state.

The Oregon Department of Energy (ODOE) was established over 35 years ago 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 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.

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 in the role of energy conservation and efficiency and require the siting of new energy resources.

Energy conservation is the cornerstone of Oregon energy policy. The Oregon Department of Energy must continue to encourage energy savings, which will reduce energy consumption and reliance on fossil fuels. Energy efficiency can help businesses become more competitive, while schools and governments can lower their operating costs, freeing up money to be spent elsewhere.

Oregon is rich in renewable resources. These indigenous energy sources can sustain the economy in tough times and enable it to grow when the economy recovers. Renewable resource projects, such as wind farms, create new jobs during construction and permanent employment when complete.

This Energy Plan will outline the history of Oregon's energy efforts, the basics of Oregon's energy supply and consumption, issues facing the State, and where we might go from here. There is a current, growing interest in energy issues, but it is important to understand the past so we can work toward a sustainable energy future.

Oregon's Energy History

For more than 35 years, the Oregon Department of Energy has been involved in a variety of energy planning efforts. Documents published early in 1975, just before the Department was officially an agency, helped shaped its creation. One of the most well-known of these is called ***Transition, A Book on Future Energy: Nuclear or Solar?***

The ***Transition*** authors outlined what they were facing at the time:

> "…increasing unemployment, rising prices, increasing bankruptcies and business failures, wildly fluctuating interest and exchange rates, increasing foreclosures…"
>
> "…as energy prices rose, it became apparent that the energy systems so many had taken for granted were almost entirely outside of our control. In fact, about 95 percent of the energy we use in Oregon is imported."

When ***Transition*** was reprinted in 1977, the introduction by Governor Tom McCall read:

> "***Transition*** is a bold document. It challenges the people of this state to create their own future rather than having it arbitrarily imposed upon them, by special interest and external events."

The establishment of the Oregon Department of Energy in 1975, it set in motion a centralized system for developing energy policies and plans, and gave Oregon a focused energy effort. Many of those policies and plans continue today, while some have been modified over time. The common thread is that the State of Oregon has been strategically evaluating energy use and supply for more than 35 years, working to give Oregonians more control of their energy future.

Today

We live in a more diverse energy world. As energy issues have become increasingly complex, global and controversial, more people are paying attention to how we obtain and use energy.

- Development of renewable energy has expanded the list of issues facing decision-makers.
- Cultural, tribal, agricultural, forest, land use, wildlife and rural issues are part of renewable energy development.
- Transmission line proposals involve federal agencies, tribes, farmers and ranchers.

Oregon appears to be in another time of transition. Despite decades of energy forecasts and plans, many are now calling for a statewide, long-term, comprehensive energy plan. What that may really mean is development of an energy strategy that, as Governor McCall said, will challenge Oregonians to create their own energy future.

Today, that future includes everything from changes in incentive programs to an increasing number of renewable energy projects. Stimulated by federal funds and new technology, there is also heightened interest in finding more energy conservation in our homes, businesses, schools and industries.

> *When Oregon imports energy, we export dollars. Perfect energy independence would keep those dollars in Oregon.*
>
> *Oregon Department of Energy's Second Biennial Energy Plan, 1987*

The problem is that there are no flawless energy sources and demand continues to increase.

As in the past, some today ask if nuclear energy is a cleaner alternative to fossil fuels.

Solar or Nuclear?

Transition found the nuclear power issue difficult to assess because:

"The growing public debate on the future of a nuclear fission powered economy contains factors which transcend the purview of science and technology. These factors have to do with the ethical dilemma of weighing the potential social and economic benefits of nuclear fission against both the risks of major injury and death to human populations, and long-term radioactive contamination of the earth."

In **Transition's** Solar Alternative chapter, the authors wrote that:

> "The most desirable energy source and delivery system for the future of Oregon, and the World, would be permanent, indigenous, safe and reliable."

And the conclusion reached was that:

> "The solar alternative will require an unprecedented degree of public awareness and a strong commitment from the people of Oregon. These are not standard times, and this is not a standard decision."

Not a Standard Time

Here we are again facing times and decisions that are not "standard." Developing new energy plans and strategies means including a greater group of stakeholders and looking at energy conservation and renewable energy development as not just a way to save and generate energy, but also a way to create jobs, jumpstart the economy and reduce greenhouse gas

emissions. It sounds like a lot to ask of one small state making up one percent of the nation's population.

However, as the Oregon Department of Energy's *Sixth Annual Report* indicated in 1982, Oregonians have been generally enthusiastic about investing in energy conservation and renewable energy, even when economic times are tough.

> "Despite prospects of a bleak economy –at least in the short-term –Oregon homeowners show a strong willingness to invest in measures to control the rising costs of electricity, natural gas and home heating oil."

Many of the questions and conclusions from the past serve today to give us direction as we again face similar challenges.

The Plan is not a wish list. It reflects today's realities. And, it recognizes that times will change. Change always brings the need for new and different responses and actions.

Oregon Department of Energy's Second Biennial Energy Plan, 1987

Roles of the Oregon Department of Energy

1. *Energy Leadership*
   - Promote the vision for Oregon's energy future, taking into account our role in developing energy policy, helping Oregon's citizens, improving the environment, and focusing on emerging markets where partnerships are needed.
   - Maximize conservation from core incentives and mandated programs. Analyze renewable resources to understand their technical feasibility as well as social, economic and environmental issues.

2. *Planning*
   - Provide technical support and coordination in developing a long-term, statewide plan for energy conservation and renewable resources.
   - Provide a comprehensive overview of Oregon's energy information, programs and activities, and act as an Oregon energy information center.

3. *Implementation*
   - Target and continually update programs that work in all parts of the state, complement economic opportunities, and leverage Department efforts by working cooperatively with others.
   - Efficiently and effectively provide services to Oregonians including the Department's incentives.

4. *Emerging Technologies and 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. *Public Education*
   - 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.

Chronologies

As a way to illustrate Oregon's energy history and foundation, what follows are three brief chronologies including a look at state and national energy highlights beginning in the 1970s, the Business Energy Tax Credit program and a review of Oregon's climate change efforts.

State and National Energy Highlights

1971	Oregon's Nuclear and Thermal Energy Council is formed to ensure that nuclear and coal-fired power plants met health, safety and environmental standards.
1973	The OPEC oil embargo led to U.S. energy shortages.
1973	Governor Tom McCall establishes an emergency energy conservation program.
1975	The Oregon Department of Energy (ODOE) is created to support energy conservation and renewable energy, and to conduct state energy planning.
1975	The Energy Facility Siting Council (EFSC) replaces the Nuclear and Thermal Energy Council. ODOE was made staff to EFSC.
1977	The U.S. Department of Energy is created from a number of other federal agencies.
1977	Oregon's Residential Energy Tax Credit (RETC) program begins by helping residents invest in solar energy.
1979	The Oregon Department of Energy's Small Scale State Energy Loan Program (SELP) and Business Energy Tax Credit (BETC) program are passed into law.
1980	Congress creates what is now called the Northwest Power and Conservation Council. The council develops regional electric power plans.
1993	The legislature directs EFSC to include in its process a special advisory group made up of the local government in the location of the proposed energy facility. The special advisory group determines whether land use goals are met.
1997	Oregon becomes the first state in the country to adopt CO_2 emission performance standards for new energy facilities; EFSC oversees this standard.
1999	The electric power industry in Oregon is restructured by the legislature in SB 1149. A three percent public purpose charge on electricity bills is established to help fund energy conservation and renewable energy.
1999	The net metering law is passed to allow those with small renewable energy projects to sell excess power back to their electric utility.
2000-2001	The West Coast energy crisis is brought on by a variety of factors including a low hydropower year, increased electricity demand, few power plants being built, and market conditions.
2001-2003	The Northwest builds about 3,350 megawatts (MW) of mainly natural-gas fired electricity generation, including 1,675 MW in Oregon.
2001	New state facilities are required to exceed the state energy code by 20 percent.
2005	ODOE develops Oregon's Renewable Energy Action Plan.
2005	The Oregon legislature adopts State appliance energy efficiency standards for 11 products that were not covered by federal standards at that time.
2006	The Renewable Energy Working Group was established to advise the State on the implementation of Oregon's Renewable Energy Action Plan. The group was staffed by the Oregon Department of Energy.
2007	The Oregon legislature passes the Renewable Portfolio Standard, the Renewable Fuel Standard and creates the Global Warming Commission. The BETC expands to a 50 percent tax credit for renewable energy projects.
2009	ODOE's Energy Loan Program expands through HB 2626, allowing SELP to finance a large volume of smaller loans to individuals and to businesses for energy efficiency and sustainable technologies. Also, SB 79 passes to encourage more energy efficiency in commercial and residential buildings.

"We must remember that every kilowatt, therm, gallon or barrel saved is money not spent on energy. Money that can be spent on jobs, services and products that provide meaningful benefits."

Governor Bob Straub, 1975

What did Oregon learn from the history of the early 1970s? A March 1991 Oregon Department of Energy Congressional Briefing highlighted these energy lessons:

Price Talks:
Through 1985, the nation made major gains in energy efficiency largely in response to (increasing) price.

Energy is a huge issue for the nation but a marginal issue for most individuals:
Most Americans are not willing to invest much today to save energy dollars tomorrow.

Efficiency is the cheapest, most environmentally-sound energy resource we have:
Energy efficiency generally goes hand-in-hand with economic efficiency.

Since 1975, the Oregon Department of Energy has used its programs and technical assistance to help move the market to more energy efficiency and to help cushion against price shocks.

Business Energy Tax Credit

The Business Energy Tax Credit (BETC), called the longest running tax incentive program in the country, helps schools, tribes, non-profits, businesses, industries, farms and ranches save energy and invest in renewable energy. Since the program began in 1979, more than 19,000 BETCs have been issued; saving energy, generating electricity and helping create jobs.

From its creation until 1999, the BETC program was capped at a maximum of $40 million in tax credits issued per year with no more than $2 million for any one project. The 1999 legislature eliminated the $40 million tax credit cap and increased the amount of any single BETC to $10 million per project. In 2007, the legislature raised the limit for renewable energy manufacturing facilities and high efficiency combined heat and power projects to $20 million per project.

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.

More recent changes have again put limitations on BETC with a program cap and implementation of a competitive tier system for renewable resource projects. The BETC program is also facing sunset dates of July 1, 2010 for renewable resource and conservation projects. Renewable energy manufacturing is scheduled to sunset on January 1, 2014.

Business Energy Tax Credit (BETC) 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. Again, this segment of 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 Business Energy Tax Credit Pass-through Option Program expands when the legislature allows non-profit organizations and public entities without tax liability to participate in the Business Energy Tax Credit Program.
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 January 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.

Greenhouse Gas Emissions Reduction Efforts

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 (GHG) is carbon dioxide (CO_2) and the other five include: nitrous oxide, methane, hydrofluorocarbon gases, perfluorocarbons, and sulphur 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 (CCIG) 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 (GWC) 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.

Energy Supply and Demand

Overview

Energy is an economic driver, one that Oregonians spend more than $14 billion on annually. 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 2009, a number which is predicted to grow to 4.4 million in 10 years. Over the years, the Oregon Department of Energy has identified two main ways to recover some of the $14 billion spent: energy conservation and efficiency, and renewable energy.

Energy conservation is the state's resource of choice to meet energy demand.

Energy efficiency helps boost the economy by lowering energy bills and keeping energy dollars in the state.

Renewables are the preferred resources after conservation.

Oregon Department of Energy, Third Biennial Energy Plan, 1989

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 (ODOE) provides information, evaluates new technologies and offers a variety of programs to assist Oregonians in conserving energy.

Since 1978, the Department's programs have saved enough electricity, natural gas, oil, wood, and diesel to cut energy bills by $1.7 billion. Oregonians have invested in conservation projects such as efficient lighting, rental weatherization, alternative fuel vehicles and sustainable buildings.

Renewable Energy

Oregon is rich in renewable energy resources. Solar, wind, geothermal, small hydroelectricity projects, biomass (wood and organic solid waste), and wave energy, along with alternative fuels can provide Oregon with energy independence, rural community development and cleaner air.

Many Oregon residents and businesses invest in renewable resources. Since 1978, ODOE's incentive programs have led to the residential installation of nearly 1,700 solar electric (photovoltaic) arrays, about 2,500 geothermal heat pumps and more than 19,000 solar water heating systems.

Energy Use and Trends

Energy consumption in Oregon continues to increase according the U.S. Department of Energy's Energy Information Agency (EIA).

The most current EIA data (2008) shows that total Oregon energy use (electricity, petroleum, natural gas) was 1,105 trillion British thermal units (Btu), up from 707 trillion Btu in 2003. That ranks Oregon, on a per capita basis, 38th in the country in energy consumption. Wyoming residents and businesses consume the most energy and New Yorkers the least. New York also has the second highest residential electricity rates in the United States.

The transportation sector uses the most energy in Oregon, followed by the industrial, residential and commercial sectors. In 2008, gasoline use made up 58 percent of that transportation energy.

But Oregon only produces about one-third of the energy it uses. Of Oregon's 414.8 trillion Btu produced, most of that 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.

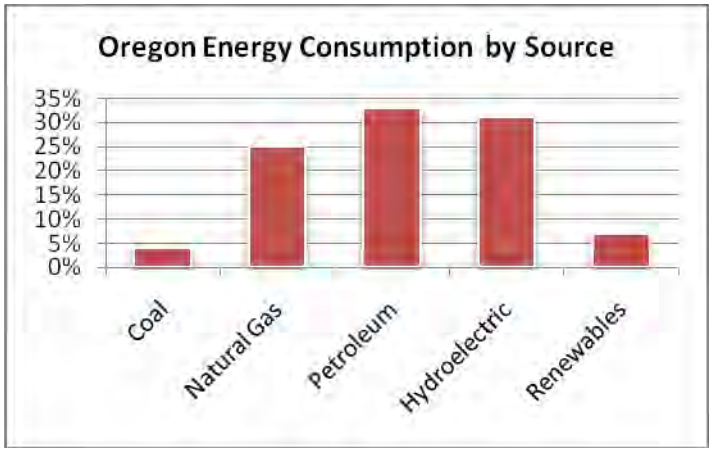


Figure 1: Energy Information Administration (EIA) data illustrates the source of energy consumed in Oregon in 2008. Most of the energy used is petroleum. Oregon produces only about 37 percent of the energy it uses.

Fuel Supply, Use and Pricing

Petroleum

The August 2010 retail price of gasoline in Oregon (excluding taxes) ranked the state as having some of the most expensive vehicle fuel in the country. At $2.54 per gallon in Oregon, only Alaska, Hawaii and California were ranked higher in price.

Petroleum prices have continued to climb and for the week ending January 24, 2011, the EIA listed the average nationwide retail price of gasoline at $3.11; a one-year increase of 40-cents per gallon.

Oregon has about 3.25 million registered passenger cars and trucks, which used more than 36 million barrels of gasoline in 2008. About 1,673 fueling outlets are located around the state; of those, 105 stations offer alternative fuels, such as compressed natural gas, ethanol and biodiesel.

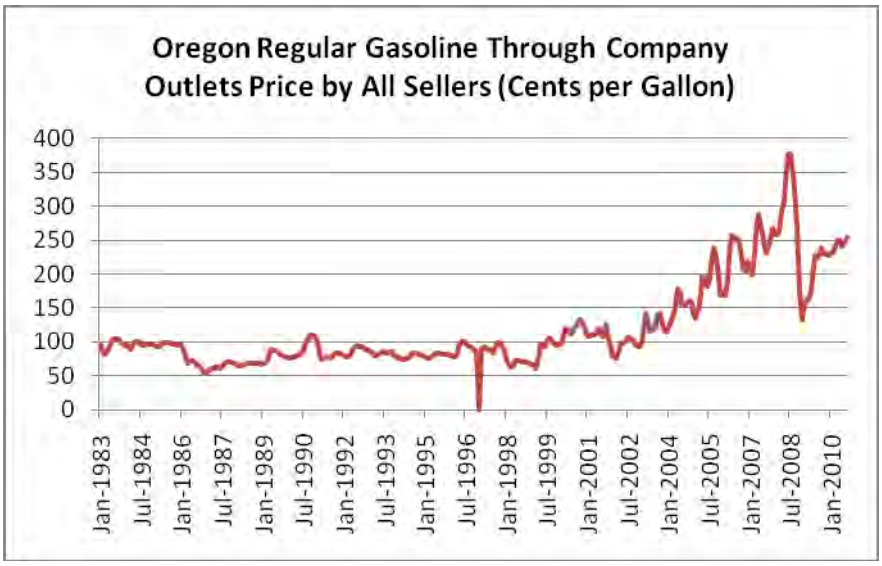


Figure 2: EIA information shows the volatility in Oregon gasoline prices.

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 (PADD V). 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.

The State receives petroleum-based transportation and heating fuels from Washington State and northern California. Tanker trucks from California supply southern Oregon, while ships and barges deliver additional product from San Francisco to the Portland area.

Energy Information Administration

Petroleum Sources

Figure 3 maps the major sources and distribution of Oregon's petroleum products. 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.

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.

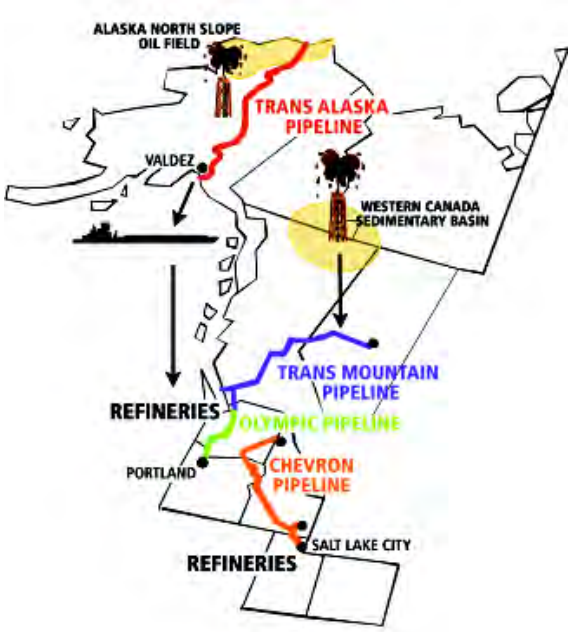


Figure 3: Illustrates the interconnection of the source, refineries and transportation of Oregon's petroleum. The majority of the crude oil comes from Alaska.

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.

The bulk of Oregon's oil enters through the Port of Portland and is distributed statewide by tanker trucks, Columbia River barge service and the Kinder Morgan pipeline, which extends to Eugene. Some specialty petroleum products (jet fuel, lubricants, ultra-low sulfur diesel) enter Oregon on tankers from California Bay Area refineries.

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.

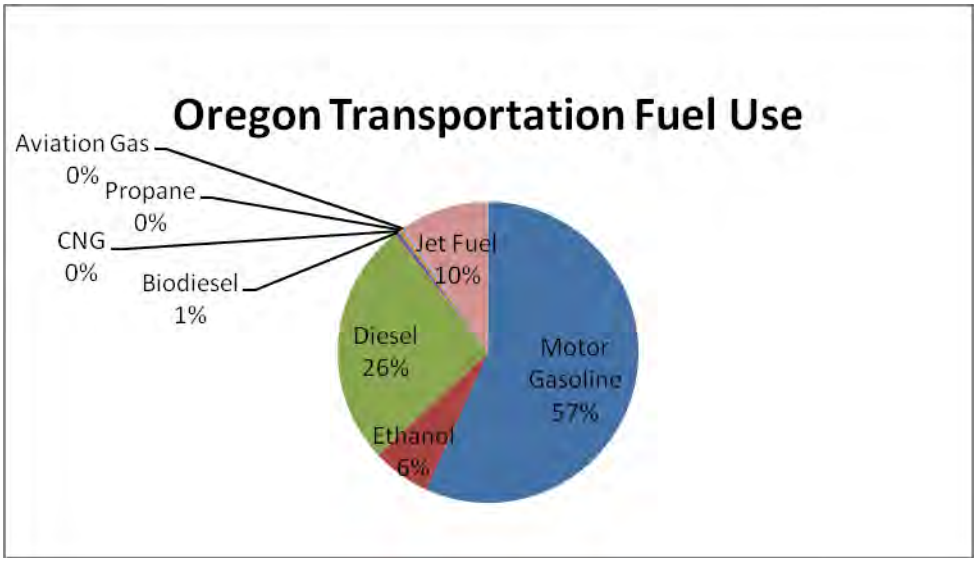


Figure 4: Gasoline makes up the bulk of Oregon's transportation fuel use.

Petroleum Shortages

The Oregon Department of Energy (ODOE) is in charge of the State's petroleum fuel supply and maintains a petroleum contingency plan. A U.S. Army Corps of Engineers (Corps) lock closure implemented from December 2010 through March 2011 on the Columbia and Snake River system is being monitored by the Oregon Department of Energy. The Corps is replacing the navigation lock gates on The Dalles, John Day and Lower Monumental dams. Normally, fuel serving eastern Oregon is transported by barge from the Port of Portland to Pasco, Washington through those locks.

ORS 176.809 authorizes the Oregon Department of Energy (ODOE) to prepare for and respond to potential petroleum shortages or disruptions that threaten the health and safety of Oregonians. Eastern Oregon communities could see some mild supply disruptions and possibly higher gasoline prices. But, as it did during Hurricane Katrina's impact on the nation's petroleum supply, ODOE is working with the Oregon Department of Justice to help prevent any possible price gouging at the pump.

Natural Gas

Oregon imports 100 percent of its natural gas. Oregon receives natural gas from British Columbia, Alberta, Wyoming, Colorado and New Mexico. Two connected interstate pipelines deliver the natural gas (Figure 5).

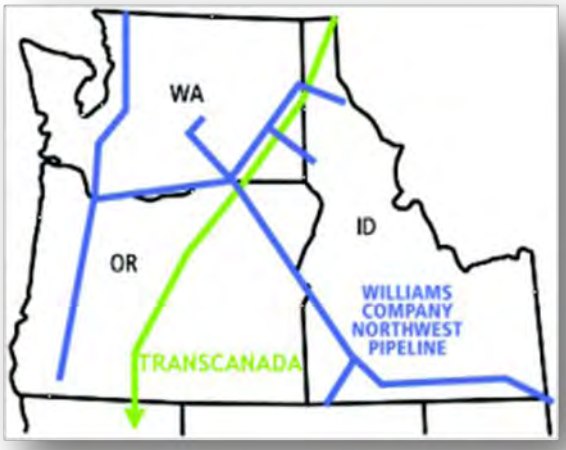


Figure 5: Two natural gas pipelines currently serve Oregon customers. The Williams Company pipeline and the Gas Transmission Northwest (GTN) pipeline owned by the TransCanada Corporation bring product from the Rocky Mountains and Canada.

The Williams Company's Northwest Pipeline brings natural gas to Portland from British Columbia and the Rocky Mountain region of the U.S. 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 (GTN) 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.

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 and underground storage at Jackson Prairie, 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.

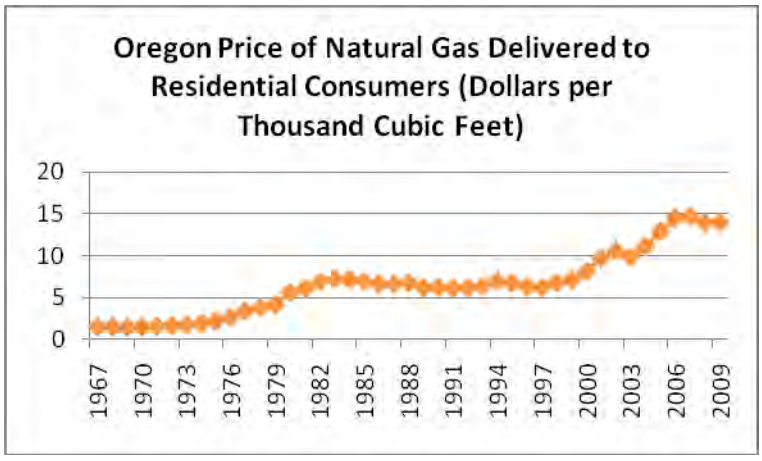


Figure 6: Energy Information Administration data shows the residential price of natural gas in Oregon through 2009.

Liquefied Natural Gas (LNG)

As part of the current and future energy mix, the U.S. is looking to import natural gas which, when produced overseas, must be super-cooled and liquefied for ocean transport. In its liquid state, the natural gas is called Liquefied Natural Gas or LNG.

It is expensive to liquefy, transport, and then convert to a gas again (regasify). Shipments of foreign LNG are currently being received at terminals along the eastern seaboard and in the Gulf of Mexico. In Oregon, there were three proposals to build LNG facilities.

- Bradwood Landing, located near Astoria, received approval to build from the Federal Energy Regulatory Commission (FERC), later filing for bankruptcy in May 2010.
- Oregon LNG, proposed near Warrenton, is currently making its way through the FERC process.
- Jordan Cove, located near Coos Bay, received FERC approval in December 2009. As of January 2011, the project developers were proceeding and the Oregon Department of State Lands was reviewing a removal/fill application by the Port of Coos Bay for a slip dock.

The Oregon Pipeline Company, affiliated with Oregon LNG, proposes to build 120 miles of pipeline from its LNG terminal to Molalla, Oregon where it would connect to Northwest Natural's existing pipeline.

Pacific Connector Gas Pipeline, affiliated with Jordan Cove LNG, proposes to build a 230-mile pipeline from the proposed Jordan Cove LNG terminal near Coos Bay to the Williams Northwest pipeline near Myrtle Creek and on to TransCanada's GTN line at Malin, near the California border.

Natural Gas Pipelines

The Ruby Pipeline, approved by FERC and currently under construction, will transport domestic natural gas from Opal, Wyoming covering 675 miles across four states to the existing Gas

Transmission Northwest (GTN) pipeline near Malin, Oregon.

The Palomar Pipeline, currently making its way through the FERC process, proposes to link the GTN Pipeline near Madras, Oregon to the Williams Northwest Pipeline near Molalla, Oregon and a second phase from Molalla to Bradwood Landing. Due to the bankruptcy of Bradwood Landing LNG along with changing market forces, the Palomar developers are reconsidering their project.

According to the Northwest Gas Association (NGWA), the Pacific Northwest is home to more than 48,000 miles of natural gas transmission and distribution pipelines. NGWA expects natural gas demand to grow an average of about one percent per year.

> The supply and price of oil are set in world markets. The State's main role is to lessen Oregon's vulnerability to severe price hikes and supply shortfalls.
>
> *Oregon Department of Energy's Third Biennial Energy Plan, 1989*

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 (PUC) 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 PUC 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

Between seven and 15 percent of Oregon's electricity is generated from natural gas. The percentage varies based on the amount of hydroelectricity generated annually. For example, seven percent of Oregon's electricity in 2003 was natural gas-fired, compared to 15 percent in 2001. In 2005, natural gas-fired electricity made up about 10 percent of Oregon's electric mix. From 2006 through 2008, natural gas averaged 12 percent of the mix.

Electricity	Oregon	U.S Average	Timeframe
Residential	9.13 cents/kWh	12.02 cents/kWh	Aug. 2010
Commercial	7.57 cents/kWh	10.69 cents/kWh	Aug. 2010
Industrial	5.65 cents/kWh	7.21 cents/kWh	Aug. 2010

Figure 7: 2010 Oregon Electricity Prices compared to the U.S. Average—Source: Energy Information Administration

Electricity Rates

According to the U.S. Department of Energy's Energy Information Administration, the Oregon residential electric rate of 9.13 cents per kilowatt-hour (kWh) in 2010 is up from 9.04 cents per kWh in August 2009. Commercial rates also rose over the 12-month period to 7.57 cents per kWh, up from 7.39. The only decline was for industrial electric rates, which were down slightly from 5.71 cents per kWh in 2009 to 5.65 cents per kWh in 2010.

Nationally, fossil fuel prices showed significant volatility during 2008. Between 2004 and 2008, the average price of fossil fuels delivered to electric plants increased a cumulative 65.7 percent. Over the same time period, the national average retail price of electricity increased 28 percent, from 7.6 cents per kWh in 2004 to 9.7 cents per kWh in 2008.

Electricity Mix

Figure 8 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.

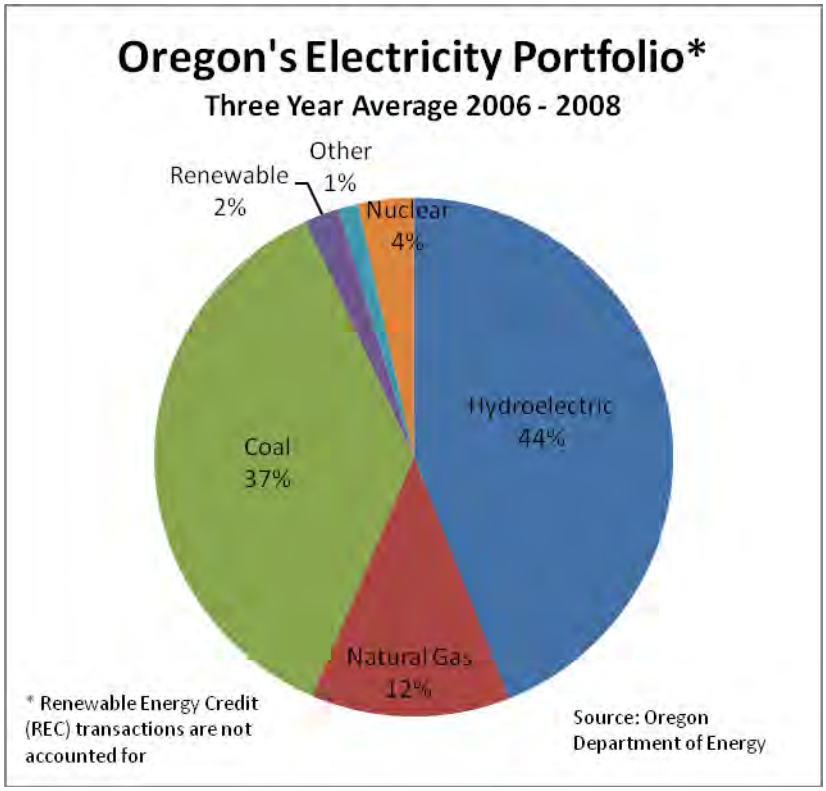


Figure 8: Where Oregon gets its electricity. Oregon's 2006-2008 fuel mix shows that electricity comes mainly from hydropower plus instate and out-of-state coal.

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 still make up a small portion of the overall electricity mix.

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.

Electricity Transmission
Moving the renewable energy from the rural areas where it is generated to the load centers where it is needed requires transmission lines.

There are four electric transmission projects approved and/or proposed in Oregon:

- Big Eddy-Knight Transmission Line (BE-K), a Bonneville Power Administration (BPA) project, 500-kilovolt line from The Dalles, Oregon to a proposed new substation four miles northwest of Goldendale, Washington.

- I-5 Reinforcements Project, BPA, an approximately 70 mile-long transmission line from Castle Rock, Washington to a new substation near BPA's existing Troutdale Substation.

- Boardman to Hemingway (B2H), approximately 298 miles of single circuit 500-kilovolt (kV) transmission line connecting the power plant near Boardman, Oregon and the planned Hemingway substation near Murphy, Idaho. This project, proposed by Idaho Power, requires the approval of the Energy Facility Siting Council.

- Cascade Crossing (CX), from Portland General Electric, is approximately 210 miles of single and double circuit 500-kilovolt (kV) transmission line from Boardman to Salem. The proposal includes three new substations, and potential upgrade of portions of the transmission system in the Willamette Valley. This project requires the approval of the Energy Facility Siting Council.

Renewable Energy Resources

The Oregon Department of Energy (ODOE) provides technical assistance and incentives for renewable resource projects. Large wind and other types of renewable 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 have received tax credits, grants and/or loan guarantees. Some of those beneficiaries include Oregon wind farms, biomass, solar, geothermal exploration and wave energy development.

Nature provides a constant supply of renewable energy resources. These usually produce fewer pollutants than fossil fuels. Renewable energy resources include:

- Biomass (from plants and other organic matter)
- Geothermal (heat from the Earth)
- Hydroelectricity
- Solar
- Ocean Energy
- Wind

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.

Nationally, between 2007 and 2008, renewable energy consumption grew 10 percent to 7.367 quadrillion Btu, which was the highest level since the U.S. Energy Information Administration (EIA) began keeping records in 1977. While the total U.S. energy consumption declined by 2 percent, primarily due to the economic recession, renewable energy's share of the U.S. market increased to over 7 percent.

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.

Increased biomass utilization can contribute to healthy forests, rural jobs, and renewable energy. Using forest slash for bioenergy production provides an alternative to open burning. Finding value-added uses for agricultural residues can increase farm revenue and help Oregon agricultural producers find new markets for their products.

Photo 1: The Harney County Hospital uses wood for heat.

Bioenergy production not only creates jobs in the facilities used to produce renewable energy or fuel, it supports jobs in the production and collection of biomass, as well as in other areas of the supply chain. Biomass as a renewable fuel feedstock requires a workforce that can produce, collect, process, and transport the material.

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. The Oregon pellet manufacturing industry is a national leader in producing high quality engineered fuels.

Biomass market development efforts include public-private collaborations like the Forest Biomass Working Group and the Forest Cluster Economic Development Team. Oregon also has an active collaboration between state agencies with responsibilities related to bioenergy development.

Energy from wood resources is important to Oregon's industrial and residential sectors. Wood energy technology is well understood, available and reliable.

ODOE Sixth Annual Report, 1982

Woody Biomass

Currently, more than 45 industrial facilities use woody biomass for energy production. These include electricity and heat produced at forest products industries such as lumber and paper mills. The energy is used to generate electricity, provide heat for drying kilns, or generate steam used for industrial process applications.

Woody biomass relies on an integrated market that allows the most value for the material. The higher value biomass material is used in the production of value-added products such as plywood or particle board, finished wood chips, small diameter applications and engineered fuels.

Lower value materials are used as chipped fuel in industrial boilers to generate heat and electricity throughout the state.

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. Methane produced in the wastewater treatment process is captured and used to produce heat and electricity in at least 29 wastewater treatment facilities around the state.

Building on the early work by the Port of Tillamook Bay and various dairy operations, a number of projects are under development and construction to use manure and other agricultural wastes to generate electricity. These facilities address a waste management challenge while also generating renewable energy and reducing greenhouse gas emissions.

Landfills are another source of biogas. 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 Producer or Collector Tax Credit

The biomass producer or collector tax credit provides a per unit incentive for various biomass feedstocks used to produce bioenergy or biofuel. The tax credit has helped Oregon's agricultural producers grow feedstock for biofuel production and has leveraged additional forest stewardship treatments that use the resulting biomass for energy production.

Community Renewable Energy Feasibility Fund

The Community Renewable Energy Feasibility Fund (CREFF) has provided early stage funding to bioenergy projects, including proposals from the City of Sisters and Wallowa Resources.

Pilot Project

The Forest Products Energy Project (FPEP) is a public/non-profit collaboration to provide strategic financial offerings and technical support to help existing forest products companies pursue the identification, development, and deployment of additional renewable energy production from biomass. The Forest Products Energy Project Team is made up of the Oregon Department of Energy, Business Oregon, Energy Trust of Oregon and the Oregon Department of Forestry. The project was developed from the work of the Oregon Forest Cluster Economic Development Core Teams and the Oregon Forest Biomass Working Group.

Ethanol and Biodiesel Fuels

Biofuels now account for a significant part of the U.S. and Oregon's transportation fuel mix, with first-generation ethanol from corn starch and biodiesel from soy the predominate biofuels in the country. Oregon has limited ability to produce feedstock for these first-generation biofuels but has greater potential for producing cellulosic ethanol. Oregon also has the ability to produce alternate feedstocks for biodiesel and renewable diesel, and to a lesser extent, to produce biogas.

Currently in Oregon, only blends of up to 10 percent (E-10) and 85 percent (E-85) ethanol can be sold. These are the only blends that have Oregon-required ASTM (American Society for Testing and Materials) standards. Standards have yet to be developed for blends between 10 and 85 percent ethanol. Retail biofuel storage capacity can be a barrier to increased biofuel use in Oregon. Most retail stations only have two tanks available, one for unleaded regular and the other for premium, which they blend for a mid-grade.

Renewable Fuel Standard

Ethanol, as mandated by the EPA's Renewable Fuel Standard (RFS2), is approaching 10 percent of gasoline consumption with current demand nearly 13 billion gallons per year in the U.S. The mandate requires 36 billion gallons of biofuel into the U.S. transportation fuel mix by 2022. To reach these numbers, marketing will have to include higher blends of ethanol and Flex-Fuel vehicles.

Photo 2: B-20 biodiesel pump

In 2007, Oregon passed Renewable Fuel Standard (RFS) legislation. The RFS required E-10, or 10 percent ethanol, in all motor gasoline fuel sold in state once production capacity reached 40 million gallons per year. The capacity was reached in September 2007 when Pacific Ethanol began processing ethanol in Boardman.

In the 2008 Special Legislative Session, a bill (Senate Bill 1079) was enacted allowing clear premium or premium without ethanol to be sold.

More than one hundred retail stations in Oregon offer alternative fuels. Nine stations in Oregon offer 85 percent ethanol, which is 15 percent petroleum and 85 percent ethanol. The State's fleet has used E-85 in their Flex-Fuel vehicles for several years with good results.

Approximately 150 million gallons of ethanol per year are consumed in Oregon. Currently, about 40 million gallons per year are produced in Oregon.

The Oregon RFS also includes biodiesel requirements. As of October 2009 all diesel, with a few exceptions, must contain at least two percent biodiesel. With current demand, this equates to around 11 million gallons per year of biodiesel. Less than half of this demand is produced in Oregon.

Most of the biodiesel sold in Oregon comes from Mid-Western soy, however about 90 percent of the biodiesel produced in Oregon is processed from waste vegetable oil. When the biodiesel production capacity in the state reaches 15 million gallons per year, the RFS requirement will increase to B-5 or a five percent biodiesel blend. On February 1, 2011, the Oregon Department of Agriculture issued a notice to fuel dealers that the five percent minimum blending requirement will by effective April 1, 2011.

Several public and private fleets in Oregon use higher blends of biodiesel. The State of Oregon Department of Administrative Services (DAS) buys B-20 for the state fleet. The City of Portland has used B-20 in many of their diesel vehicles since 2004.

Research is currently underway on biofuels from a wide range of Oregon biomass products. ZeaChem is building a plant in Boardman that will process woody biomass into ethanol along with other products. Summit Natural Energy in Cornelius is processing waste agricultural products to make ethanol.

Ethanol may soon be produced from ligno-cellulosic (plant material) feedstock such as woody forest biomass and grass or wheat straw, orchard or nursery pruning, or other agricultural plant wastes. Biomass-based oils, suitable for re-refining into various chemicals and transportation fuels or for use in certain stationary boilers, may be produced at competitive prices using various thermo-chemical processes.

Production Capability

Based on estimates from biomass inventory and assessment studies conducted during the past decade, a range of 424 to 524 million gallons of gasoline-equivalent biofuel and other alternative transportation fuels a year could be produced from Oregon biomass feedstocks. This represents approximately 20 to 24.6 percent of Oregon's consumption of gasoline and diesel (2.172 billion gallons as of 2008).

If only waste sources of biomass were used, and no crops, 182 to 282 million gallons of gasoline-equivalent biofuels and compressed natural gas could be made from biomass waste in Oregon. The amount depends on the volume and cost of the material. This represents approximately 8 to 13 percent of Oregon's current consumption of gasoline and diesel.

The variance in the low and high estimates for the first three categories in Figure 9 below (forest residue, agricultural residue and urban wood waste) comes from analysis of the cost to collect and

transport the material. At lower prices, less material can be collected, while at higher prices, more of the material can be collected.

Source	**Potential fuel volume produced** (millions of gallons of gasoline equivalent/yr)
Fuel from Waste	
1. Forest residue	58 to 132 *(dependent on price paid)*
2. Agricultural residue (corn and wheat only)	13 to 32 *(dependent on price paid)*
3. Urban wood waste	11 to 19 *(dependent on price paid)*
4. Mill residues	1
5. Orchard and vineyard prunings	6
6. Grass straw residue	33
7. Greenwaste	18
8. Mixed Waste Paper	41
9. Biogas	0[1]
Total Fuel from Waste	**182 to 282**
Fuel from Crops	
Expiring Conservation Reserve Program planted to biofuel feedstock	239
Existing crops	13
Total Fuel from Crops	**242**
Total	**424 to 524**

Figure 9: Potential range of low carbon fuel production from available Oregon biomass

[1] The amount of fuel produced from biogas is 0.023 million gallons of gasoline equivalent per year.

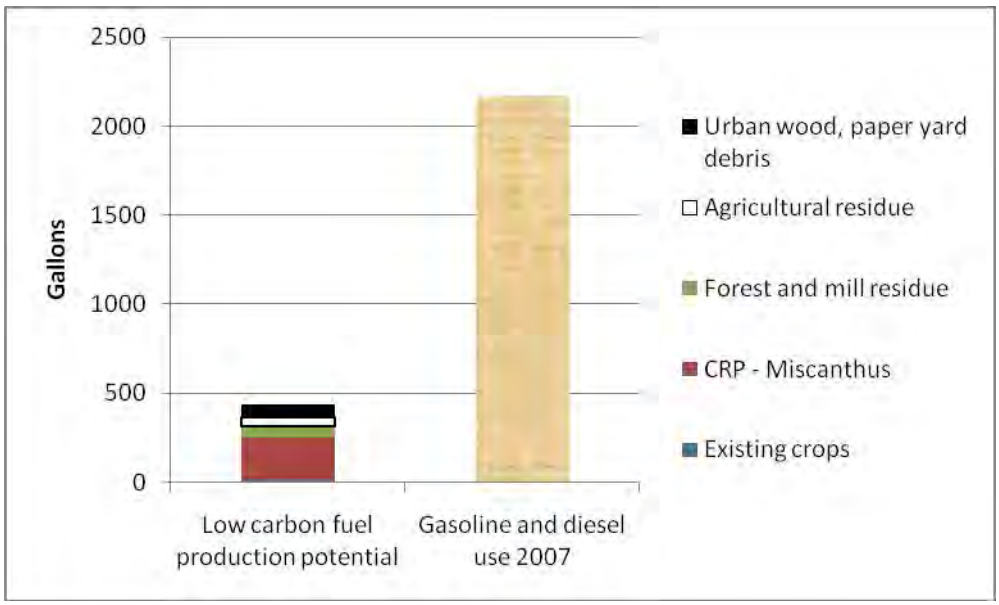


Figure 10: Lower estimates of biomass availability compared with gasoline and diesel use in Oregon

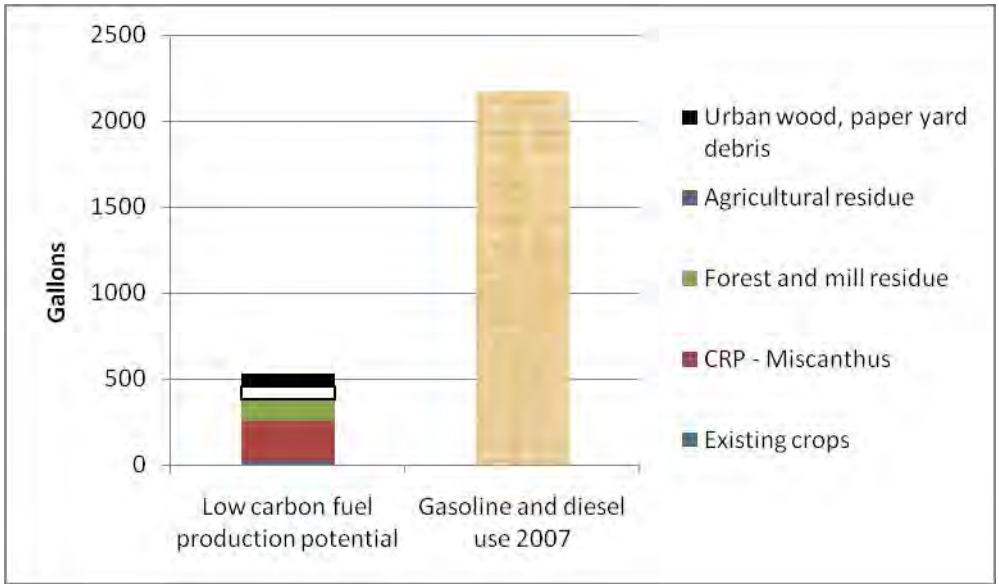


Figure 11: Higher estimates of biomass availability and alternative fuel production compared with gasoline and diesel use in Oregon.

Geothermal

Geothermal resources come from the natural heat of the earth; providing a constant base load energy from below the surface of the earth. Geothermal energy is used in Oregon to dry agricultural products, for aquaculture (raising fish), for space heating, to heat greenhouses, and to heat swimming pools at a number of spas and resorts.

Oregon has been involved in the direct use of geothermal energy for years, but there is currently no commercial electricity production from geothermal. However, funding awards from the federal American Recovery and Reinvestment (ARRA) Program may help change that.

Those ARRA awards include $25 million for AltaRock Energy to demonstrate an experimental technology at the Newberry Volcanic Monument extracting energy from geothermal systems that may not have enough water, $1.8 million for testing innovative exploration and drilling techniques at the Crump Geyser in south central Oregon, and $4.4 million for technologies to identify fault lines at Glass Buttes.

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 (DOGAMI) has geothermal resource maps available to the public showing both regional and site-specific information. DOGAMI also received $600,000 in ARRA funds to help develop a national geothermal data system.

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 barrier for development of geothermal electricity generation in Oregon is its cost.

Geothermal work in the Newberry area near Bend is being conducted by AltaRock Energy and Davenport Newberry on what is called Enhanced Geothermal Systems (EGS). The U.S. Department of Energy (USDOE) 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.

Geothermal experts consider the area on the flanks of Newberry Volcano, outside the Newberry National Volcanic Monument, to be one of the best prospects for high-temperature geothermal electricity production in the Pacific Northwest. To date, limited exploration drilling has measured temperatures up to 315 degrees Celsius (600 degrees Fahrenheit).

In 2010, U.S. Geothermal’s proposed Neal Hot Springs geothermal electricity facility received a USDOE conditional loan guarantee of $102.2 million. Located about 90 miles northwest of Boise, three production wells have been drilled and tested, with more underway for the proposed 22 megawatt facility.

Nevada Geothermal Power has private land leases to explore Crump Geyser in Lake County. The company plans to drill three production wells to see if there is enough heat for a 30 megawatt facility.

The town of Paisley in Lake County is also exploring use of its geothermal resources.

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 city also received $816,100 in ARRA funds to help construct a low temperature power plant.

The Oregon Institute of Technology (OIT) 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. $1 million in ARRA funds will be used to install a low temperature geothermal unit on campus.

Traditionally, high-temperature geothermal resources 150 degrees C (300º F) and above can be used to generate power. Recent advances in technology now allow hot water as low as 88º C (190º F) to economically generate power. Intermediate temperature of 50 degrees C (110º F) and above can supply heat for industrial, agricultural and municipal applications.

Low-temperature heat pump applications 10º degrees C (50º F) and above can supply heat for residential and commercial building applications. Currently, about 1,900 ground-source heat pumps provide space and water heating for Oregon homes.

Photo 3: Greenhouses heated with geothermal energy in the Klamath Falls area. (D.A. Black)

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. Oregon's consumer-owned utilities have benefited from cheaper rates derived from the BPA power system. Hydropower is also 26 percent and five percent of the electricity portfolio of Oregon's two major investor-owned power providers, Portland General Electric and Pacific Power, respectively.

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.

In the past two years, the Swalley Irrigation District and Central Oregon Irrigation District have each constructed new facilities. These projects were combined with piping upgrades to improve water capture. They received loans from the Oregon Department of Energy's Small-Scale Energy Loan Program (SELP).

Pumped storage is a two-pool facility where power is generated to soften load spikes, and then during low power demand, water is pumped back up to the higher pool to refill. As a near-battery for the grid, pumped storage is being considered to resolve transmission and wind integration challenges. Pumped storage facilities require significant upfront capital expense and siting analysis. Since the projects use more energy than they produce, there must usually be additional recoverable benefits for the project to make financial sense.

Figure 12: The Northwest Power and Conservation Council map of Columbia and Snake River dams and fish protection facilities.

In 2008 and 2009, federal licenses were issued for new hydropower facilities on U.S. Army Corps of Engineers dams, Dorena Dam on the Row River and Applegate Dam on the Applegate River, a tributary of the Rogue. Two additional facilities are advancing in the licensing process, Wickiup Dam on the Deschutes River in central Oregon and Mason Dam on the Powder River in eastern Oregon. Both of these facilities are operated by the U.S. Bureau of Reclamation.

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. The non-profit Oregon Wave Energy Trust (OWET) funds independent research and development under the state's Oregon Innovation Council, fostering growth and evaluation of wave energy development potential on Oregon's shores.

The National Northwest Marine Renewable Energy Center (NNMREC), 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. Currently, the Center is developing a mobile Ocean Test Berth (MOTB) for deployment in 2012 off the coast of Newport. The Test Berth will give wave energy conversion devices a power launch pad, with the infrastructure required to test and validate devices that can be used across a broad swath of ocean landscape.

A collection of state agencies formed the foundation of a landmark settlement with Ocean Power Technologies (OPT) in July 2010 for the Reedsport project[2]. 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. OPT is seeking state authorization and a federal license for this 10-buoy development at Reedsport. A single test buoy that OPT intends to pilot at this location is under construction at Oregon Iron Works. A Coos Bay barging company expects to tow the device for anchoring in spring 2011.

With the Reedsport project, Oregon has built a coordinated regulatory pathway for the next generation of marine energy developments. In November 2009, the Land Conservation and Development Commission approved a new Part 5 of the Territorial Sea Plan that broadly governs marine renewable energy development. The hope is that by extensively mapping the current resource values, fishing, crabbing, and recreational activities, Oregon will be able to make more informed renewable energy siting decisions.

Large-scale federal grants have changed the funding landscape in Oregon. The state's wave energy sector may benefit from federal grants for study-framework planning, the Reedsport project, the OSU Center, and other new industries and device development.

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.

There are three primary ways in which this energy is harvested: as direct light into buildings for light and heat, to heat water using roof-mounted collectors, and to convert sunlight to electricity using photovoltaics (PV). Each solar harvesting approach is unique in its technology and market constraints.

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 (PV) in the Residential Market

The residential PV market experienced significant growth in 2010. In 2007, there were 230 residential tax credits issued for PV systems statewide. In 2009, there were almost 400 tax credits issued. In 2010 there will likely be more than 1,000 tax credits issued. Figure 13 demonstrates the growth in the number of systems installed statewide over the past five years.

[2] FERC Project Number P-12713-002

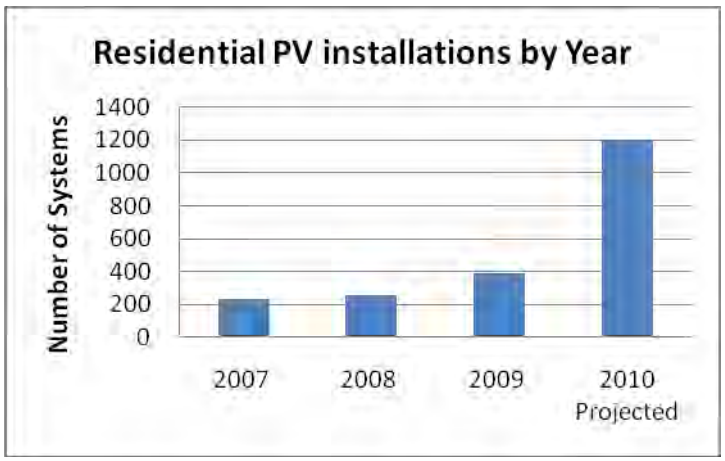


Figure 13: Installation of residential solar electric systems has increased in Oregon.

There are many factors that can be attributed to the expansion in the residential PV market in Oregon. The combination of state and federal tax credits with cash incentives offered by the Energy Trust of Oregon has greatly reduced the cost of these systems. Long-term support for PV installations within the state has allowed the local industry to expand, mature and streamline costs. There are currently 169 tax credit-certified solar technicians across the state installing residential solar energy systems. In 2007, there were 54 tax credit-certified solar technicians. The presence of large PV manufacturing facilities in the state, such as SolarWorld, has also raised the profile of the technology.

Declining System Costs

The primary factor increasing the number of PV systems installed in the state is declining system cost. In 2007, the average residential PV system in Oregon cost $8.04 per DC Watt. In 2010, the average system cost is $6.70 per DC Watt with many systems being installed for less than $6.00 per DC Watt. Figure 14 demonstrates the average statewide PV system cost per DC watt in the four years.

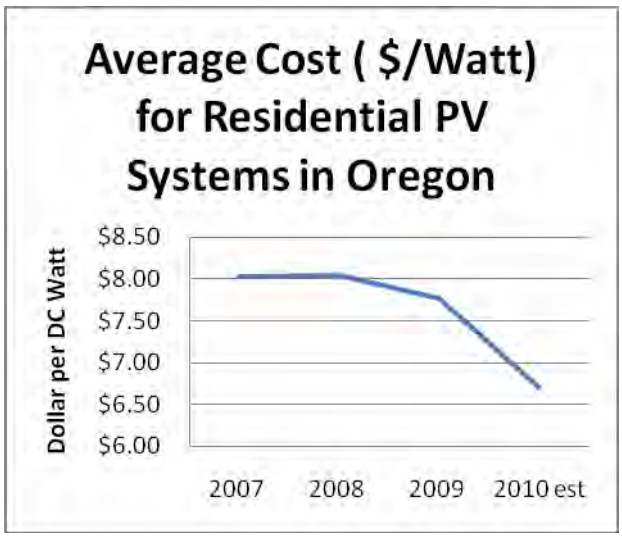


Figure 14: Shows the declining cost of residential solar electric systems.

Solarizing Oregon

Another factor increasing the number of residential PV systems installed in Oregon have been bulk purchasing agreements organized by cities and neighborhood associations. These efforts commonly known as "solarize" programs have been organized in Portland, Beaverton, Salem and Pendleton.

Photo 4: City of Pendleton Solarize Program

Alternative Incentive Structures

In June 2009, the Oregon legislature passed House Bill 3039 directing the Oregon Public Utility Commission (OPUC) to create a Volumetric Incentive Rate (VIR) pilot program, often referred to as a feed-in tariff. The VIR was established to evaluate the effectiveness of a performance-based incentive for promoting photovoltaic installations. The original law was amended with House Bill 3690 (2010) which provided clarification on system size definitions and established the ability to provide an incentive for "the non-energy attributes of electricity."

The pilot VIR payment is limited to ratepayers in PGE, Pacific Power and Idaho Power territories. The program has targets to install 25 megawatts (MW) of capacity by 2015. Of this, 75 percent of the capacity is to be for residential and small commercial projects up to 100kW in size. The VIR was launched on July 1, 2010 with VIR rates set between $0.65 per kWh and $0.55 per kWh. The allocated capacity was reserved in less than 30 minutes. The second round was launched on October 1, 2010 with rates reduced by 10 percent. The second round was fully allocated within 15 minutes.

The primary difference between the pilot VIR program and the state energy tax credit programs is the unit that is measured to calculate the value of the incentive. The Residential Energy Tax Credit (RETC) program provides a capacity-based incentive for photovoltaic system installations. The incentive is calculated on a $/watt basis based on the nameplate capacity of the PV system. The RETC incentive is paid out over a maximum of four years. The VIR program provides an incentive on a $/kWh basis based upon the actual metered energy output of the system. The VIR incentive is paid over 15 years and provides incentives for system longevity and performance.

Development of the VIR program brought to light potential conflicts with the Federal Energy Regulatory Commission (FERC), which has jurisdiction over the rates that utilities can pay for energy. The creation of the VIR payment was seen as potentially violating FERC's jurisdiction. Noting that issue, the OPUC created a program where participants are not allowed to sell surplus energy to the utilities. Instead the utilities will only provide the VIR payment for energy that is generated and consumed on-site. This "net metering" approach applies to systems up to 100kW in size and prohibits payment for surplus energy generated by a PV system over the course of a year.

Large Systems in the Volumetric Incentive Rate (VIR) Program

The pilot VIR has limited capacity for larger scale PV installations up to 500kW in size. The rates for the large-scale projects is determined through a Request for Proposal (RFP) and bidding process where project developers submit competitive rates in an attempt to win a VIR payment contract. The bidding process is designed to establish a VIR rate in a market-based manner.

Neither the small-scale net metering VIR nor the large scale bidding program can be considered a traditional "feed-in tariff." A traditional feed-in tariff sets a rate of payment for generation and offers a standard contract for the purchase of the energy. This approach creates an incentive for surplus generation and operates without a net metering or bidding process.

Photo 5: The 419 kW DC PV array at the City of Gresham Waste Water Treatment Plant, which is currently the largest ground-mounted installed solar array in Oregon.

Oregon's Historic Solar Connection

On April 25, 1954, two Oregonians helped invent the solar electric or photovoltaic (PV) cell and created a revolution in the renewable energy field. Daryl Chapin and Gerald Pearson graduated from Willamette University in Salem and went on to work at Bell Telephone Labs in New Jersey. Pearson was born in Salem in 1905.

The two men, along with Calvin Fuller, were originally searching for a solution to battery problems within the Bell telephone system when they discovered the solar electric cell. The scientists helped create the first solar cell capable of generating enough power from the sun to run everyday electrical equipment.

Wind

While wind energy in Oregon continues to be the leading electricity-producing renewable resource, it lags far behind conventional hydroelectricity production. By 2009, the U.S. Department of Energy's Energy Information Administration reported that wind energy production in Oregon constituted 4.4 percent of Oregon's total net generation and over 75 percent of the total "non-hydroelectric" sources of renewable energy. Due to the variable nature of wind, the turbines generate, on average, about a third of the maximum output or capacity.

Most of Oregon's wind development takes place primarily in the central and eastern Columbia River area and in northeastern Oregon. Wind farm proposals of 105 megawatts (MW) and above go through Oregon's Energy Facility Siting Council (EFSC) process. Developers of less than 105 MW may also choose to go through EFSC, considered a one-stop process with appeals of decisions going directly to the Oregon Supreme Court. Of the more than 20 current operational wind farms in Oregon, about 75 percent have a capacity below the EFSC 105 MW threshold and were approved at the county land use process.

The first Oregon wind farm, Vansycle, began operating in 1998 at 25 MW. Current operational wind projects are located mainly in Sherman, Gilliam, Morrow and Umatilla counties and offer a total capacity of nearly 2,100 MW.

Oregon Wind in the News

Many articles have been written calling Oregon home to the world's largest wind farm, Shepherds Flat. This is actually three separate facilities with three site certificates issued by the Oregon Energy Facility Siting Council. Shepherds Flat North was approved with a capacity of up to 318 megawatts (MW), South and Central were approved for up to 290 MW each.

Earlier in 2010, Shepherds Flat made national headlines when the Pentagon said that the proposed wind turbines might interfere with its radar site in Fossil. With no permit from the Federal Aviation Administration, there would have been no wind farms. The Department of Defense later dropped its opposition to the project.

Photo 6: Wind Energy in northeast Oregon (D.A. Black)

Oregon added the most wind capacity (175 MW) of any state in the country during the third quarter of 2010, according to a report issued by the American Wind Energy Association[3]. While Texas still leads in overall installed capacity, many developers there are waiting for additional transmission lines.

Oregon is also home to the North American headquarters of wind turbine manufacturer Vestas and to wind farm operator Iberdrola Renewables.

[3] American Wind Energy Association, 3rd Quarter 2010 Market Report

Introduction to the Issues Chapter

A number of issues are addressed in detail in this energy plan. However, not all the current energy discussion topics are captured, such as long-term energy planning and measuring the role of energy in economic development.

Long-Term Energy Planning
Over the years, energy plans have been filled with forecasts, projections and assumptions. The business of forecasting in economics or energy is tricky.

For instance, the Oregon Department of Energy's First Biennial Energy Plan of 1985-1987 used 20-year forecasting models for residential energy consumption. Those models accounted for refrigerators, freezers, televisions and lights but did not foresee computers, cell phones, iPads and other personal electronics. According to the International Energy Agency, sales of household electronic devices could triple by 2030.

The objectives of a long-term energy plan could be several:

- Reducing greenhouse gas emissions
- Green job creation through energy investments and incentives
- Greater build out of renewable energy and associated infrastructure to reduce the amount of coal in Oregon's electric mix, stimulate rural community development and create energy independence
- Reach the goal in the Northwest Power and Conservation Council's 6th Power Plan of meeting 85 percent of the region's 20-year load growth with conservation
- Developing alternative options to meet transportation needs
- Enhancing Oregon's reputation for advancing technology through research and development

Energy as Economic Development
For about 35 years, the Oregon Department of Energy has been capturing, quantifying and reporting measurements of the use of energy, the cost of energy, the sources of energy, the amount that can be conserved, the amount of demand, and ways to save and generate more energy. Over the years, energy efficiency and renewable energy have been seen as ways to save energy and reduce the environmental impacts of energy use.

With the economic downturn, more people have begun to look on energy as a way to generate jobs. Widespread energy efficiency installations could create employment among those who install insulation, windows, heating systems and lighting. Renewable energy develops jobs during the construction phases of wind farms, the installation of solar panels and the operation of biomass facilities. The Oregon Department of Energy will conduct a financial analysis of the Business Energy Tax Credit program as directed by HB 2180 (2009).

Emerging Issues

Ongoing federal level work is important for Oregon to track. The State is home to the only federally owned and operated lab, the National Energy Technology Lab (NETL) in Albany. Formerly part of the U.S. Bureau of Mines, the Albany Research center is known as NETL-Albany. Work there includes projects such as carbon dioxide sequestration by mineral carbonation, and micro-reactors for reforming and/or continuous reforming and separation of hydrogen for fuel cells. In December 2010, USDOE/NETL published the Carbon Dioxide Capture and Storage RD&D Roadmap.

The USDOE also issued its Critical Materials Strategy in December 2010. Rare earth metals and other materials are used in building wind turbines, solar cells, electric vehicles and energy-efficient lighting. China is home to more than 95 percent of the production or rare earth metals. The report looks at the important role these materials play in the clean energy development and examines the supply risks over the short and long term.

Photo 7: Community Smallwood Solutions, Wallowa, (D.A. Black)

"The time has come again for bold ingenuity and leadership. We live in a world of dwindling energy supplies and rising costs.

We are vulnerable. But we are not helpless."

Governor Vic Atiyeh, New Energy Directions for Oregon, 1979

Energy Issues Facing Oregon

Unlike water or gas, electricity cannot be stored. It must be generated as it is needed, and supply must be kept in balance with demand.

Furthermore, electricity follows the "path of least resistance," so it generally cannot be routed in a specific direction.

This means generation and transmission operations in North America must be monitored and controlled in real time, 24 hours a day, to ensure a consistent and ample flow of electricity.

NERC is responsible for aspects of an international electricity system that serves 334 million people, and has some 211,000 miles of high-voltage transmission line.

From the North American Electric Reliability Corporation (NERC) website

Electricity Transmission and Distribution

The U.S. consists of three electricity transmission grids, the Western Grid, Eastern Grid and Texas. The Western Grid is under considerable transmission stress because of congestion in the regional electric transmission system. Congestion can lead to electricity curtailments for business and industry.

New transmission facilities and routes for transmitting energy are being planned to meet the growing load demand from residents and business, and to accommodate the dispersed locations of alternative energy sources. However, the public is concerned about the potential impacts of new transmission lines across Oregon. Utilities, transmission facility developers, tribes, local communities, and state and federal agencies that manage public lands and natural resources are all facing growing challenges associated with siting new transmission facilities.

Transmission Line Proposals

Discussions regarding development of two major electric transmission lines began in 2009 when Idaho Power filed the Boardman to Hemingway (B2H) Notice of Intent with the Energy Facility Siting Council. Portland General Electric later filed their Notice of Intent to construct the Cascade Crossing Transmission Line.

These two projects are now active in the federal and State of Oregon decision processes and will be for several years. No major transmission lines have been sited or constructed in Oregon for several decades and there is considerable state and stakeholder concern about these projects and their impacts. These lines are proposed to allow local utilities to meet federal reliability requirements, provide transmission service as required by the Federal Energy Regulatory Commission (FERC) and have been indentified in Integrated Resource Plans acknowledged by the Oregon and Idaho Public Utility Commissions.

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.

According the U.S. Department of Energy (USDOE), investor-owned utilities own almost 80 percent of electricity transmission in the nation. Publicly owned utilities and cooperatives, along with the federal power agencies, such as the Bonneville Power Administration, make up the remainder. There are more than 140 million electricity customers in the U.S.

In 2007, Congress identified a need to modernize the more than 100-year-old grid and began an effort called Smart Grid as part of the Energy Independence and Security Act. The USDOE's Office of Electricity Delivery and Energy leads the Smart Grid Task Force and is developing policies, communication protocols and a framework for the grid to interact across the different levels of electricity generation, transmission, distribution and consumer use.

A smart grid, as defined by USDOE's National Energy Technology Laboratory would:

- Be self-healing from power disturbance events
- Have active participation by consumers in demand response
- Operate resiliently against physical and cyber attack
- Provide power quality for 21st century needs
- Accommodate all generation and storage options
- Enable new products, services, and markets

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 (ARRA). The pilot projects are underway and plan to be completed by 2013.

Major transmission lines connect Oregon's electricity grid to California and Washington State, allowing for large interstate energy transfers. One of these transmission systems is the Western Interconnection, which runs from British Columbia and Alberta in Canada through Washington, Oregon, and southern California to the northern part of Baja California, Mexico.

The system, also known as the Pacific Intertie, is the largest single electricity transmission program in the United States and covers all or part of 14 states.

Although the Pacific Intertie was originally designed to transmit electricity south during California's peak summer demand season, flow is sometimes reversed overnight and has occasionally been reversed during periods of reduced hydroelectric generation in the Northwest.

Nearly one-half of Oregon households use electricity as their main source of energy for home heating.

U.S. Department of Energy's Energy Information Administration

Developing Energy Resources

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

ODOE is processing more than 2,200 megawatts of proposed wind power projects, biomass-fired generation facilities, and gas-fired generation plants. As renewable energy project locations have moved beyond the dry land wheat fields of eastern Oregon, public concern has developed over land use, noise, scenic, wildlife and possible health issues.

The Energy Facility Siting Council will continue to balance energy demands with water supply conflicts, local air quality concerns and cumulative impacts from multiple projects. The increase in renewable energy generation projects in the Columbia Basin has raised numerous concerns about the possible impacts on human health, avian and bat species, and the visual landscape.

As the Renewable Portfolio Standard generation goals are met with intermittent resources such as wind, it is anticipated that more natural gas-fired power plants will be proposed to provide base load electricity. These natural gas projects use large amounts of water; water consumption and resource impact concerns could be raised.

Working with the Federal Government
ODOE's siting staff also participates in an expanding list of Federal Energy Regulatory Commission (FERC) and other federal agency decision processes. Liquefied natural gas (LNG) terminal projects remain active, as do natural gas transmission projects. The Ruby natural gas pipeline project has been permitted and is in construction, the Bonneville Power Administration has proposed upgrades to their electric system, and the BLM and U.S. Forest Service continue to process rights-of-way requests for projects that cross federal lands.

The Oregon Department of Energy is also working with a wider variety of federal partners on a number of issues, including the U.S. Fish and Wildlife Service, BLM, U.S. Forest Service and the Natural Resource Conservation Service.

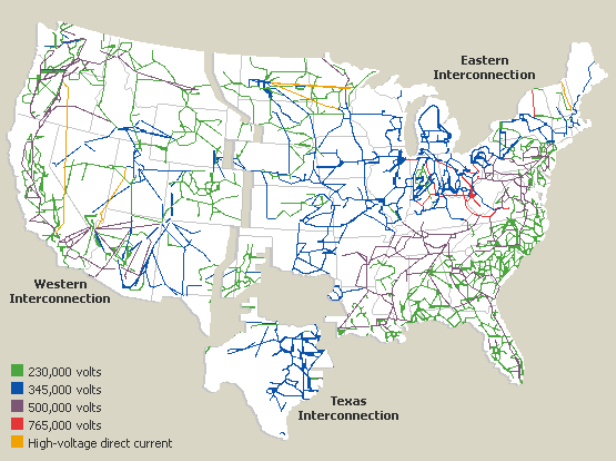
New Federal Partnership
A state and federal agency collaborative effort, brought together by Governor Kulongoski, is working on regional policy opportunities and challenges associated with sage grouse conservation, sagebrush habitat protection, and renewable energy development.

The partners in the Renewable Energy and Sagebrush Conservation Partnership will seek collaborative approaches to habitat issues. The group is also looking for ways to agree on criteria for

identifying areas in eastern Oregon that have potential for new energy development, as well as those areas with potential challenges to development.

Other Planning Efforts
The Oregon Energy Planning Council (OEPC), formed following an Executive Order from Governor Kulongoski, is looking at the Energy Facility Siting Council statutes (ORS 469.300 to 469.520) to determine whether the statutes are adequate and sufficient to accomplish the growing demand for new transmission facilities, or whether amendments are needed. The OEPC issued their report to the Governor in December 2010.

ODOE is a member of the Western Interconnection Planning Work Group that is studying the need for transmission lines in the West. Besides FERC, NERC (North American Reliability Corporation) and the WECC (Western Electricity Coordinating Council), numerous other entities are involved in transmission planning. These include TEPPC (Transmission Expansion Planning Policy Committee), NARUC (National Association of Regulatory Utility Commissioners), WIEB (Western Interstate Energy Board), and CREPC (Committee on Regional Electric Power Cooperation).



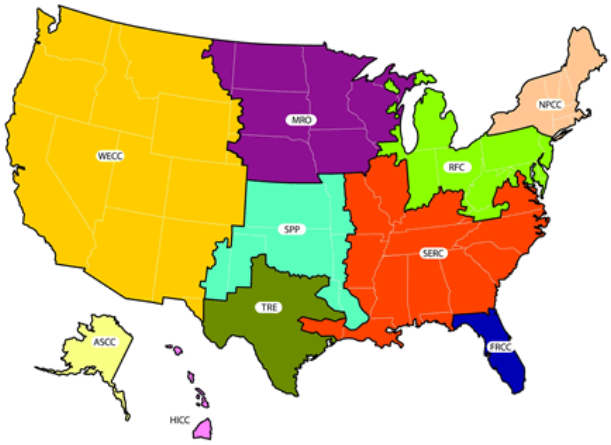


Figure 15 shows how the electric grid is made of three distinct sections. Figure 16 shows the map of the North American Reliability Corporation. NERC has authority from the Federal Regulatory Commission to enforce electric reliability standards. Oregon is part of the WECC or the Western Electricity Coordinating Council.

Federal Actions

Federal Stimulus Programs, the American Recovery and Reinvestment Act (ARRA) Awards
Congress enacted, and the President signed, federal stimulus legislation in February 2009 to help jump-start the economy by creating and retaining jobs. The Oregon Department of Energy (ODOE) received four ARRA awards to pass-through during the 2009-11 biennium totaling approximately $56 million. Besides the funds ODOE received, federal stimulus has provided funds to private businesses and other governments for renewable energy development and energy conservation. What follows are the grants ODOE applied for and received:

- $42.1 million through the State Energy Plan (SEP), to improve energy efficiency in private and public buildings, including K-12 schools, colleges, universities, and state and local government buildings; 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 that the state received be distributed to the smaller cities and counties ineligible for a direct allocation under this program. About 40 percent was directed at two major projects: a biomass boiler project, energy efficiency upgrades and a feedstock study at a rural school in Vernonia, and, a solar project in Christmas Valley at a military complex.

- $3.6 million through the State Energy Efficient Appliance Rebate Program (SEEARP), which provides 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 ODOE, 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.

These one-time awards were distributed to 300 sub-recipients in each of Oregon's 36 counties. Together the awards are expected to:

- Save or produce 1,102,178 MM Btu of energy annually
- Reduce greenhouse gas emissions by 48,691 tons annually
- Retrofit more than 30 million square feet of building space
- Create or retain 555 jobs
- Leverage $29 million in other funds
- Save more than three million gallons of water annually

The EPA and the Tailoring Rule

In 2010, the U.S. Environmental Protection Agency (EPA) released its final Greenhouse Gas (GHG) Tailoring Rule. When the rule was published, it became a source of interest in Oregon and the subject of numerous discussions, newspaper articles and editorials. The topic also raised concern with elected officials, industry and state agencies.

In January 2011, the EPA decided to defer GHG requirements for from biomass-fired carbon dioxide emissions for three years. The EPA will use the time to conduct further analysis of the emissions associated with burning biomass.

Tailoring Rule Background

The tailoring rule stems from the April 2, 2007 Supreme Court decision, *Massachusetts v. EPA*. In this case, the Supreme Court found that the EPA was required to determine, under the Clean Air Act, whether greenhouse gases (GHG) from motor vehicles contribute to air pollution and may endanger public health, or if the science is too uncertain to make a reasoned decision.

After this decision, the EPA issued two findings. One stated that GHG are reasonably anticipated to endanger the public health. The second finding stated that new motor vehicles contribute to the GHG air pollution that threatens public health and welfare.

On May 13, 2010, the EPA released the final *Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule*, otherwise known as the GHG Tailoring Rule, under the Clean Air Act (CAA). This rule follows another final rulemaking, *Light-Duty Vehicle Greenhouse Gas Emissions Standards and Corporate Average Fuel Economy Standards*, which applies to light-duty vehicles (passenger cars, light-duty trucks, and medium duty passenger vehicles) from model years 2012 through 2016. The rule regulates the emissions of GHG and requires those vehicles to meet an average emissions level of 250 grams of CO_2 per mile.

Greenhouse gas regulation in the transportation sector also affected the stationary source emitters. The EPA said stationary sources that emit GHG could be subject to the requirements of the Prevention of Significant Deterioration (PSD) and Title V permit programs. This meant that millions of new sources could have been subject to permitting requirements. The EPA issued the tailoring rule to "tailor" the applicability criteria that determine which sources and modifications are subject to GHG permitting requirements and phase in this requirement over time.

State of Oregon Regulations

The EPA has required each state to submit information that describes if the state has the authority to regulate GHG under its existing PSD and Title V permit programs or if they will need to conduct any regulatory or legislative process and what the timeline for this process would be. If a state chooses not to follow EPA's approach, the state must provide information on its authority for the alternative approach and how the state will administer the program.

On July 29, 2010, the Oregon Department of Environmental Quality (DEQ) responded to EPA's request for information saying that that the Oregon Environmental Quality Commission (EQC) cannot automatically adopt EPA's approach by reference. Because the EQC rules do not automatically incorporate future EPA rules, DEQ will have to look at including GHG as a regulated pollutant.

Meeting the Challenge of Climate Change

Oregon has been at the forefront of combating climate change for over 20 years. As an early leader in climate change policy and planning efforts, with comprehensive greenhouse gas reduction plans released in 1990 and 1995, Oregon helped to define a state's role in addressing climate change. Oregon set a benchmark for itself in 1992 to hold emissions to 1990 levels.

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 (GHG) 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.

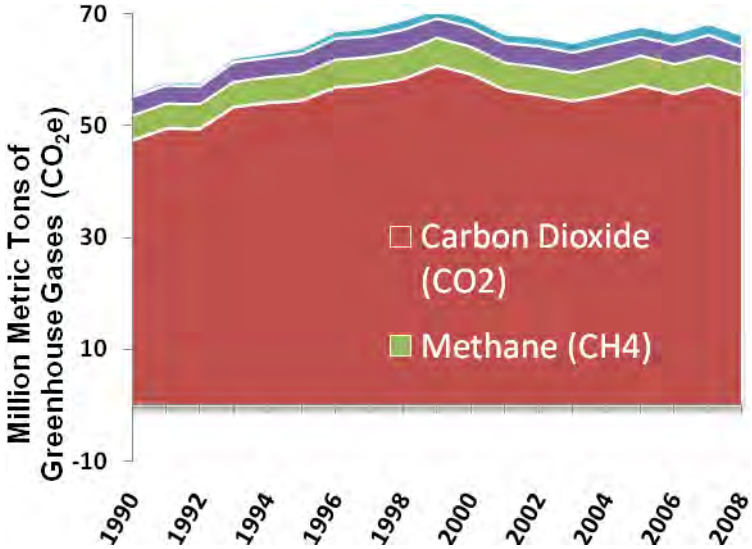


Figure 17: Illustrates the historical composition of Oregon's greenhouse gas emissions.

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 hovered around 8 to 9 percent recently, representing the smallest share of emissions in Oregon.

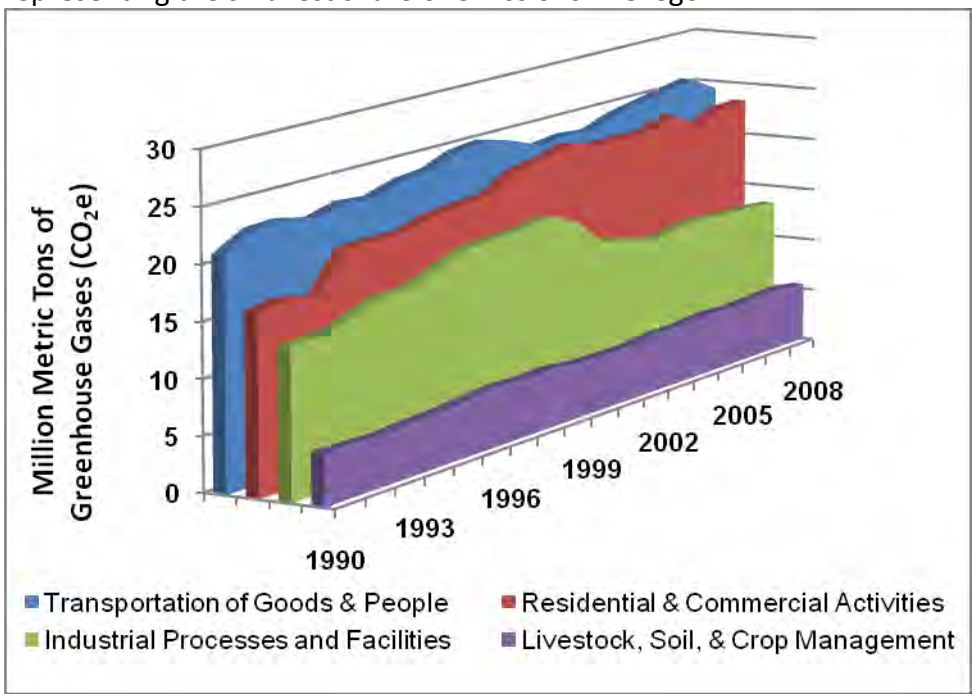


Figure 18: Transportation accounts for the largest sector of GHG emissions.

As can be seen in Figure 18, 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 recently began requiring significant emitters of greenhouse gases to report their emissions to the Department of Environmental Quality, mirroring similar requirements now in place by the U.S. Environmental Protection Agency. This new source of emissions data will enhance ongoing efforts to track Oregon's greenhouse gas emissions. It will also provide new challenges as state agencies will need to reconcile differing data and analysis frameworks.

Oregon's Greenhouse Gas Reduction Goals

In 2004, Governor Kulongoski convened the Governor's Advisory Group on Global Warming to make recommendations on reducing greenhouse gas emissions in Oregon. The final report from this process, the *Oregon Strategy for Greenhouse Gas Reductions*, has served as the cornerstone for greenhouse gas policy since its release. One of the key recommendations from that report, which

the governor endorsed, was a set of greenhouse gas reduction goals for Oregon. Those goals are to arrest the growth of Oregon's greenhouse gas emissions and begin to reduce greenhouse gas emissions by 2010, to achieve greenhouse gas levels that are 10 percent below 1990 levels by 2020, and by 2050, to achieve greenhouse gas levels that are at least 75 percent below 1990 levels. These targets were later put into statute by the 2007 legislature.

Oregon Global Warming Commission

At the same time that the legislature put Oregon's greenhouse gas reduction goals into law, they formed the Oregon Global Warming Commission (GWC) to monitor progress toward these goals, recommend ways to coordinate state and local efforts to reduce Oregon's greenhouse gas emissions, and to develop ways to help governments, businesses and residents prepare for the effects of climate change. The Global Warming Commission has been meeting since early 2008 and is staffed by the Oregon Department of Energy.

In its report to the legislature in 2009, the GWC reported that Oregon was on track to meet the 2010 goal of stabilizing emissions growth. However, based on existing emission trajectories and proposed policies, Oregon will likely fall short of meeting the 2020 goal and, by extrapolation, will not be in a position to meet the 2050 goal without additional policy action.

The GWC is currently in the process of developing a "Roadmap to 2020" plan to identify policies, practices, and programs that can help the state meet its 2020 and 2050 emission reduction goals. An interim roadmap report was adopted by the Global Warming Commission at the end of October 2010 and a public comment process on those recommendations will take place in 2011.

State Efforts to Prepare for and Adapt to Climate Change

An increasingly important component of Oregon's climate change policy is to prepare for the impacts of climate change, many of which the state is already beginning to face. In 2006, the Climate Change Integration Group (CCIG) was established as a follow up to the 2004 Advisory Group on Global Warming. Their final report, delivered to Governor Kulongoski in 2008, laid the foundation to begin developing a preparation and adaption strategy to climate change.

In 2010, a collaboration of state agencies convened by the governor began putting together a detailed preparation and adaptation strategy, with a preliminary report issued at the end of 2010. This report will be supplemented by the first comprehensive report on the impacts of climate change by the Oregon Climate Change Research Institute. The Institute is a research section of the Oregon University System, put in place by the same legislation that formed the Oregon Global Warming Commission.

The energy sector and the Oregon Department of Energy face some unique challenges in dealing with the growing impacts of climate change in Oregon. The increasing average annual temperature in the state is shifting the demand for electricity from winter heating to summer cooling, particularly in rapidly growing areas like the Rogue Valley and central Oregon. This trend is expected to continue and intensify. The change in snow melt patterns and precipitation is also starting to affect the region's hydropower resources. With potentially less water and with different flow conditions, the

already strained hydropower resources of Oregon could face even more challenges. This has impacts for energy resource planning and creates the potential for relying on additional fossil-fuel resources to make up for lost hydropower.

Western Climate Initiative

The governors of Oregon, Washington, California, Arizona, and New Mexico formed the Western Regional Climate Action Initiative (later shortened to the Western Climate Initiative, or WCI) in February of 2007. The WCI followed in the footsteps of the West Coast Governor's Global Warming Initiative by combining with a similar Arizona and New Mexico climate change partnership. In the short term, the WCI Partners agreed to set a regional greenhouse gas reduction goal, participate in a greenhouse gas registry and develop a design for a "market-based multi-sector mechanism," such as cap-and-trade. In the long term, they agreed to work jointly on promoting clean and renewable energy, energy efficiency, regional and national climate policies favorable to the West, and climate change adaptation measures. There are now seven U.S. states and four Canadian provincial WCI Partners (see Figure 19).

The WCI Partner jurisdictions released the *Design for the WCI Regional Program* in July 2010 which outlined a comprehensive strategy, including an emissions cap and other core policies (e.g., renewable energy, transportation, energy efficiency) to reduce greenhouse gases and spur a clean-energy economy. Five WCI Partner jurisdictions of California, New Mexico, Quebec, Ontario, and British Columbia currently have the legislative or regulatory authority to implement cap-and-trade in their jurisdictions and are in the process of putting in place administrative rules for the program.

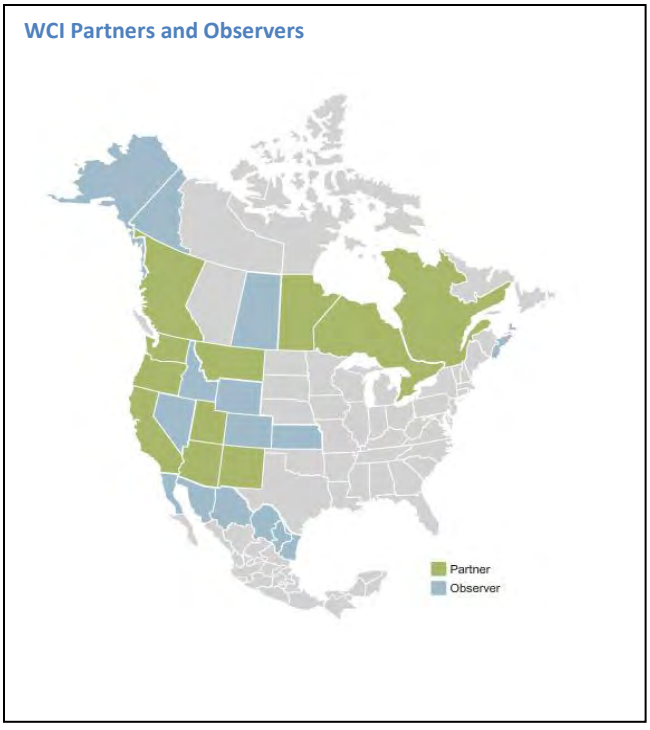


Figure 19: Western Climate Initiative Partners map

These jurisdictions comprise over two-thirds of the total emissions in WCI Partner jurisdictions. Therefore, a significant and robust carbon market could emerge in 2012. Oregon remains engaged in WCI, positioning itself to take advantage of this emerging carbon market and to influence climate change policy at the federal and regional level.

Climate Change and Transportation, House Bill 2186 and Senate Bill 1059

Transportation accounts for an increasing percentage of greenhouse gas emissions in Oregon, now about 38 percent of all greenhouse gas emissions, up from 34 percent reported in the 2004 *A Framework for Addressing Rapid Climate Change*.

When energy content is taken into account, transportation is 30 percent of Oregon's energy demand. To help mitigate these emissions, bills were passed in the 2009 and 2010 legislative sessions, aimed at reducing dependence on petroleum-based technologies in the transportation sector.

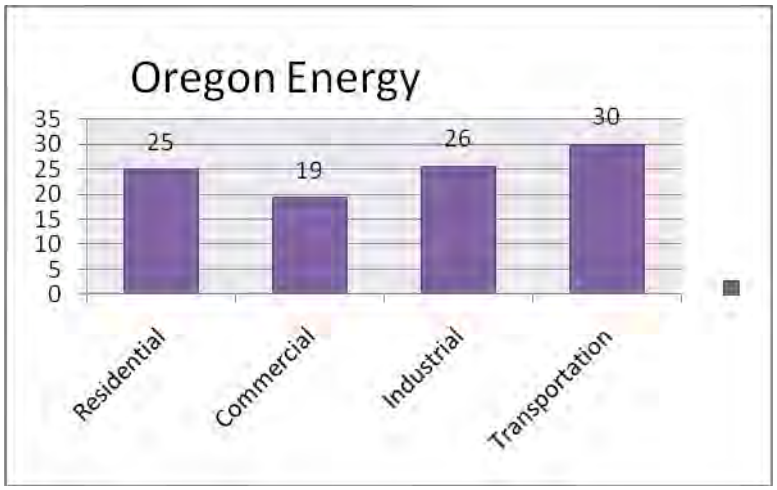


Figure 20: About 30 percent of Oregon's energy demand is for transportation energy

House Bill 2186, passed in 2009, authorizes the Environmental Quality Commission to adopt a low carbon fuel standard for vehicle fuels and other measures to reduce greenhouse gas emissions from vehicles. The Commission is also directed to conduct studies and make recommendations to help achieve the State's statutory greenhouse gas reduction goals; namely, to reduce greenhouse gasses 10 percent below 1990 levels by the year 2020 and 75 percent below 1990 levels by the year 2050.

Senate Bill 1059 directs the Oregon Transportation Commission to adopt a statewide transportation strategy to meet the state's greenhouse gas emission reduction goals. Senate Bill 1059 also directs the Department of Transportation and the Department of Land Conservation and Development to establish guidelines for developing and evaluating alternative land use and transportation scenarios that may reduce greenhouse gas emissions.

The Oregon Department of Energy and Department of Environmental Quality also have roles in the legislation. ODOE is working with the other agencies to estimate Vehicle Miles Traveled (VMT), the rate at which new vehicles will replace existing vehicles, and the carbon intensity of transportation fuels. The information will be used in a model to evaluate GHG emissions in the light-duty transportation sector through 2050.

Nuclear and Coal Power Plants

Nuclear Power Plants

For a number of reasons (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.

Coal Power Plants

Coal power plants release sulfur dioxide, nitrogen oxides and mercury, and release carbon dioxide. In 2009, the legislature passed a law (Senate Bill 101) that effectively prohibits utilities and energy service providers in Oregon from entering into new long term contracts for coal power and investing in new coal plants. This Emission Performance Standard (EPS) is largely identical to similar laws in Washington and California.

As a result of this law it is unlikely that Oregon electricity customers will be asked to invest in or help support new coal facilities. In combination with Oregon's long-standing CO_2 emissions standard for energy facilities sited in Oregon, this law now means that Oregon is regulating CO_2 emissions for power both generated within and imported into the state.

Carbon Dioxide Mitigation

To reduce the impact of coal burning, developers are seeking ways to sequester the carbon released from coal plants. Geologic sequestration involves the capture and storage of carbon dioxide to prevent its release into the atmosphere. The main method being considered to sequester the carbon dioxide is geologic storage via deep injection into saline aquifers and other structural traps.

In Oregon, since 1997, new power plants must meet Oregon's strict carbon dioxide emission standards or pay a penalty in the form of emissions offsets. For a 500 megawatt coal plant, the penalty could be on the order of $100 million based on a 30-year operating life.

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. Following the end of plutonium production in 1989, 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 53 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 of, resulting in extensive contamination of the groundwater. Treatment systems are currently in place and are also being greatly expanded to contain and clean-up the contaminants. The U.S. Department of Energy, which owns and operates Hanford, is required to stop hexavalent chromium, a toxic chemical, from entering the Columbia River by December 2012, and stop all other contaminants from entering the river by December 2016. Oregon has strongly encouraged the U.S. Department of Energy to beat those deadlines, if possible.

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 go fully on line until 2019. Some portions of the Waste Treatment Plant may be operational by 2016, which might allow for treatment of some waste earlier than scheduled. 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 October 31, 2010, Hanford has sent 530 truckloads of this waste to New Mexico and Idaho. The waste travels along Interstates 82 and 84 in northeast Oregon. The U. S. Department of Energy plans to dramatically increase these shipments from Hanford in the coming 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 (ODOE) 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 26,000 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. One issue of concern is the reduction of federal funding to both counties upon completion of the incineration of the last of the nerve agents at the Umatilla Depot. These funding cuts are expected to greatly reduce both counties' overall emergency preparedness programs.

Petroleum

The Oregon Department of Energy is responsible for protecting public health and safety in the event of a fuel crisis in Oregon. ODOE developed 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. ODOE 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, being done in coordination with the Oregon Public Utility Commission, will help ensure a rapid recovery of energy systems in the event of an energy emergency.

LNG

As part of its emergency preparedness obligations, the Oregon Department of Energy (ODOE) is responsible for protecting the health and safety of Oregonians in the event of a liquefied natural gas (LNG) emergency along the transport channel as well as at any potential facility. There are two proposed LNG 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.

ODOE works with LNG developers, the U.S. Coast Guard (USCG), and local emergency response organizations to develop a comprehensive emergency response plan to be completed prior to construction. ODOE, in conjunction with the USCG, assesses waterway suitability for the transportation of LNG shipments. The Department also reviews facility security plans to ensure federal and state requirements are met; and evaluates the LNG 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 PUC 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.

Then-Governor Kitzhaber petitioned the U.S. Environmental Protection Agency (EPA) 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 ODOE, 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.

OREGON'S ENERGY FUTURE

To promote renewable resources, the 1977 Legislature created a tax credit program for home solar, wind or geothermal systems. Hydro was added in 1979.

The BETC program began in 1980 to encourage businesses to use renewables, waste heat and recycling. Conservation was added in 1983.

Oregon Department of Energy's Third Biennial Energy Plan, 1989

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."

What follows is a look at some of the numbers tied to energy savings and renewable energy development. These are cumulative numbers, starting from the time these Oregon Department of Energy programs began in the late 1970s.

The numbers are a snapshot in time of energy savings and generation; a look at what we've invested. This "photograph" can illustrate where Oregon has been with its programs and where it may need to go. Oregon's long-standing energy programs have led to national recognition over the years.

The 2010 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 2010 ranking, the American Council for an Energy-Efficient Economy (ACEEE) placed Oregon third in the nation behind California and Massachusetts. The scoring is based on state government incentives, appliance efficiency standards, transportation, building codes, public benefits fund and combined heat and power.

2011 is the first implementation year for the Renewable Portfolio Standard (RPS). The 25 percent renewable energy by 2025 RPS faces its first check in when the three largest utilities in Oregon show that they have achieved the five percent 2011 goal. That increases to 15 percent in 2015, 20 percent in 2020 and 25 percent in 2025.

ENERGY SAVINGS AND INVESTMENTS

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 (ODOE) provides information, analyzes new technologies, and offers a variety of programs to encourage Oregonians to use energy more efficiently and to use renewable energy sources.

This section describes ODOE's conservation and renewable resource programs, including energy loans, and gives estimated savings and electricity generation in 2009.

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 2009.

Electricity	12.3 billion kilowatt-hours
Natural gas	275.8 million therms
Oil	13.4 million gallons
Wood and other fuels	5.7 trillion Btu
Gasoline & Diesel	20.8 trillion Btu
Biofuels	7.3 billion Btu

Altogether, the yearly energy savings and electricity generated are 105.3 trillion Btu or enough to meet the energy needs of about 1.5 million Oregon homes.

BUSINESS ENERGY TAX CREDIT

ODOE offers tax credits to businesses encouraging them to invest in energy conservation, renewable resources, renewable energy manufacturing, recycling, alternative fuels, transportation efficiency and sustainable buildings.

The owner of a project may transfer or pass-through the tax credit to an Oregon business in exchange for cash payment. The project owner may be a public or non-profit institution.

The Business Energy Tax Credit (BETC) is 35 percent of the eligible cost of the project. The tax credit may be taken in one year for projects under $20,000. For larger projects, businesses take 10 percent of the credit in the first and second years and five percent each year thereafter.

The 2007 legislature increased the BETC to 50 percent for renewable energy projects, which is taking 10 percent per year over five years. The 2010 Legislative Special Session placed a $300 million cap on the amount of tax credits that could be issued for renewable energy resource projects. Besides a cap, HB 3680 in 2010 also set up a tiered system for evaluating renewable energy proposals, and provided a list of selection criteria.

Number of BETCs: 19,148—since the program began

Recipients	
Commercial firms	16,067
Manufacturers	2,030
Farms and ranches	1,051

Types of investment

Conservation	16,879
Recycling	1,082
Renewable resources	1,187

BETC Energy savings in 2009	
Electricity	3.5 billion kWh
Natural gas	141.5 million therms
Oil	7.9 million gallons
Wood/other	1.9 trillion Btu
Gas/Diesel	20.4 trillion Btu

Energy produced in 2009

Electricity	4.2 billion kWh
Biofuels energy	5.1 trillion Btu
Thermal energy	2.8 trillion Btu

Value of savings/generation in 2009 $1,067 million

Example of a school's use of the BETC Pass-through Option:

The Klamath County School District upgraded an existing geothermal heating system at Henley High School. The project cost more than $96,000 and will save about $23,000 annually in natural gas costs. Since schools do not have tax liabilities, using the BETC pass-through option, Henley High School chose to pass-through the earned credit and received $24,528 in return. The lump sum payment helped the school pay off the cost of installing the upgrades.

RESIDENTIAL ENERGY TAX CREDIT

As new energy-saving technologies have come on the market, the legislature has expanded the Residential Energy Tax Credit (RETC) 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 December 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. However, the next generation of plug-in hybrid vehicles will be eligible for the tax credit. New vehicles that run on electricity or natural gas will continue to qualify for the alternative fuel vehicle tax credit. The change came as part of House Bill 2078, passed during the 2009 legislative session.

Number of RETCs: 411,926—since the program began

Renewable resource systems

Solar water heating	19,366
Heat Pump/Water Heaters	300
Geothermal	2,492
Solar space heating	1,716
Solar electric	1,692
Wind	53
Hydro	20

Appliances

Clothes washers	206,863
Refrigerators	32,072
Dishwashers	80,046
Water heaters	5,793
Furnaces, Boilers, Air handlers	33,769
Wood and Pellet Stoves	2,512
Energy-efficient ducts	6,255
Heat pumps/air conditioning	5,964
Ventilation systems	218
Drain-water heat exchangers	24

Alt. fuel/hybrid vehicles 12,771

RETC Energy savings in 2009	
Electricity	163.7 million kWh
Natural gas	5.4 million therms
Oil	15,698 gallons
Gas/Diesel	2.2 million gallons

Value of savings/generation in 2009 $26.1 million

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 (SHOW) 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 audits:	44,093—since the program began in 1978
Loans	4,426
Loan amount	$11.6 million
Rebates	15,004
Rebate amount	$7.8 million
Energy savings in 2009	2.0 million gallons of oil
Value of savings in 2009	$4.2 million

ENERGY-EFFICIENT MANUFACTURED HOMES

Unlike homes and apartments built on site, manufactured homes are not subject to Oregon's building code. Instead, federal law governs energy efficiency and other aspects of manufactured homes. ODOE worked with the manufactured home industry in the Northwest to build energy-efficient homes, but the effort ended in late 2009.

Energy-efficient homes manufactured and sited since 1995: 31,589

TRANSPORTATION PROGRAM

ODOE works with business and public entities to increase use of public transit, carpools, vanpools, car sharing and bicycles. The Oregon Department of Energy encourages shuttle services and initiatives to change travel behavior, thereby saving fuel and reducing greenhouse gas emissions.

Project Type	**Vehicle Miles Reduced (VMR)**
Bicycles	7,962,850
Car Sharing	10,971,669
Commuter Pool Vehicles	56,032,915
Efficiency Truck Technology	166,705
Financial Incentive Programs	74,207,713
Telework and Travel Behavior Change	39,557,098

Transportation Management Associations	101,486,756
Transit Passes	525,602,333
Transit Providers	123,057,851
Transit Shuttles	3,042,316
Transportation RD&D	89,976,369
Transportation Services K-12 students	6,447,833
Other Transportation	2,000,000

RESIDENTIAL BUILDING CODES

The cheapest and most effective way to ensure a home is energy-efficient is to build it that way. In 1974, Oregon became the first state to include energy standards in a statewide building code. The standards required minimum insulation levels in ceilings, walls and floors. Before that time, most Oregon homes were built with little, if any, insulation.

The energy standards have been raised several times since then. A home built today requires about half the energy to heat as a home built before the energy standards.

ODOE's role is to submit recommendations to the Building Codes Division for cost-effective changes to the standards and provide technical help.

Number of homes built to energy standards since 2003:

Single-family	369,638
Multi-family	182,320

Energy savings in 2009

Electricity	1,170 million kWh
Natural gas	87.9 million therms

Value of savings in 2009 $219.5 million

COMMERCIAL BUILDING CODES

According to the Energy Information Administration, 40 percent of total U.S. energy consumption in 2008 was used in buildings.

Building envelope along with heating, ventilation and air conditioning (HVAC) standards became part of the state building code for commercial buildings in 1978. The standards address lighting, the heat loss and gain of the building shell, and the efficiency of heating, ventilation and cooling systems. The standards have been raised over the years.

Energy savings in 2009

Electricity	2.3 billion kWh
Natural gas	19.0 million therms

Value of savings in 2009 $198.8 million

LARGE ELECTRIC CONSUMER PUBLIC PURPOSE PROGRAM

Under Senate Bill 1149, 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.

Projects completed since 2002: 123

Energy savings in 2009

Electricity	176.1 million kWh

Value of savings in 2009 $9.4 million

ENERGY-EFFICIENT NEW 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.

ODOE 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. By the end of 2009, more than 100 state buildings had been built or renovated with energy efficiency measures that go beyond code requirements.

Energy-efficient new or renovated state buildings since 2001: 137

Energy savings in 2009

Electricity	46.1 million kWh
Natural gas	1.0 million therms
Other	42.6 billion Btu

Value of savings in 2009 $5.4 million

ALTERNATIVE FUELS

Vehicles that run on alternative fuels such as natural gas, biodiesel, electricity, propane, methanol, ethanol and hydrogen are less polluting than vehicles that burn gasoline or diesel. In 1991, the Legislature made alternative fuel vehicles and fueling stations eligible for the Business Energy Tax Credit. As of December 31, 2009 hybrid-electric vehicles were no longer eligible for the tax credit, but electric vehicles (EVs) are still eligible.

In 1997, the Legislature expanded the Residential Energy Tax Credit (RETC) to include alternative-fuel vehicles and fueling systems. Hybrid vehicles have rapidly increased in market share since being introduced in the late 1990s, and thus are no longer eligible for the RETC.

Oregon's first commercial biofuel production facility became operational in 2005 with a small used cooking oil-to-biodiesel plant in Salem. Several private and public fleets use blends of biodiesel. The State fleet uses an E-85 blend of ethanol.

Business energy tax credits	
Vans/trucks (propane or natural gas)	353
Buses (propane or natural gas)	298
Forklifts (natural gas)	58
Cars (natural gas or electric)	892
Fueling stations (natural gas)	38

Residential energy tax credits	
New gas-electric cars	12,633
New electric vehicles	68
New natural gas vehicles	6
New propane vehicles	1
Electric conversions	22
Natural gas conversions	5
Propane conversions	14
Biodiesel conversions	3
Charging systems	19

SCHOOLS

Oregon's electric industry restructuring law (SB 1149) sets aside funds for improving the energy efficiency of schools in the service areas of Portland General Electric and Pacific Power; education service districts administer the funds. More than 800 schools will benefit. Funds must first go to energy audits, then to measures recommended by those audits. The Oregon Department of Energy (ODOE) provides technical oversight for the energy audits and projects to ensure consistency statewide with the program guidelines.

For schools statewide, 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.

Buildings completed since 1997:	**2,178**
Total incentives:	$10.6 million

Energy savings in 2009	
Electricity	100.3 million kWh
Natural gas	6.6 million therms
Oil	350,434 gallons
Other	23.2 billion Btu
Value of savings in 2009	$16.4 million

High Performance Schools
The High Performance Schools effort is being phased out for other efforts. ODOE had offered technical assistance for the design of energy and resource efficient new school facilities. A High Performance School facility features energy and water efficiency measures, an enhanced learning environment through natural daylighting, good indoor air quality and improved occupant comfort. Twenty-six schools took advantage of this program.

Williams Oil Settlement
The Oregon Department of Energy (ODOE) received $1 million in Williams Settlement Funds for funding energy efficiency measures in Oregon K-12 public schools served by consumer-owned utilities. The settlement came out of an investigation by the attorneys general of Oregon, Washington and California. They examined allegations of price manipulation and antitrust violations in the Western power market during the energy crisis of 2000-01.

ODOE provided energy audits for schools and technical assistance for completing energy efficiency projects in 38 schools. This schools effort has ended.

ENERGY LOANS

Approved by the voters in 1980, the State Energy Loan Program (SELP) has made more than 800 loans, totaling nearly $500 million. These projects save or produce energy worth about $45 million annually. 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 non-profits. 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.

Conservation Loans

Of the 590 conservation loans made by the program through 2010, 289 have been to businesses, 89 to school districts, 84 to local governments and 37 to state government. Others receiving loans include homeowners, Oregon colleges and universities, and tribal governments.

Renewable Resource Loans
Through 2010, SELP made about 250 loans for renewable resource projects, including 78 for geothermal, 83 for solar, 42 for hydro, 26 for biomass, nine for waste heat and eight for wind.

Energy Savings and Generation through 2010:

Electricity	615.97 million kWh
Natural Gas	13.75 million therms
Oil/Diesel	3.76 million gallons
Electric Generation	502.67 million kWh
Fuel	11.98 billion Btu
Wood/Other	860.93 MMBtu

Besides loans for proven technologies, the program showcases innovation. Among the projects funded recently by the Energy Loan Program are:

- A $340,000 loan funded a windows retrofit project to a circa 1900s Portland industrial building.
- Six orchard owners took advantage of the loan program to install wind machines to protect more than 100 acres from frost with loans totaling more than $300,000.
- With a loan for $4.5 million, a data center in Beaverton installed energy efficiency HVAC units as part of their expansion project.
- Loans for deferred maintenance to Oregon University System campuses totaling more than $46 million since 2009.

Energy Efficiency and Sustainable Technology (EEAST) Act
HB 2626 (2009) created the Energy Efficiency and Sustainable Technology Act of 2009 (EEAST) as part of Oregon Revised Statute 470. EEAST provides authority to finance residential and commercial energy efficiency and renewable energy projects in Oregon by allowing consumers to repay energy loans as a line item charge on their monthly utility bill or as a part of a county property tax bill for loans issued by Local Improvement Districts.

FUTURE ENERGY RESOURCES

Over the past year, with the continuing development of renewable resources, Energy Facility Siting Council (EFSC) members and their staff have heard concerns regarding the cumulative impacts of renewable energy projects. These include the need for a statewide comprehensive energy plan, loss of scenic views, decreased property values, reduced species populations, fragmentation of productive habitat, effects to human health, and the industrialization of forest and agriculture lands.

With the renewal of the federal production tax credit and the planned expansion of the bulk transmission network, the development of additional renewable energy projects seems to be on the horizon. Oregon's energy landscape has been changing quickly, from a few wind turbines in 2000 to thousands of megawatts installed in the Columbia Basin by the close of 2010. The concerns mentioned above stand in contrast to the creation of construction jobs and new careers. Add in policy mandates to improve reliability and reduce dependence on fossil fuel sources and you have the beginnings of a decision-making dilemma. Among the issues, EFSC has heard recently:

- The rural way-of-life versus urban energy use
- Environmental trade-offs; has it become save habitat and species or save the climate?
- The value of small, distributed energy sources versus large, central power plants
- Balancing the policy of developing least cost resources with climate policy

The Energy Facility Siting Council (EFSC) 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 EFSC consideration.

EFSC 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 EFSC has exempted from siting standards.

The Council uses all relevant state and local criteria in making its siting decisions. In addition to their own standards, they apply applicable Oregon Department of Environmental Quality (DEQ), Department of State Lands, Oregon Department of Fish and Wildlife, Oregon Water Resources and local land use requirements. Only DEQ's federally delegated water and air quality permits are excluded from EFSC review.

Photo 8: Wind farm in eastern Oregon (D.A. Black)

EFSC 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.

New Generating Capacity in Oregon

Since 1990, EFSC has approved applications for both renewable energy and fossil fuel-powered power plants. Those built include: Coyote Springs Power Plant, Hermiston Generating Plant, Hermiston Power Plant, Stateline Wind Plant, Klamath Generation, Klamath Cogeneration Plant, Port Westward, Biglow Canyon and Klondike III wind farm.

Wind farms approved and given site certificates include the Golden Hills, Helix, Leaning Juniper II, Montague and Shepherds Flat North, South and Central.

Proposals under Review
EFSC is actively reviewing site certificates applications for renewable energy and fossil fuel plants. Applications for renewable energy projects have dominated the Council's agenda for most of 2010, with hundreds of megawatts approved.

At present, ODOE is reviewing applications for an additional:

- 1,050 megawatts (MW) of wind generation known as Baseline and Rock Creek; Gilliam County
- 500+ MW of Saddle Butte; Gilliam and Morrow counties
- 200 MW expansion of the Helix Project; Umatilla County
- 300 MW of wind called Antelope Ridge; Union County
- 200 MW of wind, Summit Ridge; Wasco County

EFSC has begun review of the Klamath Bioenergy Facility, a 35 MW biomass-fired project proposed in Klamath County, and the Carty Generating Station a 900 MW natural gas-fired electricity generating facility in Morrow County.

Also under review are two large bulk electricity transmission lines, the Boardman to Hemingway line (B2H) proposed by Idaho Power, and the Cascade Crossing Line proposed by Portland General Electric.

Besides renewable energy development, the changing transportation landscape also effects electricity.

Electric Vehicles

Oregon and the nation will see changes within the transportation sector due in part to concerns about oil shortages, increasing petroleum prices, and climate change, along with the rise of more fuel-efficient vehicles. Almost every major automotive manufacturer is planning to launch plug-in electric vehicles (EV) in the near future, propelling a fundamental shift to more efficient electric drive systems.

Electricity is diverse and domestic and can be produced from several regional sources such as hydro, coal, natural gas, wind, nuclear and solar. Over 60 percent of the fossil fuels used in the transportation sector are imported from foreign countries and sold in a volatile global market. Electricity is produced locally and regionally and prices are generally more stable than oil or gasoline prices due to regulatory policy. Transportation electrification will require additional investment in grid reliability, but the power sector's infrastructural backbone is available virtually everywhere in the U.S.

Electric vehicles are more efficient than an internal combustion engine (ICE) vehicle. An EV can transform up to 90 percent of the energy content to mechanical energy. In contrast, today's most efficient ICE vehicles have efficiency ratings of only 25 to 27 percent. With gasoline prices of $3.00 per gallon, the operating cost of an efficient gasoline engine car (30 mpg) is 10 cents per mile. For current pure electric vehicles, assuming an average electricity price of 10 cents per kilowatt-hour (kWh), operating costs are only 2.5 cents per mile.

Electric miles are cleaner than gasoline miles on a well-to wheels analysis. A well-to-wheels analysis studies the energy use and carbon emissions attributable to a vehicle from the time an energy source is extracted until it is consumed.

Figure 21: Outlines the boundary of Oregon's initial electric vehicle initiative

One of the biggest limitations for drivers thinking about making the transition to EVs is the absence of a reliable network of charging facilities to increase the range of these vehicles and to alleviate the fear of "running out of juice." There are only about 400 all-electric vehicles registered in Oregon, but within a decade, plug-in cars could account for as much as 20 percent of new vehicles sold. Oregon is currently beginning to install the infrastructure to support these vehicles.

The U.S. Department of Energy announced in 2009 that Oregon was selected as one of seven test markets for the largest deployment of electric vehicles (EVs) and the associated charging infrastructure in history. ECOtality (formerly eTec of Phoenix), will receive $130 million in federal stimulus funds to study electric vehicle usage in six states and Washington, D.C. The project goal is to install EV charging stations and analyze their use and the behavior of EV drivers to guide widespread adoption throughout the country.

ECOtality is partnering with Nissan North America to deploy approximately 1,000 Nissan electric cars (called the "Leaf") in Oregon and as many as 2,500 charging stations to be installed at homes and businesses that participate in the program. The grant will focus on the Portland, Eugene, Salem and Corvallis areas with a small number of chargers in Medford.

Deployment of EV charging infrastructure installations are expected to begin in winter of 2011.

The Oregon Department of Transportation (ODOT) will receive $700,000 in federal State Energy Program (SEP) stimulus funds administered by the Oregon Department of Energy to install up to eight EV fast charging stations in southern Oregon from Eugene to Ashland. The initiative is meant to complement existing EV charging installations underway and to electrify an important leg of the "Green Highway" to the California border. These DC fast charges are capable of charging a Nissan Leaf to an 80 percent charge in 26 minutes.

In October 2010, Governor Kulongoski and Senators Wyden and Merkley also announced that ODOT will also receive an additional $2 million from the TIGER II program of the U.S. Department of Transportation for up to 24 EV fast charging stations.

Photo 9: An electric vehicle charging station.

The Energy Past as Future

It is, and has been, Oregon's goal to promote energy efficiency and renewable energy. The Oregon Department of Energy has long supported these goals for a number of reasons:

1) Energy independence through conservation and local energy sources
2) Development of rural economies
3) Building in system reliability through distributed generation
4) Reducing greenhouse gas emissions

Years of Energy Planning

While our past energy *plans* have looked at use, consumption, forecasts and scenarios, a future Oregon energy *strategy* needs to move beyond the energy world to include land use planning, urban design, water resources, affordable housing, economic development, efficient product procurement, and transportation.

Even with economic uncertainties, the Oregon Department of Energy remains committed to working with a larger group of stakeholders, to help Oregon achieve its energy goals.

Oregon, with only one percent of the U.S. population, has made substantial commitments to conservation and renewable energy for more than 35 years.

When it comes to energy choices, one small state can make a difference, especially when we work together.

"We must pursue mutual objectives that are consistent with state energy policy through cooperative efforts with utilities, local governments and others."

Oregon Department of Energy, First Biennial Energy Plan, 1985

And…

It is the "others" we need to bring more fully into the planning process to help develop an Oregon energy strategy.

Oregon Department of Energy Biennial Energy Plan, 2011

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 watthours). 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 (CFCs).

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 (IOU)—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 2009 and 2010 Legislative Sessions

2009

House Bill 2180

The Oregon Department of Energy was directed, 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 determine the extent to which each facility depends on state tax incentives for investment and continued operation. The purpose of the analysis is to identify the economic benefits and costs to the State of the BETC program.

House Bill 2186

House Bill 2186 authorizes the Environmental Quality Commission to adopt a low carbon fuel standard for vehicle fuels and to adopt other measures to reduce greenhouse gas emissions from vehicles. The Commission is also directed to conduct studies and make recommendations to help achieve the State's statutory greenhouse gas reduction goals; namely, to reduce greenhouse gasses 10 percent below 1990 levels by the year 2020 and 75 percent below 1990 levels by the year 2050.

House Bill 2626

The Oregon Department of Energy's Small-Scale Energy Loan Program was expanded under this bill. The agency was directed to finance smaller loans to individuals and businesses for energy efficiency and sustainable technologies. The Energy Loan Program may underwrite and finance loans administered by other entities, such as the Energy Trust, consumer-owned utilities, local governments and other entities. The loans can be repaid through utility financing, such as on-bill financing and other methods to simplify repayment. The bill creates the program initially as a series of pilot projects, with the goal of broader implementation if the program proves successful.

House Bill 2940

The Renewable Portfolio Standard (RPS) was changed under HB 2940. It allowed older biomass facilities to qualify as eligible facilities that utilities could use to meet their RPS obligations. The bill allows up to 100 megawatts total of pre-January 1, 1995 biomass to qualify for the RPS under certain conditions. (January 1, 1995 is the oldest date for most types of renewable energy facilities to be eligible for the RPS.) If owners of more than 100 megawatts of biomass seek to use this provision, they must share the 100 megawatts on a proportionate basis.

House Bill 2940 also allows up to 11 megawatts of energy facilities which burn municipal solid waste and which were operational prior to January 1, 1995 to qualify for the RPS. In addition, to encourage hydrogen from renewable energy, the Public Utility Commission may allow full recovery of costs by investor-owned utilities for energy infrastructure and equipment using, synthesizing or storing anhydrous ammonia.

House Bill 3039

This legislation established the first feed-in tariff in the United States for solar photo-voltaic systems. The bill directed the Public Utility Commission to establish pilot feed-in tariff for each investor-owned utility. Qualifying systems may be up to half a megawatt in size, with the total cumulative capacity in the pilot stage of 25 megawatts. The pilot phase runs until 25 megawatts are installed, or March 31, 2015, whichever is earlier. In order to further encourage solar energy, the solar photovoltaic energy counts double for purposes of compliance with the Renewable Portfolio Standard.

House Bill 3039 also includes a provision to encourage greater use of fuel cells in Oregon. (Three companies currently produce fuel cells in Oregon.) House Bill 3039 requires a state agency to include use of fuel cells to the extent possible for emergency backup and other critical power applications in construction and major facility renovations. The agency shall consider the impact on emissions and life cycle costs in its comparison of fuel cells with other equipment.

House Bill 3463

The renewable fuel standard for biodiesel was amended by HB 3463. It changed the trigger for activating the renewable fuel standard from actual production of gallons of biodiesel to capacity for production of biodiesel in Oregon. This change is consistent with the method of calculating the activation of the standard for ethanol, which took effect in 2008. All gasoline in Oregon must now contain at least 10 percent ethanol, except for very limited exceptions.

Senate Bill 79

The legislation encouraged energy efficiency in commercial and residential buildings. Senate Bill 79 established a Task Force to develop recommendations for energy performance scoring systems for use in new and existing commercial and residential buildings. Senate Bill 79 also directed the Building Code Division to adopt an optional “Reach Code” to maximize energy achievable efficiency.

Senate Bill 101

Senate Bill 101 limits greenhouse gasses from new power plants located in Oregon or serving Oregon load from out of state. The bill requires that emissions from new power plants not exceed the greenhouse gas emissions of a modern natural gas power plant. This effectively eliminates new coal plants until carbon sequestration is commercially viable.

Summary of Energy Legislation
Passed by the 2009 and 2010 Legislative Sessions

2010

House Bill 3613
This legislation continued a ban on drilling for oil, gas and sulfur in Oregon's coastal waters until 2020.

House Bill 3633
The Renewable Portfolio Standard (RPS) was amended for electric utilities to clarify that marine renewable energy resources are included in the goal that one-third of Oregon's renewable resources come from small-scale renewable energy projects no larger than 20 megawatts. The bill also directed the Department of Land Conservation and Development to conduct a study on how best to develop ocean wave energy and other marine renewable resources.

House Bill 3649
HB 3649 allows up to forty average megawatts per year of low-impact hydroelectric facilities to qualify for the Renewable Energy Standard for electric utilities. These hydroelectric facilities qualify whether or not they are owned by an electric utility. The Renewable Energy Standard requires that 25 percent of the electric load of Oregon's largest utilities must come from qualifying renewable energy by the year 2025. Smaller utilities have lower targets. The standard means that virtually all of Oregon's load growth must come from renewable energy.

House Bill 3674
Another RPS amendment was for electric utilities to allow certain biomass facilities not previously eligible and municipal solid waste generating facilities to qualify as eligible resources to meet the standard. Biomass facilities in operation before January 1, 1995 and up to eleven megawatts of electricity from direct combustion of municipal solid waste operating before January 1, 1995 qualify for the Renewable Energy Standard.

However, renewable energy certificates based on the amount of power these facilities generate must be banked and cannot be used for compliance with the Renewable Portfolio Standard until 2026. Up to nine megawatts of electricity from direct combustion of new municipal solid waste facilities also qualifies for the Renewable Portfolio Standard.

House Bill 3675
HB 3675 makes a number of technical changes to the Energy Efficiency & Sustainable Loan Program, which was established in House Bill 2626 in 2009. The technical changes deal with fees, determination of adequacy of funds, on-bill financing requirements of investor-owned utilities and other administrative matters. The program is operated by the Oregon Department of Energy.

House Bill 3680

Significant changes to the Business Energy Tax Credit (BETC) were made under this legislation. There is a $300 million cap for preliminary certifications of all projects using renewable energy in the biennium ending June 30, 2011, and a cap of $150 million for the following year ending June 30, 2012.

There is a $200 million cap for preliminary certifications of renewable energy manufacturing facilities in the biennium ending June 30, 2011, and a cap of another $200 million for the biennium ending June 30, 2013. HB 3680 reduced the amount of tax credit for a wind project over 10 megawatts to the lesser of 2.5 percent of the total cost of the facility or a maximum credit of $3.5 million in 2010, $2.5 million in 2011 and $1.5 million in 2012. The bill also imposed a number of administrative requirements, such as a competitive tiered system for awarding renewable energy BETCs.

The bill extended the tax credit for renewable energy manufacturing facilities to January 1, 2014. The bill also included batteries for renewable energy storage and all-electric vehicles in the definition of renewable manufacturing equipment. The tax credit sunsets for all other projects, such as energy efficiency, direct use of renewable energy and electricity from renewable energy, on July 1, 2012.

House Bill 3690

The bill made adjustments to the solar feed-in-tariff enacted by the 2009 Legislature. It establishes different size categories for solar photovoltaic (PV) systems and allows the Public Utility Commission to adjust PV in utility programs for different size categories of PV systems.

House Bill 3691

HB 3691 provided that a utility may recover all prudently incurred costs associated with meeting the Renewable Portfolio Standard, including above-market costs for renewable energy. The bill also allowed for recovery of all prudently incurred above-market costs for solar PV, for implementing the PV feed-in tariff.

House Bill 3693

The legislation allowed that the sale of biodiesel fuel containing additives to prevent congealing may occur between October 1 of any year and the following February 28 without violating the Renewable Fuel Standard for biodiesel fuel.

Senate Bill 1059

The Oregon Transportation Commission was directed to adopt a statewide transportation strategy to meet the state's greenhouse gas emission reduction goals. Senate Bill 1059 also directed the Department of Transportation and the Department of Land Conservation Development to establish guidelines for developing and evaluating alternative land use and transportation scenarios that may reduce greenhouse gas emissions. The Oregon Department of Energy and the Department of Environmental Quality will assist the other two agencies.

Appendix C—Energy Success Stories

New Coos Bay Fire Station Adds Solar, Gets a Tax Credit

In 1956, the City of Coos Bay added a "temporary" building on to its City Hall to house Fire Station #1. The "temporary" facility remained a fire station for the next 54 years.

The building was too small and poorly designed for a modern fire station. The fire chief was also concerned that if there had been an earthquake, the equipment (and firefighters) would be trapped in a pile of rubble.

Thanks to a $6.9 million bond approved by voters in the May 2008 Presidential primary election, the old fire station is now closed and scheduled for demolition. A beautiful new fire station with twice the square footage and built for earthquake stability began operation in June, 2010.

"It will be LEED certified," said Mark Anderson, deputy fire chief. "We aimed for gold and may get platinum." LEED is an acronym for Leadership in Energy and Environmental Design, an internationally recognized sustainable "green" building certification system. Platinum is the highest LEED rating.

The new station has many sustainable features including:

- A Presbyterian Church was razed to make room for the station on Elrod Street. Concrete from the church was used as fill; the wood floor from the church sanctuary was used in the new station lobby; a pew from the church is being used as lobby seating. More than 85 percent of the church was recycled for the new building.
- 60 percent of the subcontractors were local residents.
- An electric vehicle charging station is available.
- Rainwater is captured and stored underground to water landscaping and test fire pumps.
- Clover provides a green patch replacing higher maintenance grass.
- The concrete is stained light to reflect the sun.
- A metal roof reflects the sun.
- There is maximum amount of natural light entering the building and numerous skylights.
- Some of the building insulation material is made with recycled blue jeans.
- The training room is used by various community groups including knitting clubs, the Red Cross and book groups.
- There are spaces for bike parking.
- The firefighters gear is located by the water heaters to help dry them after wear and to keep them away them from the fumes of the fire trucks.

- There are automatic turnoffs on cooking equipment if fire fighters need to respond to an alarm.
- The grounds are planted with low-water landscaping materials.
- There are two solar thermal water heaters that provide up to 90 percent of the station needs.
- There is a 23,600 kilowatt-hour solar electric system on the roof to produce part of the facility's electrical needs.

Coos Bay Fire Station #1

The solar system cost an estimated $110,994. The City applied for a Business Energy Tax Credit through the Oregon Department of Energy. They should qualify for a tax credit of 50 percent of eligible costs ($55,497) that the City will transfer to a private entity with tax liability in exchange for a 36.821 percent cash payment ($40,869). The Energy Trust of Oregon also contributed a $34,650 incentive. Kyle Electric, Inc. of Coos Bay installed the solar system.

Despite being twice the space as the old station, Anderson said that the City has been told that their utility bills in the new fire station should remain about the same. The installation of a solar electric system and energy efficient measures incorporated into the new facility are responsible for the more efficient use of energy in the new station.

The energy tax credit and incentives make the measures affordable for the City which has waited 54 long years to move from their "temporary" fire station into a permanent and long-term facility.

###

RECOVERY FUNDS TO HELP HARNEY COUNTY

SALEM - The Oregon Department of Energy awarded $377,683 in American Recovery and Reinvestment Act funds to five energy projects in Harney County. The funds are part of the State Energy Program for energy efficiency and renewable energy projects.

The five projects are expected to save an estimated 2.5 million kilowatt-hours of electricity per year, enough to heat 214 average Oregon homes per year.

The Harney County School District received two awards. One was for a lighting retrofit of the Lincoln Building in Burns that houses alternative education students, charter school offices, park and recreation and administration offices. The other award was for replacing windows and doors and installing insulation at Burns High School.

Crane Union High School will also get energy-efficient lighting thanks to a grant as will the Harney County Library.

The Oregon Department of Fish and Wildlife (ODFW) office in Hines will upgrade windows, insulation, lighting and heating system. The office is 40 years old and has very little work done to it over the years. The ODFW maintenance fund is contributing $10,000 to the project in addition to the $20,000 award.

Harney County projects include the following:

Entity	Facility Name	Award Amount	Type of Award	Type of Project
Harney County	Harney County Library	$70,000	State Energy Program	Lighting
Harney County School Dist.	Lincoln Building	76,601	State Energy Program	Lighting
Harney County School Dist.	Burns High School	190,457	State Energy Program	Windows, doors, insulat.
Harney District 1 J	Crane Union High School	20,625	State Energy Program	Lighting
Oregon Dept. Fish Wildlife	ODFW Hines Office	20,000	State Energy Program	Pipe replacement, meters
TOTAL		$ 377,683		

A list of all Oregon counties that received American Recovery and Reinvestment Act funds and amounts awarded is available at http://www.oregon.gov/ENERGY/Recovery/docs/County_list.pdf

###

Appendix D—2010 Government to Government Report

Key Contacts:

Bob Repine
Acting Director
Phone: (503) 378-5489
Fax: (503) 373-7806
bob.repine@state.or.us

Diana Enright
Special Assistant to the Director
Phone: (503) 378-8278
Fax: (503) 373-7806
diana.enright@state.or.us

The mission of the Oregon Department of Energy (ODOE) is 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.

New Opportunities

2010 has seen an increasing interest in the development of Oregon's biomass resources for energy production. The Oregon Department of Energy (ODOE) has been working with the Confederated Tribes of the Warm Springs on their biomass project. We are also exploring other opportunities with Warm Spring Forest Products Industries.

Renewable energy proposals, such as wind turbine installations, have been the topic of discussions with other tribes.

Ongoing Efforts

Siting of Energy Infrastructure

The Oregon Department of Energy works with tribes regarding the proposed siting of new energy facilities and pipelines. Some of the proposals include electric transmission lines and wind farms. With many of these set to be located east of the Cascades, the Oregon Department of Energy opened a small field office in Hermiston to better serve the public in that area. The transmission line projects under review include Boardman to Hemingway, proposed by Idaho Power and Cascade Crossing from PGE.

With the proposed siting of bulk transmission lines in the state, the Department anticipates greater involvement and communication with the effected tribes and tribal lands, including coordination of decision processes between Tribal Nations, federal land managers and the Energy Facility Siting Council (EFSC). The Oregon Department of Energy is staff to EFSC.

Nuclear Safety and Emergency Preparedness

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 (ODOE) 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 (CTUIR) 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.

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.

Incentives

The Oregon Department of Energy, through the pass-through option of its Business Energy Tax Credit (BETC) program, has been able to help fund both conservation and renewable energy tribal projects.

A conservation BETC has been awarded to the Confederated Tribes of the Grand Ronde for an efficient transportation project. Two tax credit applications from the Coquille Indian Tribe are under review. The projects would save energy for the Coquille Community Center by providing solar electricity and water heating. The center houses the Head Start and afterschool programs, along with the recreation hall for the reservation.

Public Information and Outreach

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

Appendix E—Oregon Electric Utilities

Oregon Counties and the Electric Utilities that Serve Them	
Baker	Oregon Trail Electric Cooperative, Idaho Power Company
Benton	Consumer Power Inc., Pacific Power
Clackamas	Canby Utility Board, Portland General Electric
Clatsop	West Oregon Electric Cooperative, Claskanie People's Utility District, Pacific Power
Columbia	West Oregon Electric Cooperative, Columbia River Public Utility District, Claskanie 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
Gillam	Wasco Electric Cooperative, Columbia Basin Electric Cooperative
Grant	Oregon Trail Electric Cooperative, Central Electric Cooperative, Columbia Power Cooperative
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, Consumer 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, Consumer Power Inc., Central Lincoln People's Utility District, Pacific Power
Linn	Consumer Power Inc., Pacific Power
Malheur	Harney Electric Cooperative, Idaho Power Company
Marion	Consumer Power Inc., Salem Electric Cooperative, Pacific Power, Portland General Electric
Morrow	Umatilla Electric Cooperative, Columbia Basin Electric Cooperative
Multnomah	City of Cascade Locks, Pacific Power, Portland General Electric
Polk	Consumer 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, 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