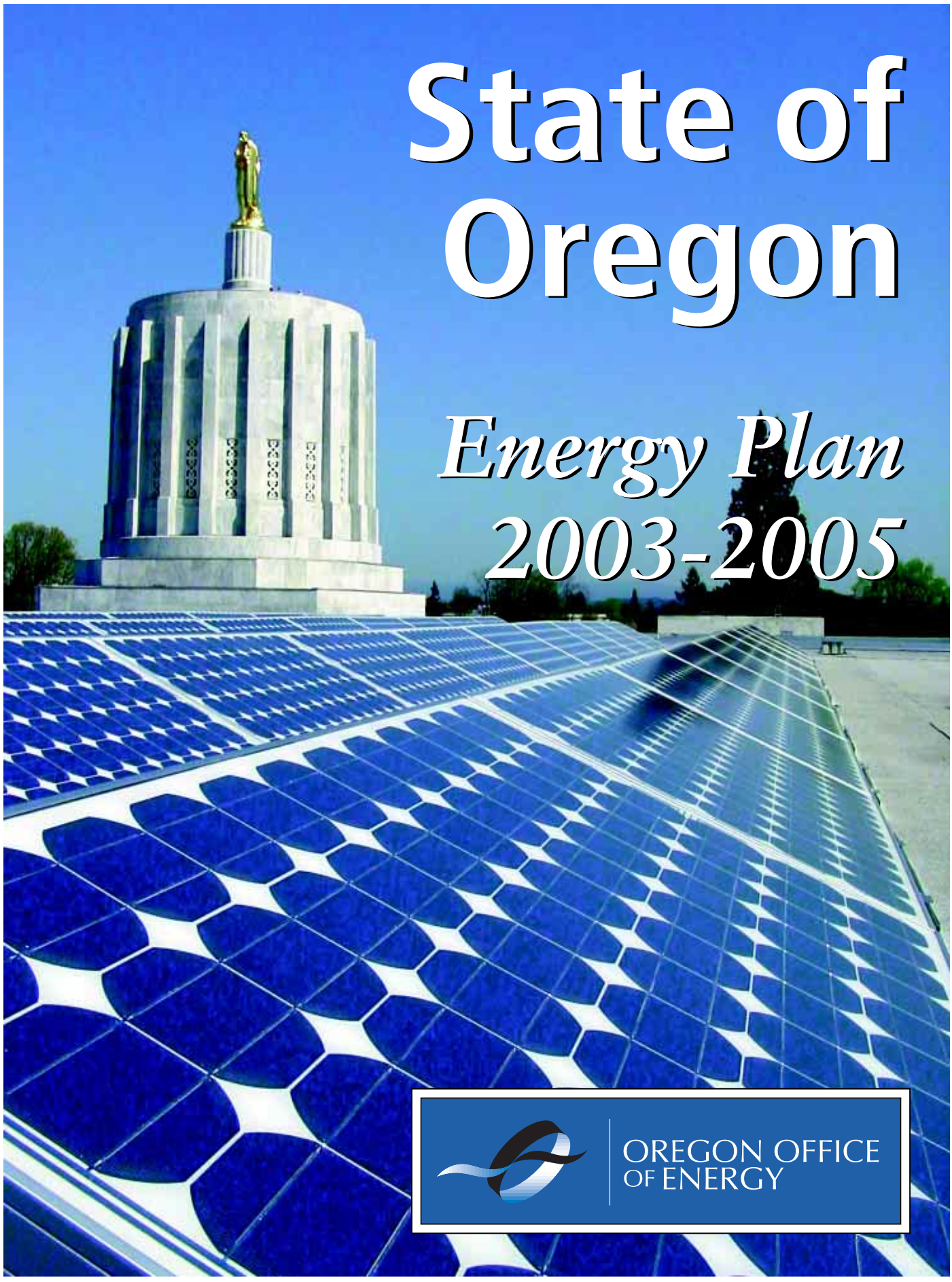

State of Oregon

Energy Plan 2003-2005

OREGON OFFICE OF ENERGY

B I E N N I A L

Energy Plan

OREGON OFFICE OF ENERGY

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DECEMBER 2002 **OOE-002**

Biennial Energy Plan

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Introduction

Oregonians spend about $6 billion a year for energy. That includes electricity, natural gas, gasoline, other petroleum products, wood, propane and other fuels. Producing and using energy influences the environment. Energy consumption and prices are in turn influenced by environmental, social, economic and political factors. Over the years, energy has been affected by everything from war to drought and from deregulation to fish habitat.

The Oregon Office of Energy *(Energy)* was created in 1975, in part, as a response to the 1973-1974 gasoline shortage. Oregon decision-makers decided they needed the resources to proactively address energy issues.

Energy works with a broad cross-section of Oregonians from businesses to trade associations, from homeowners to renters, and from government entities to schools. This outreach takes place primarily through personal contact and *Energy's* interactive Web site. Another way to communicate what is taking place in the energy arena is through the Biennial Energy Plan. The plan identifies trends in energy supply, demand, conservation, nuclear safety, and the maintenance of a healthy economy.

This plan begins where the last one ended, with the winter of 2000-2001 and how the state addressed the energy crisis. The following pages also present background information on the source of Oregon's energy and how it is used; the key energy issues facing Oregon including adequate energy resources; *Energy's* action plan for 2003-2004; and accomplishments in the areas of conservation, providing new energy resources and nuclear safety.

Two appendices accompany this report. One is a list of Oregon's counties and the electric utilities that serve them and the other is a glossary of energy terms.

Energy Crisis of 2000 and 2001

By the summer of 2000, Northwest energy experts concluded that a decade of abundant, low-cost electricity in the region was ending. They saw the threat of escalating electricity prices and electricity shortages. Indeed, in the winter of 2000-2001, the Northwest faced severe electricity supply problems and record price spikes for both electricity and natural gas.

Several factors caused the crisis. Years of economic growth led to increased demand for electricity, but not an increase in electricity generation. Low prices and plans to deregulate the electricity industry caused energy developers to wait to build. While Oregon sited and placed in service six power plants totaling more than 1,800 megawatts during the 1990s, a number of plants approved in California and Washington were not built. A drought made less water available for hydropower.

In addition, the Northwest was not able to rely on the customary winter electricity imports from California. California suffered its own crisis attributable to a failed deregulation effort. In fact, in mid-December 2000, the U.S. Energy Secretary ordered Oregon and other Northwest utilities to make power available to California after local needs were met.

Twice during the winter of 2000-2001 the governors of Oregon and Washington called on residents, businesses, governments and others to save electricity to help avoid any power emergencies. In the end, the region avoided a severe shortage through response to public appeals for conservation during the drought, utility and industry management of power demand, a slower economy, unprecedented high prices, and improved weather conditions.

However, the problems caused by California deregulation, along with the Northwest's own supply problems, caused record high electricity prices. A contributing factor to high prices was the dependence in the West on natural gas-fired power plants. Natural gas prices spiked at the same time, worsening power prices. From May 2000 to June 2001 wholesale electricity prices were often 10 times the normal price. Wholesale prices stabilized by mid-2001 primarily because electricity use declined. By late 2002, retail electricity rates began to decline.

In response to the energy crisis, the 2001 Legislature made changes to expand the Business Energy Tax Credit, the Residential Energy Tax Credit and the State Energy Loan Program. New legislation required state agencies to reduce energy use in existing state buildings by 10 percent and by 20 percent in new buildings. It also required that agency equipment purchases be energy-efficient.

The Legislature also made a number of changes to the energy facility siting process. The Oregon Office of Energy (*Energy*) provides staff support to the Energy Facility Siting Council, a volunteer board appointed by the Governor and confirmed by the Senate. Among the changes are exemption from Council review for temporary, emergency standby, and smaller renewable resource facilities and expansion of certain existing renewable resource electric generation facilities.

Other legislative changes to the siting process included expedited review of generating plants of up to 100 average megawatts (an average megawatt is the continuous output of a one-megawatt plant over a year). Expedited review also applies to natural gas-fired power plants that have either low environmental impact or are sited at an existing industrial or energy facility. New law also allowed construction of an approved facility to proceed while judicial review is in process, required Supreme Court review within six months in most cases, and streamlined reviews by all other state and local agencies.

The changes in statute made by the 2001 Legislature helped ease the uncertainty faced by power plant developers. That led to an increase in the number of electricity generation plants approved and the number of projects qualifying for the state's incentive programs.

Since mid-2000, the Energy Facility Siting Council has approved exemptions from Council jurisdiction for 463 megawatts of high efficiency co-generation facilities and temporary power plants. In addition, since mid-2000, the Council has approved site certificates for another 1,842 megawatts of electricity generation.

For 2001, the number of Business Energy Tax Credit applications doubled compared to 2000, partly due to legislative changes. In addition, *Energy* received tax credit applications from three businesses for industrial co-generation in each of 2000 and 2001 with a proposed output totaling 23 megawatts. The Energy Loan Program loaned $11.5 million for an industrial co-generation plant in Linn County.

The electricity supply situation has improved. Power supplies should probably be adequate for several years, even in a drought. However, longer-term, uncertain wholesale market conditions may limit power plant construction and supply deficits could result.

Oregon and Energy: From Demand to Supply

Oregonians spent about $6.5 billion on energy in 1999, the last year for which figures are available. This number does not include the energy used to generate power. Total energy use was 809 trillion British Thermal Units (Btu—a measure of energy consumption), an increase of 9 percent from 1990 to 1999. However, per capita energy use actually fell by 9 percent, a decline due mainly to decreased use of wood waste in factories.

Energy Use in Oregon

Nearly half of the energy Oregon uses comes from petroleum and is used primarily for transportation (Figure 1). However, between 1990 and 1999, Oregon saw a major shift in the mix of energy use, following trends that began in the early 1980s:

- **Natural gas use rose from 13 percent to 19 percent of total energy use.** *Residents, businesses and industry switched from wood, heating oil and electricity to natural gas, mainly due to cost.
  **(These figures do not include natural gas used to generate power. That use rose to almost seven times the 1990 level by 1999.)*
- **Energy use from wood and wood waste fell from 20 percent to 12 percent of total energy use.** The decline was due to decreased use of cordwood in homes, wood waste in lumber mills and pulping liquor in paper factories.
- **Non-transportation petroleum use fell from 11 percent to 9 percent of total use.** The decline was due to switching to natural gas. Non-transportation petroleum includes such products as heating oil.
- **Transportation petroleum use rose from 37 to almost 40 percent of total energy use.** The increase was due to population growth and reduced conservation in this sector compared to other sectors.
- **Electricity consumption remained constant at about 20 percent of total energy use.**[1]

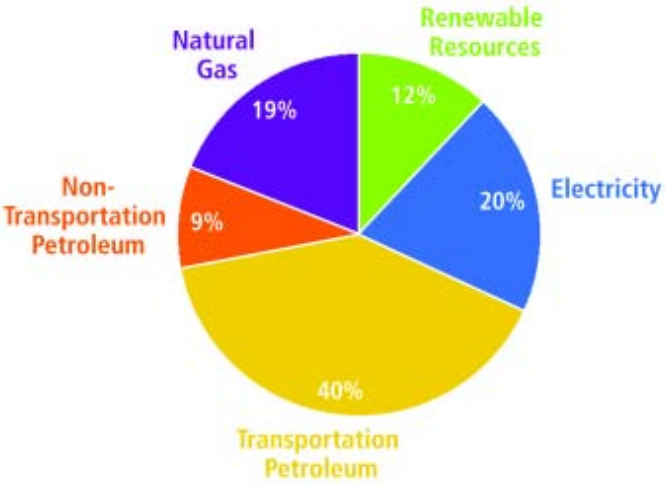


Figure1: Oregon Energy End Uses
Nearly half of Oregon energy use comes from petroleum products, primarily for transportation.

Energy Use by Sector

Commercial

Electricity accounts for 60 percent of commercial energy use. The percentage is higher than residential because of lighting and air conditioning loads. Commercial petroleum use is predominately heating oil. Natural gas is mostly used for space and water heating.

Industrial

Oregon's industries—manufacturing, agriculture, forestry, fisheries and mining—use more energy than the commercial and residential sectors combined. Manufacturing is the primary user. In 1999, these industries used 286 trillion Btu. For comparison, the entire city of Springfield, Ore. used 3 trillion Btu of energy. One trillion Btu is

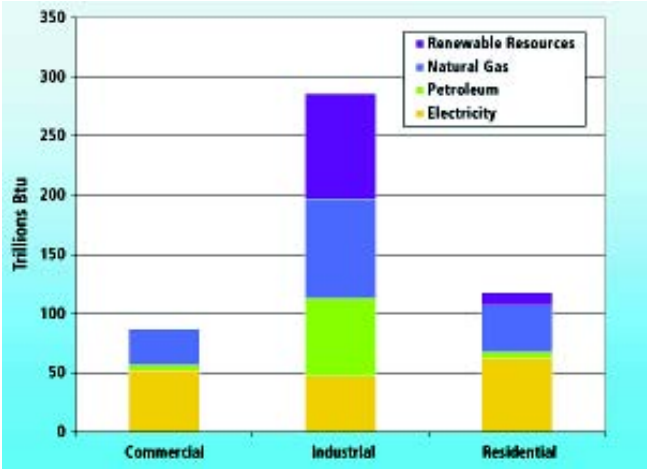
[1] Percentages may total more than 100 percent due to rounding of numbers.

the equivalent of eight million gallons of gasoline.

Natural gas accounts for 30 percent of industrial energy use. Wood waste in lumber mills and waste pulping liquors in paper mills also account for 30 percent. The industrial sector uses less electricity than the other sectors, with electricity representing only 17 percent of industrial energy use. Distillate heating oil accounts for only 3 percent of industrial petroleum use. The other petroleum products used include asphalt, road oil, residual heating oil, propane, gasoline, lubricants and petroleum coke. These account for the 20 percent of industrial energy use.

Residential

Electricity accounts for 52 percent of the energy used in Oregon homes. Natural gas provides a growing share of space and water heating. Renewable energy use is primarily cordwood, with small amounts of solar water heating, solar electricity and geothermal energy. Residential petroleum use is predominately heating oil and propane, also known as liquefied petroleum gas.



** Industrial use includes some wastes and natural gas used to generate electricity.*

Figure 2: Oregon Non-Transportation Energy Use 1999
Oregon's industries use more energy than the commercial and residential sectors combined.

Expenditures for Energy Use

During the 1990s, the cost of energy was not a major factor in the economies of Oregon and the nation. Energy expenditures declined because of:

- less energy-intensive jobs;
- more efficient use of energy; and
- other prices rising faster than energy prices

Energy expenditures as a percentage of Oregon state gross product and the U.S. gross domestic product decreased steadily in the 1990s. Oregon gross state product is the value added in production by the labor and property located in Oregon. It is similar to the U.S. gross domestic product and is the broadest measure of the state's economic output.

Because energy prices increased dramatically in 2000 and 2001, the relative importance of energy costs rose for both the U.S. and Oregon. This impact was greater for Oregon because its electric prices increased more than for the rest of the U.S.

Energy Use by Type

Petroleum

Petroleum use in Oregon has nearly tripled in the past 40 years, driven mainly by transportation uses. In 1999, petroleum products accounted for almost half of the energy used in the state.

How Oregon Uses Petroleum

Between 1960 and 1999, Oregon's non-transportation petroleum use declined steadily, while transportation petroleum use increased significantly (Figure 3).

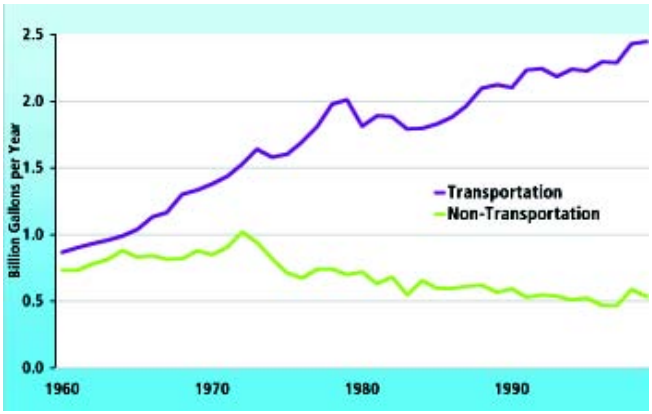


Figure 3: Historical Petroleum Use
Transportation and non-transportation petroleum uses were roughly equal in 1960. By 1999, Oregonians were using nearly five times more petroleum for transportation than for other purposes.

Oregonians annually use over one billion gallons of gasoline. Figure 4 shows that most of the petroleum used in 1999 went to transportation.

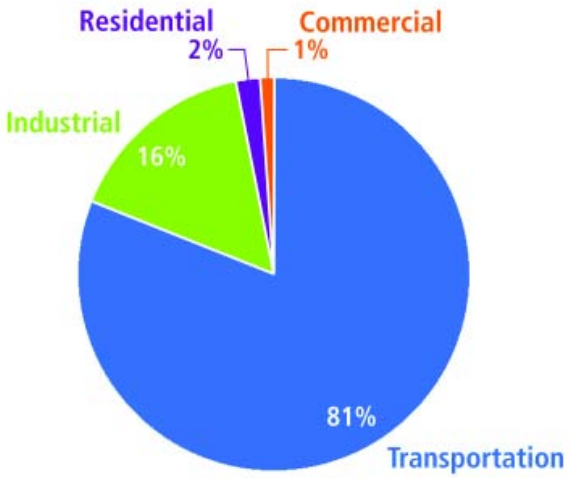


Figure 4: Oregon's 1999 Petroleum Use
In 1999, transportation petroleum accounted for 81 percent of petroleum use.

Oregon's Transportation Fuel Mix

Almost all of Oregon's transportation fuel is petroleum-based (Figure 5). In 1999, gasoline accounted for 59 percent of total petroleum used for transportation and 24 percent of Oregon's total energy use. Diesel, used primarily in trucks, trains and ships, represented 22 percent of petroleum fuels used and 9 percent of Oregon's total energy use.

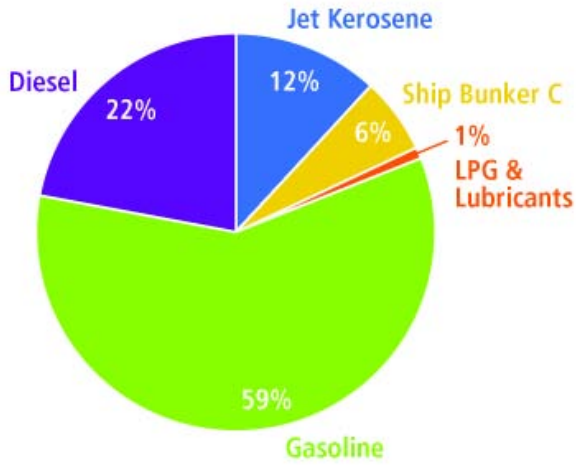


Figure 5: Oregon Transportation Fuel Mix 1999
Petroleum products comprise 99 percent of Oregon's transportation fuel mix. "Other" transportation fuels include compressed natural gas (CNG), liquefied natural gas (LNG), liquefied petroleum gas (propane), electricity, ethanol and biodiesel, some of which are partially derived from petroleum.

The 1990s saw a 16 percent increase in the use of motor fuel that is subject to Oregon taxes. That includes all motor gasoline, plus diesel for light trucks and cars. The increase was due to population growth. However, per capita use declined 2 percent during this period. Per capita vehicle miles traveled actually rose by 3 percent, but the increase was offset by a 5 percent improvement in fuel efficiency for newer cars and light trucks. The fuel efficiency of new vehicles has remained stagnant or fallen in recent years, largely because of the increased sales of sport utility vehicles and pickup trucks.

From 1999 to 2001, per capita use of taxed motor fuel fell an additional 3 percent. This was primarily due to decreased driving per capita, influenced by fuel-price increases after 1999, as well as the 2001 recession.

The Oregon Department of Transportation forecasts that by 2007, the fuel efficiency of light vehicles will increase 4 percent compared to 2001 and that travel per capita will return to 1999 levels.

Non-Petroleum Transport Fuels

Other fuels used for transportation in Oregon include ethanol, biodiesel, compressed natural gas, liquefied natural gas, liquefied petroleum gas (propane) and electricity. These alternative fuels are used in place of diesel and gasoline, although some of them are either used with, or partially derived from, petroleum products.

Federal policy directs utilities and states to adopt alternative fuels to reduce dependence on foreign petroleum or to improve air quality. Most alternative-fueled vehicles are eligible for Oregon residential and business energy tax credits and state energy loans.

Ethanol and biodiesel are the main alternatives to gasoline and diesel respectively. Ethanol is an alcohol fuel distilled primarily from corn. Biodiesel is oil, distilled primarily from soy. Both biofuels also can be produced from other types of biomass (plants and other organic matter).

Following ethanol, compressed natural gas and propane are Oregon's most common alternative fuels. However, they represent less than 0.04 percent of transport fuel use. The State of Oregon operates 100 compressed natural gas vehicles in its fleet.

Oregon has 800 registered hybrid gas-electric vehicles. Although Oregon has about 1 percent of the U.S. population, it has 5 percent of the hybrid electric vehicles, due in part to *Energy's* residential and business energy tax credit programs.

Hybrids average 45 miles per gallon – twice that of the average passenger car. A hybrid recovers energy normally wasted when braking and uses it to power an electric motor that assists the gasoline engine. Hybrids also gain efficiency by having the gasoline engine operate at a constant optimum speed.

The state also has about 100 all-electric vehicles. The public transit system in Portland (Max) operates on electricity.

Source and Distribution of Oregon's Petroleum

Oregon imports 100 percent of its petroleum, and unlike other Western states, does not have refineries or internal crude oil resources. Taken together, Alaska, Arizona, California, Hawaii, Nevada, Oregon and Washington form a nearly self-contained system of petroleum production and consumption. 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.

Figure 6 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. 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.

More than 80 percent of the crude oil these 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 5 percent, comes from the continental

U.S., Mexico, Indonesia or the Middle East.

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

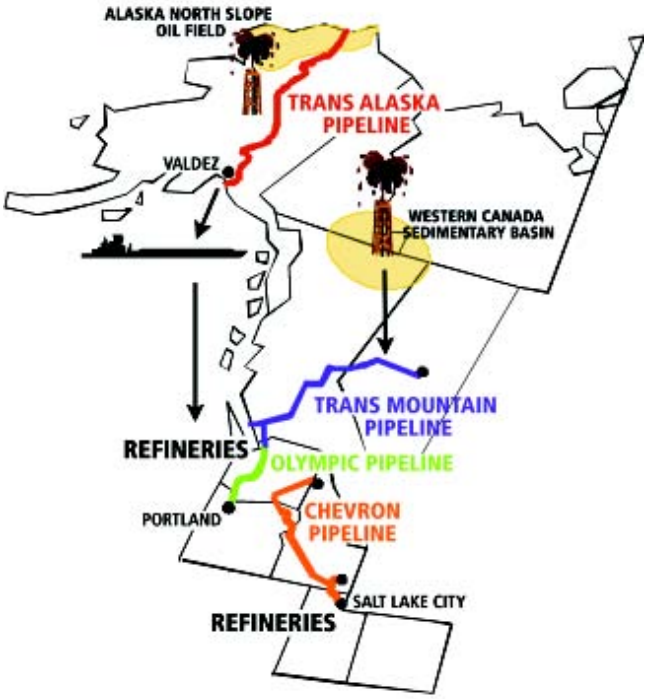


Figure 6: Source of Oregon's Petroleum
This shows the interconnection of the source, refineries and transportation of petroleum to Oregon. The majority of the crude oil comes from Alaska.

Oregon has about 2,250 retail fueling stations, with more than 29,000 registered fuel pumps. Between 1997 and 2002, the state lost about 10 retail gasoline stations but gained approximately 6,000 retail fuel pumps. The difference between station and pump growth resulted from buyouts, remodels of retail gasoline stations, and installation of pumps at grocery and department stores.

Petroleum Prices

Figure 7 shows average U.S. retail prices for gasoline and residential heating oil for 1984 through 2000. The yearly prices are adjusted to remove the effects of inflation and are expressed in 2002 dollars. The changing U.S. retail prices reflect volatility in world crude oil prices. Oregon's prices have followed similar patterns. Regardless of U.S. crude oil production levels, Oregon's retail prices will continue to be linked to world oil prices.

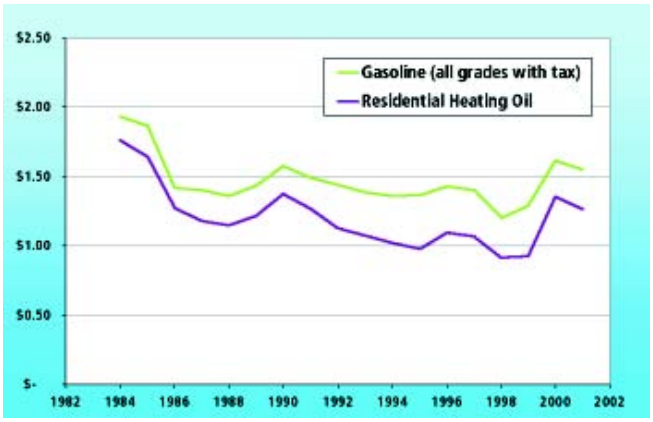


Figure 7: Average U.S. Retail Prices for Gasoline and Residential Heating Oil
The volatility in U.S. retail prices for gasoline and residential heating oil mirrors volatility in the world crude oil market.

Petroleum Contingencies

To mitigate the affects of a petroleum emergency, the Oregon Office of Energy (*Energy*) maintains the Oregon Petroleum Contingency Plan. The plan outlines alert and notification procedures as well as actions to supply gasoline and diesel fuel to the emergency services sector for vehicles, generators and onsite storage. Growing use of transportation petroleum in the West puts pressure on an already tight supply system.

The Valdez terminus of the Trans Alaska Pipeline can store up to 386 million gallons of crude oil. However, this represents, at most, one week of the pipeline's current output.

Distribution sites in the Portland area store less than one month's supply of refined petroleum products. Smaller stocks are stored at private distribution centers in Eugene, Medford, Bend, Pendleton, Coos Bay, Newport and Astoria. Local availability and retail prices are sensitive to supply, demand and delivery schedules. During the past five years, distributors have occasionally limited allocations. In some cases, this forced service stations to curtail retail hours.

The Puget Sound refineries have operated above 90 percent capacity for the past decade. The refineries cannot accommodate dramatic demand increases and have no plans to increase production capacity. If refinery output decreased due to an emergency, Oregon would have to import petroleum products from distant refineries. The state could face shortages and steep cost increases.

Three of five British Columbia refineries have closed since 1996, significantly reducing additional refinery production. Five San Francisco Bay area refineries operate at capacity and are being converted to produce only products meeting California Air Resources Board standards by 2003. Increasing demand in the California market for these products makes it less likely these refineries will supply the Oregon market.

The world's largest oil refinery, owned by SK Corporation in Ulsan, South Korea, could provide petroleum products using crude from Southeast Asia. Production has begun in the oil sands region of Alberta, Canada, but this will likely only replace declining crude oil supplies in North America.

Natural Gas

This section discusses natural gas use by Oregon customers. Natural gas used to generate electricity is discussed in the next section.

How Oregon Uses Natural Gas

Oregon's industrial sector is the greatest user of natural gas (Figure 8). The state's industries use more than 150 percent of the natural gas used by the residential and commercial sectors combined. The industrial sector uses natural gas primarily for process heating. The residential and commercial sectors use natural gas primarily for space and water heating, with some use for cooking and clothes drying.

Natural gas use in all sectors benefited from efficiency improvements in equipment, appliances and industrial processes between 1990 and 1999. But, despite gains in efficiency, Oregon's use of natural gas per capita increased 63 percent between 1990 and 1999, rising to 24 percent of total energy use in the state. By sector, total natural gas use rose as follows:

- Residential sector: 43 percent
- Commercial sector: 21 percent
- Industrial sector: 91 percent

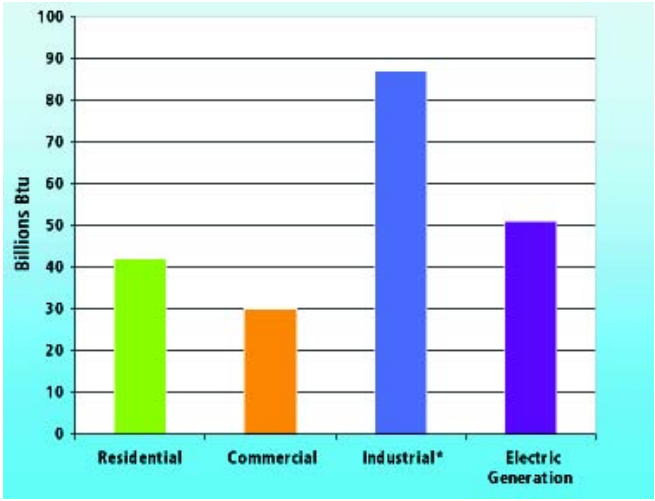


Figure 8: Oregon Natural Gas Use 1999

Natural gas use in Oregon's industrial sector increased 91 percent in 10 years. Industrial use includes a small amount for electricity generation. In 1999, the industrial sector used about 150 percent more natural gas than the residential and commercial sectors combined.

This phenomenal growth occurred for two main reasons:

- Growth in the Oregon economy.
- Natural gas increased in market share. Natural gas displaced electricity, oil and cordwood in the residential sector, oil in the commercial sector, and oil and wood waste in industries.

From 1999 to 2001, Oregon's per capita residential and commercial natural gas use fell nearly 10 percent. This was due to a slowdown in the economy and sharply higher natural gas prices.

Source and Distribution of Natural Gas

Oregon receives natural gas from British Columbia, Alberta, Wyoming, Colorado and New Mexico. Two connected interstate pipelines deliver the natural gas (Figure 9).

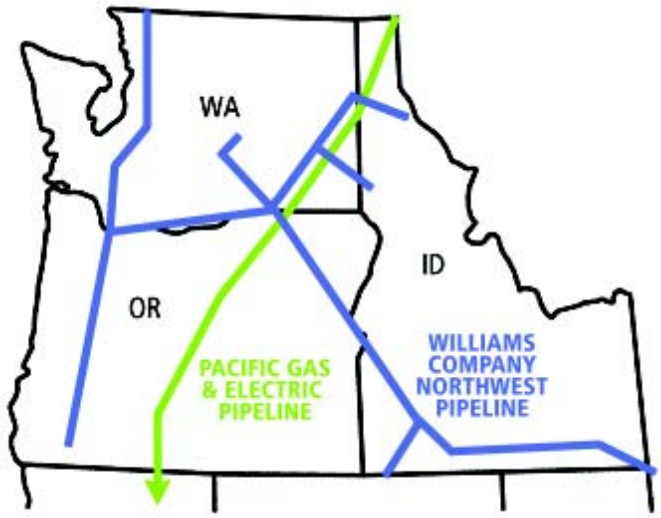


Figure 9: Pipelines Serving Oregon
Two natural gas pipelines serve Oregon customers. The Williams Company and the Pacific Gas and Electric pipelines bring product from the Rocky Mountains and Canada.

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, Wash. and roughly follows Interstate 5. Gas from the Rockies comes into Oregon near Ontario. A lateral pipeline transports gas from Washougal, Wash. to the Portland area, the Willamette Valley and Grants Pass.

Natural gas from Alberta arrives in a Pacific Gas and Electric 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 Pacific Gas and Electric pipeline connects with the Williams Northwest pipeline at Stanfield, Ore.

Three natural gas utilities serve Oregon:

- Northwest Natural serves 80 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, Ore. and liquefied natural gas storage facilities in Newport and Portland. Northwest Natural also has contracts to use liquefied natural gas storage at Plymouth, Wash. and underground storage at Jackson Prairie, Wash.

Avista obtains natural gas from the Williams pipeline and the Williams-Grants Pass lateral as well as Pacific Gas and Electric's main pipeline and Medford lateral.

Cascade customers from Madras to Chemult receive natural gas from Pacific Gas and Electric's main 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.

Natural Gas Regulation

The Federal Energy Regulatory Commission regulates siting of interstate natural gas pipelines as well as prices for the use of pipelines. Siting of large intrastate pipelines is regulated by the Oregon Energy Facility Siting Council.

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. Many industrial customers buy directly from the wholesale market.

Retail natural gas rates generally pass through 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.

State statute requires natural gas utilities to offer conservation programs. Utilities provide free energy audits and weatherization incentives for residential customers. They also provide energy audits for commercial customers, but charge for this service.

Natural gas utilities must prepare integrated resource plans for the PUC. These plans outline contracts to meet natural gas demands, proposed pipeline expansions, new storage facilities, and energy conservation budgets and programs. In October 2002, Northwest Natural began new conservation and low-income bill assistance programs.

Natural Gas Prices and Additional Supplies

Figure 10 shows the wholesale price of natural gas sold to Oregon utilities from 1984 through 2001 and the residential retail price. Yearly prices are adjusted to remove the effects of inflation. A therm is 100,000 Btu.

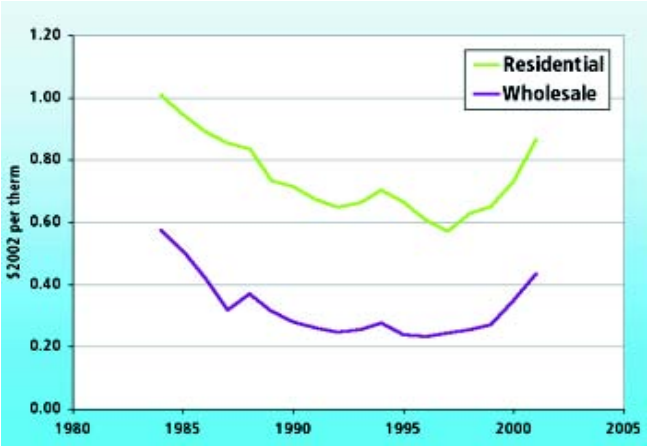


Figure 10: Natural Gas Prices

After falling in the late 1980s, Oregon's wholesale natural gas prices hovered between 20 and 30 cents per therm during the 1990s. Prices spiked in 2001.

In 2002 dollars, wholesale natural gas prices hovered below $3 from 1990 through 1999. In 2001, the wholesale price rose sharply to almost $5. In 2002, wholesale prices stabilized a little below the 2001 level but well above the 1990-1999 level. Retail prices followed a similar pattern.

There are several projects underway to expand natural gas pipeline capacity in the U.S. and Canadian West. The largest of these is the Kern River Gas Transmission Company's $1.2 billion pipeline expansion designed to meet growing demand for natural gas in Utah, Nevada and California.

Although pipeline additions will likely keep pace with growing demand, U.S. domestic production may not. A drilling boom in 2001 did little to increase U.S. production. By early 2002, domestic production had returned to 2000 levels despite current high wholesale prices.

Canadian imports are increasing to fill the supply gap, but these cannot meet the entire U.S. shortfall if natural gas demand grows as expected. Three possible new sources could fill the gap at wholesale prices of $4 per thousand cubic feet or less:

- Pipelines to reserves in Prudhoe Bay, Alaska and MacKenzie Delta, Canada
- Imported liquefied natural gas
- Deep offshore exploration of the Gulf of Mexico

These will require huge investments of time and money. Only the deep Gulf of Mexico investments are being made now. Natural gas prices for Oregon and the U.S. will likely remain volatile until these new sources are available.

Natural Gas Contingencies

A sustained loss of pipelines connecting Oregon to any of its three sources of natural gas would disrupt the state's economy, particularly manufacturing. However, barring a major earthquake or other catastrophic event, it is unlikely a sustained disruption would occur. In the event of a disruption, utilities could acquire alternative supplies. This would impact wholesale costs and retail rates, but only for sustained interruptions.

Because natural gas customers have electricity, a gas pipeline interruption could put stress on the electric system, which would face increased electrical loads. Reduced gas supplies for gas-fired power plants would also strain the electric system.

Electricity

In 1999, electricity accounted for about 20 percent of Oregon's total energy use. This percentage has been constant since 1980.

How Oregon Uses Electricity

About the same amount of electricity is used by Oregon's residential, commercial and industrial sectors (Figure 11).

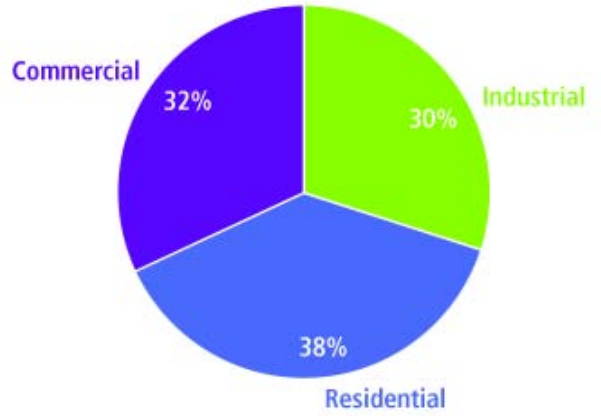


Figure 11: Oregon Electricity Use 1999
Electricity use by the residential, commercial and industrial sectors is roughly equal. Industrial use includes manufacturing, mining and irrigation.

During the 1990s, industrial per capita use declined 24 percent. This was largely due to plant closures or reduced output from factories, such as aluminum smelters, that are heavy users of electricity.

Residential per capita electricity use declined 2 percent due to offsetting factors. Larger average house size and new end uses, primarily air conditioning, tended to increase electricity consumption. Efficiency improvements, such as better windows and more efficient appliances, tended to decrease use. Residential electricity use also declined because of an increase in natural gas used for space and water heating

Commercial per capita electricity use rose 6 percent during the decade. The primary reason was increased use of office machinery, such as computers. There was also less switching to natural gas in the commercial sector than in the residential sector.

From 1999 to 2001, Oregon per capita electricity use fell about 5 percent. This was mainly due to public appeals for conservation during the drought, a slowdown in the economy and sharply higher prices. This reduction does not include the shutdown of aluminum and other direct industrial customers of the Bonneville Power Administration.

Residential electricity sales fell slightly more than sales to the commercial and industrial sectors. At the end of 2002, both of Oregon's aluminum smelters were closed, one permanently. This appears to be part of the long-term trend toward a less energy-intensive Oregon economy.

Sources of Electricity

The three main providers of electricity in Oregon are the investor-owned utilities Portland General Electric (PGE) and Pacific Power (a PacifiCorp company), and the Bonneville Power Administration (BPA), a federal power-marketing agency. Appendix 1 lists Oregon's counties and the electric utilities that serve them. The two major sources of electricity in Oregon are hydropower and coal, but natural gas is playing an increasing role in future supplies.

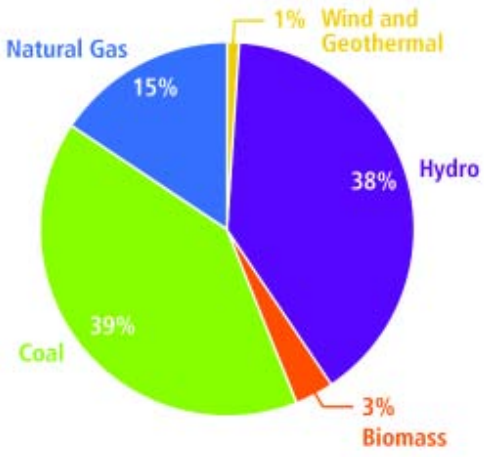


Figure 12: Oregon Electric Mix 2001
Oregon's electricity comes mainly from hydropower and that generated by coal.

Table 1 details how Oregon's electricity is generated. A provider does not necessarily generate all the electricity it sells, and it sells some of the power it generates, so the resource mix can include electricity purchased from other sources.

	PGE	Pacific Power	Bonneville
Coal	37.8	78.8	4.2
Hydro	31.4	8.9	80.6
Natural Gas	27.8	10.9	1.2
Nuclear	1.1	-	13.3
Wind	0.3	0.1	-
Biomass	-	1.3	0.4
Geothermal	0.3	-	0.1
Waste & Petroleum	1.1	-	0.1

Table 1: Resource Mix 2001 (percent)
PGE uses a roughly equal mix of coal, hydro and natural gas resources. Coal is the dominant resource for Pacific Power. Bonneville supplies primarily hydropower.

Pacific Power serves 31 percent of Oregon's electric utility load, providing power to more than 486,000 customers. In 2001, Pacific Power's mix was based on its generating resources and long-term contracts, as these are sufficient to meet its load.

PGE serves 40 percent of Oregon's electric utility load, providing power to about 733,000 customers. In 2001, PGE's own resources and long-term contracts for specific projects served 72 percent of its load. The remainder is based on a calculated regional mix from other resources in Oregon, Washington, Idaho, Montana, Utah and Wyoming.

The Bonneville Power Administration provides power to Oregon's 36 consumer-owned utilities as well as to direct-service industrial customers. Consumer-owned utilities include people's utility districts, municipally-owned utilities and electric cooperatives. Many consumer-owned utilities supplement their Bonneville supplies.

Bonneville also shares the benefits of the federal Columbia River power system with residential and small farm customers of investor-owned utilities in the form of money or power.

In 2001, BPA's mix was based on its generating resources and long-term contracts, which are sufficient to meet its load.

Idaho Power, another investor-owned utility, serves about 1 percent of Oregon's electric load.

Electricity Regulation

In Oregon, energy is regulated in three ways:

- The Federal Energy Regulatory Commission (FERC) no longer regulates the price of wholesale electricity. However, FERC still is responsible to assure that wholesale rates are reasonable. In response to the California wholesale price crisis, the FERC adopted price caps in June 2001. Cost-based price caps are still in place but will have an effect only if markets prices spike again.
- The Federal Energy Regulatory Commission regulates transmission rates.
- The Oregon Public Utility Commission regulates how much utilities charge their customers for electricity use and for distribution of electricity.

Wholesale Power

In the mid-1980s, the FERC began deregulating power sales between utilities. Before then, these wholesale prices were capped at the full cost of the power. Now, the price of wholesale power is deregulated. From May 2000 to June 2001, wholesale prices were often 10 times the normal price. In June 2001, the FERC limited the maximum price that could be charged, after much damage was done to the regional economy.

Transmission

BPA, Pacific Power and British Columbia Hydro are the largest transmission providers in the Northwest. Other Northwest transmission line owners are PGE, Idaho Power, Avista, Puget Sound Energy, Sierra Pacific and Northwest Energy (formerly Montana Power).

The FERC regulates the prices for sending power across transmission lines. Under PUC rules, these costs are passed through to retail electric utility customers. The Energy Facility Siting Council regulates the siting of transmission lines in Oregon.

Transmission Restructuring

Under current FERC procedures, Northwest power planners are exploring creation of an independent regional transmission organization (RTO West) to improve the efficiency of Northwest wholesale power markets. RTO West would plan and operate the assets of the 10 major transmission owners, the nine Northwest transmission owners and Nevada Power, as if they were owned by a single utility. This would eliminate transmission charges at utility boundaries that artificially restrict commerce and would allow more use of existing transmission capacity. Even so, establishing a regional transmission organization could be expensive and is controversial. The main cost would be buying and testing the telecommunications and computer hardware and software.

Retail Electricity and Distribution Rates

The Oregon Public Utility Commission (PUC) regulates retail rates for the electricity use and distribution portions of electric bills. Rates are set to give utilities an opportunity to earn a fair rate of return on their investments. In Oregon, the rate of return has been about 10 percent. Power costs are mostly passed through to customers.

Oregon Retail Electric Restructuring

Oregon Senate Bill 1149 took effect March 2002, ushering in several changes in how Oregonians purchase electricity and pay for conservation and renewable resources.

Non-Residential Customers
Senate Bill 1149 allows all non-residential customers to choose their electric supplier. Drafters of the legislation were concerned about what might happen to the utility resources that customers would leave behind if they chose a supplier other than their electric utility. The "abandoned" resources could become a burden on remaining customers if the resources cost more than wholesale market prices. On the other hand, if abandoned utility resources were less expensive than the market, customers could not afford to leave.

As a result, Senate Bill 1149 requires customers who buy from non-utility suppliers to pay charges or get credits for the net value of the resources they leave behind. This is expected to minimize cost shifts between customers who continue to get their power from the utility and those who don't. Remaining issues regarding these transition credits and charges will be resolved by PUC rulemaking.

As of November 2002, there were no customers buying from independent suppliers. However, about 1 percent of Pacific Power's and 9 percent of PGE's eligible customer load chose daily, monthly or quarterly market prices through their utility. These were primarily large industrial customers, who will benefit from low market prices until a spike occurs. When transition credit and charge issues are resolved, these customers may buy power from independent suppliers.

Residential and Small Business Customers
Senate Bill 1149 also gives residential and small commercial customers three types of options:

- buy part of their power from new renewable resources,
- buy 100 percent of their power from a mix of new and older renewable resources, or
- pay different rates for electricity based on the time of use.

These options have been available since March 2002. As of October 2002, about 30,000 customers were participating or roughly 3 percent of those eligible.

Public Purpose Charge
Senate Bill 1149 also requires electric utilities to collect a public purpose charge from all electric retail customers. The charge, which totals 3 percent of electric revenues, pays for conservation, low-income weatherization, school conservation and the above-market cost of generating electricity from renewable resources. The revenue replaces the funds utilities spent on conservation and renewable power programs prior to passage of the legislation. As directed by the PUC, most of these funds are administered by the Energy Trust of Oregon, a nonprofit organization set up for this purpose.

Electricity Price and Supply

From May 2000 though June 2001, wholesale prices in the West spiked to several thousand dollars per megawatt-hour. Previously, wholesale electricity prices had ranged from $10 to $50 per megawatt-hour. A megawatt-hour is 1,000 kilowatt-hours (kWh), which is the amount of electricity the average Oregon household uses in a month. A kilowatt-hour measures the amount of electricity consumed over time.

A combination of market factors caused wholesale prices in the West to soar:

- Growth in electricity use outpaced the growth of supplies.
- A severe drought in the West reduced hydro supplies.
- The price for natural gas to fuel power plants increased.
- Flawed deregulation of California retail markets affected prices throughout the region.

Wholesale prices stabilized by mid-2001 primarily because electricity use declined. Retail rates, though falling somewhat, could remain relatively high in 2003 because of delays in passing on wholesale power costs to customers.

Approximately 4,000 megawatts (MW) of new gas-fired plants were constructed in 2001 in the West, including 667 MW in Oregon. An additional 20,000 MW in the West likely will be finished in 2002 and 2003, making these new plants enough to satisfy 30 percent of the region's electric load.

The Northwest's 2002 load has declined to that of the 1991 level. There should be adequate power for several years, even in a drought. However, adequate resources do not guarantee stable wholesale prices. The West is dependent on natural gas-fired power plants. If natural gas prices spike, power prices likely will follow.

Electricity Conservation

Investment in electricity conservation dwindled during the 1990s. Conservation achieved in the Northwest from 1990 to 2000 fell short of levels the Northwest Power Planning Council had targeted as cost-effective (Figure 13). In hindsight, the Planning Council targets were too low because they were based on natural gas price forecasts that were too low. Even so, the region achieved only half of the targets. Oregon's performance was no better than the region as a whole.

Low wholesale electricity prices in the 1990s contributed to this conservation shortfall in the following ways:

- Investing in conservation when wholesale electricity prices are lower than a utility's cost-of-service rate tends to increase short-term retail rates.
- Utilities were worried that retail customers might buy wholesale power from independent suppliers and leave utilities burdened with conservation costs.
- BPA feared the potential loss of wholesale customers to the wholesale market.

Senate Bill 1149's public purpose charge assures steady conservation investments. It is estimated that Oregon will save 300 average megawatts over the next 10 years from these funds. That is the equivalent of five times the power used by Springfield, Ore., at less cost than electricity generated from a new power plant.

The remainder of the 3 percent public purpose charge pays for renewable resources, low-income weatherization, school conservation and low-income housing.

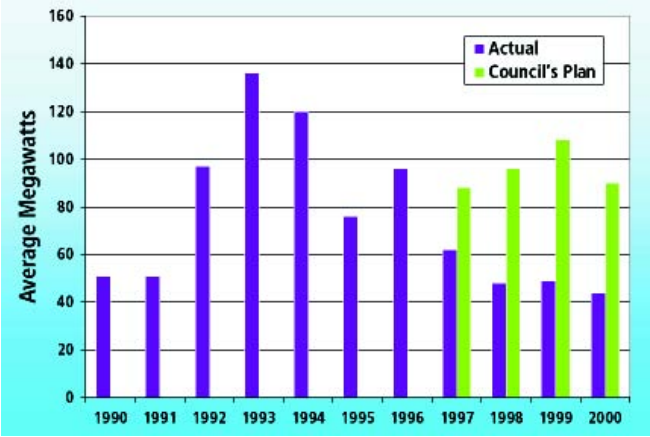


Figure 13: Annual NW Utility Conservation Savings
Conservation achieved by Northwest utilities declined during the 1990s, falling short of targets set by the Northwest Power Planning Council. Oregon's performance mirrored that of the region.

Electricity Contingencies

Earthquakes and drought pose the greatest natural risks for Oregon's electricity supply. A drought would be especially problematic if accompanied by a natural gas shortage or the loss of major

transmission lines or power plants. Extremely cold weather also strains supplies.

BPA, Pacific Power and PGE have contingency plans for dealing with short- and long-term electricity shortages. The PUC approves plans from Pacific Power and PGE. *Energy* and Oregon Emergency Management notify local agencies in case of emergencies.

PGE and Pacific Power have programs to pay customers for reducing use if there is a long-term shortage. During severe long-term shortages, the PUC could require all Oregon electricity consumers to reduce monthly use, relative to the prior year.

During a short-term shortage, utilities ask their customers to make voluntary reductions. If these fall short, utilities can black out individual substations for one or two hours. These events are called rotating outages or rolling blackouts. Critical substations serving hospitals, communications or public safety are exempt. If a substation serves only a few large customers, and those customers reduce their use by the same proportion as the outage, the substation is exempt. For some industrial customers, rotating outages are more disruptive than reducing output or shutting down equipment to achieve equivalent savings.

Renewable Energy Resources

Nature provides a constant supply of renewable energy resources. Their use usually produces fewer pollutants than fossil fuels. Renewable energy resources include:

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

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.

Hydroelectricity

The Pacific Northwest generates about half of its power from hydroelectric dams, most of those are federally owned. Few opportunities remain to site new dams because state law prohibits hydroelectric projects from harming fish.

Wind

Wind-generated electricity is becoming increasingly competitive as wind turbine and other costs decline, the price of natural gas increases, and the federal wind production tax credit continues.

Oregon now has four large wind projects. The largest, with a maximum output of 263 megawatts, is the Stateline project on the Washington border, just north of Pendleton. Turbines on the Oregon side of this project have a maximum output of 83 megawatts and there are plans for expansion. Wind generation, on average, is about a third of the maximum output.

Two other projects have a maximum output of fewer than 25 megawatts each: the Vansycle Ridge wind plant, also near Pendleton, and the Klondike plant near Wasco, in Sherman County. The Condon plant in central Oregon has a maximum output of about 50 megawatts.

Several new wind projects and expansions are planned in the state.

Biomass Fuels

Biomass facilities produce electricity and heat or steam from wood waste or from waste gas (methane) from landfills, sewage treatment plants and manure. Overall, biomass provides 98 trillion Btu of energy, equivalent to 47 percent of Oregon's

natural gas use. Almost 90 percent of this is wood wastes burned at 64 industrial sites. In addition to steam and process heat, some of these sites generate power, totaling 108 megawatts.

Three landfills tap waste methane gas to generate 4 megawatts of electricity and provide industrial fuel. In addition, 29 wastewater treatment plants use methane to generate a total of 3 megawatts of electricity and provide heat for sewage treatment. Electricity is beginning to be generated using manure from dairy cows.

Biomass also can be used to produce biofuels for transportation, including ethanol and biodiesel. Ethanol represents 4 percent by volume of gasoline sold in Oregon. During the winter, most gasoline sold for roadway use in Oregon contains 10 percent ethanol. The ethanol provides oxygen, reducing carbon monoxide. Some gasoline suppliers sell a 10 percent ethanol blend year-round.

Biodiesel is used at concentrations of up to 20 percent, blended into petroleum diesel. Oregon used less than 100,000 gallons of biodiesel in 2001, or 0.02 percent of petroleum diesel sold in the state.

Solar

Solar energy can provide space heating, hot water and electricity. Designing buildings to make the most of sunlight for lighting also can reduce energy needs, especially for commercial buildings.

South-facing windows with overhangs to prevent overheating in summer and heat storage materials add little to the cost of a new building. Solar water heating can supply about half of the hot water for a typical Oregon home. Residents have installed more than 17,000 solar water heating systems in the last 20 years. Solar electricity still costs several times more than natural gas-fired generation, but costs continue to fall. There are more than 250 solar electric systems in the state. Business and residential energy tax credits have helped to offset the cost of these systems.

Geothermal

About 1,800 ground-source heat pumps provide space and water heating for Oregon homes. The city of Klamath Falls uses geothermal energy for a district heating system. Geothermal sources elsewhere in Oregon supply heat for buildings, swimming pools, resorts and industrial uses.

In 1996, CalEnergy Co. received a site certificate to build a 30-megawatt geothermal power plant near the Newberry Volcanic Monument in Deschutes County. Despite considerable investment in exploratory drilling, the company did not find a source of heat and steam sufficient for generating electricity. The company canceled the Newberry project and is pursuing a similar project in northern California.

Promoting Renewable Resources in Oregon

Energy provides tax credits and low-interest loans for all types of renewable resource projects. Large wind and certain biomass facilities also qualify for federal production incentives.

Many utilities offer consumers the option to pay extra to support development of new renewable resources, including wind, geothermal, landfill gas and solar. These resources may be in Oregon or located elsewhere on the Western electric grid.

Some Oregon residents and businesses invest in renewable resource generation on site. Oregon law requires electric utilities to buy excess power from customers with small solar, wind or hydroelectric systems. Utilities also must purchase excess power produced from small fuel cells, which can run on natural gas or methane, a biomass byproduct.

The three percent public purpose charge on the bills of PGE and Pacific Power customers will

provide an estimated $10 million per year over 10 years in generation from renewable resources. Leveraging investments by others, these funds should add 450 average megawatts of renewable power by 2012 — an eight-fold increase for the state.

Environmental Impacts of Energy Use

Energy use and production affects the environment in a number of ways, including impacts to air and water.

Air Pollutants

Carbon dioxide (CO_2), methane and nitrous oxide (N_2O) are greenhouse gases. Carbon dioxide cannot be removed easily from tailpipes and smokestacks. Therefore, reducing carbon dioxide emissions requires increasing energy efficiency, switching to less carbon-intensive fuels (from coal to natural gas generation, for example) or using renewable resources.

The Oregon Department of Environmental Quality (DEQ) regulates emissions of nitrogen oxides, volatile hydrocarbons, sulfur dioxide and particulate matter from vehicles, factories and power plants. Oregon's emissions must meet federal standards.

Vehicle emissions are the principal source of nitrogen oxides and volatile hydrocarbons in Western cities. Power generation from coal, and to a lesser extent natural gas, is another major source of nitrogen oxides.

Due to recent pollution control requirements, new gas-fired power plants produce only 3 percent of the nitrogen oxides of existing coal-fired plants of the same size, and virtually no volatile hydrocarbons, sulfur dioxide or particulate matter.

Coal power plants are a major source of sulfur dioxides. Diesel-powered vehicles also produce sulfur dioxides, but new federal standards will greatly reduce these emissions.

Wood stoves, diesel-powered vehicles, field burning and forest fires are significant sources of small particulates.

Other Environmental Impacts

The Oregon Water Resources Department rules allow new power plants to use water only if the use does not interfere with existing water uses, including fish and wildlife habitat. The DEQ regulates water pollution and temperature from power plant discharges.

State standards also set limits on the impacts that new power plants can have on soils, protected areas, fish and wildlife habitat, threatened and endangered species, noise, and scenic, cultural and recreational values. The Energy Facility Siting Council requires new plants to meet state standards.

Federal and non-federal projects must comply with decisions by federal authorities related to salmon species that are threatened with extinction. Improvements in fish habitat often are part of FERC re-licensing of non-federal projects.

Nuclear Cleanup and Emergencies

Nuclear facilities in or near Oregon include: the Hanford Nuclear Reservation in Washington; the closed Trojan Nuclear Power Plant in Rainier, Ore.; abandoned uranium mines in Lakeview, Ore.; and nuclear reactors used for research in Portland and Corvallis.

Energy is responsible for clean up of nuclear waste and preparing for nuclear emergencies. That preparation includes participating in Oregon's domestic terrorism preparedness programs.

Hanford Nuclear Site

The Hanford Nuclear Site, located on the Columbia River in southeast Washington, is the site of the largest radioactive waste cleanup in the world. The site covers 586 square miles and contains waste from 40 years of plutonium production used for weapons. The U.S. Department of Energy's (USDOE) Richland Operations Office manages the site. Waste from Hanford has contaminated nearby groundwater and some waste is entering the Columbia River, although in quantities below regulatory standards.

Although much work is being done to clean up the radioactive waste, cleanup will take decades. In the meantime, a fire, explosion or accident involving Hanford's underground waste storage tanks, plutonium manufacturing facilities or laboratories could release radioactive materials. Such a release could impact Oregon.

Also located at Hanford is the Columbia Generating Station, the Northwest's only operating commercial nuclear power plant. An accident at this plant could cause an airborne radioactive release, with potential impacts to Oregonians.

The consequences in Oregon from a radioactive release could be economic and environmental. Hanford is within 40 miles of agriculture-rich Umatilla, Ore.

To mitigate the risk Hanford poses to Oregon, *Energy* is urging the U.S. Department of Energy to clean up the site without delay. *Energy* also works with USDOE, the Columbia Generating Station, Washington State and the affected counties to ensure that the region can provide a coordinated response to a Hanford emergency. This includes conducting and participating in routine exercises.

Every two years, the Federal Emergency Management Agency evaluates Oregon's ability to respond to a commercial nuclear power plant accident that results in the release of radioactive materials. Oregon is tested on its ability to alert and mobilize emergency responders; assess the severity of the radiological accident; identify and track the radioactive release; and conduct environmental monitoring, sampling, and analysis. The state must also show it can issue and implement appropriate protective actions for the public, and provide timely and accurate information to the public and news media.

Trojan Nuclear Power Plant

The Trojan Nuclear Power Plant is on the bank of the Columbia in Columbia County. Portland General Electric (PGE), the plant's owner, permanently closed Trojan in 1993 and is decommissioning the plant. Decommissioning involves removing radioactive and hazardous materials so the site can be used for another purpose. *Energy* oversees the decommissioning work.

Trojan's nuclear reactor was dismantled in the late 1990s and all major components were shipped to the Hanford commercial low-level waste site for burial.

The plant's spent fuel is presently stored on site in a spent fuel pool. PGE plans to move the fuel to dry storage containers to allow decommissioning of the spent fuel pool and its associated building. In 1999, PGE discovered flaws in a previously approved fuel storage system. The Energy Facility Siting Council and the U.S. Nuclear Regulatory Commission are reviewing design of new fuel storage containers. Following their approval, PGE will begin removing the spent fuel. The utility expects to complete fuel removal and storage in early 2004.

After all the spent fuel is placed in the containers, it will be stored securely at the plant site until a national spent fuel repository opens. In early

2002, the U.S Secretary of Energy recommended that the federal government proceed with constructing such a repository at Yucca Mountain in Nevada. Congress voted to override Nevada's veto of the proposed disposal site. A national spent fuel repository is not expected to open until at least 2012.

After PGE completes all clean-up activities, the utility must perform a detailed survey that shows all areas of the plant are free of contamination. The Council must review and approve the survey before cleanup is considered finished. *Energy* provides technical staff for the Council. After the Council approves the survey, all areas of the plant, except for the spent fuel storage area, will be free for non-nuclear use. The plant will be released for non-nuclear use before shipment of the spent fuel begins.

An accident involving Trojan's spent fuel would, at most, result in a small release of radioactive materials. On-site workers might need protection; people off site likely would not. The State of Oregon, Columbia County and PGE are prepared to respond to an emergency. *Energy's* emergency preparedness plan includes the Trojan Nuclear Plant.

Lakeview Abandoned Uranium Mines

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

Governor Kitzhaber 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 on the need for cleanup in September 2001. Besides the EPA, others involved include *Energy*, the U.S. Forest Service, and Oregon DEQ. Negotiations are underway to decide the specific course of action, and which parties will be responsible for cleanup costs. Final site design will include consolidating and stabilizing about one million tons of mine overburden (rock waste), and neutralizing the acidic water in the White King mine pit. Cleanup is expected to begin in late 2003 or early 2004 and should take two summer construction seasons.

Research Reactors

Oregon has two small nuclear reactors used for research: one at Reed College in Portland, and another at Oregon State University's Radiation Center in Corvallis. The reactors are regulated by both the U.S. Nuclear Regulatory Commission and by Energy.

Transportation of Radioactive Materials

Radioactive materials travel on Oregon's roads every day. Radioactive waste travels through the state, destined for disposal at Hanford. Radioactive medicines are distributed daily across Oregon, and radioactive materials often are transported to and used at construction and industrial sites.

Most of these shipments pose low risk because of the nature of the cargo. More shipments, of much more dangerous waste, likely will be trucked in the future as waste is moved from Hanford to permanent disposal sites.

Energy works with local, state and federal agencies to ensure the safe transportation of these wastes. *Energy* also works to ensure swift and appropriate response to a radioactive material transportation accident, providing training for emergency responders along the transport corridors. More than 650 emergency responders and hospital emergency room personnel attended radiological training from 2000-2002.

Energy Policy Issues Facing Oregon

Adequate Electricity Resources

The Northwest Power Planning Council estimates that power plants recently built or under construction will meet the projected growth in electricity demand through 2006. In Oregon, the gas-fired power plants and wind facility completed in 2001-2002, along with a gas-fired power plant expected to be complete in 2003, will supply 1,580 megawatts of capability. That will be enough to meet 18 percent of expected peak Oregon loads.

Late in 2002, the Oregon Energy Facility Siting Council approved three more gas-fired plants for the state, totaling almost 1,800 megawatts. Many power plants were recently completed in California, Arizona, Washington and Nevada, helping to ensure adequate resources throughout the West.

However, power from any plant is dedicated to Oregon loads only if an Oregon utility owns and operates it for its customers or has an agreement to buy its output. To avoid the shortages and price spikes of 2000-2001, Oregon's investor-owned utilities are planning to rely less on wholesale power markets. Instead, they plan to build more power plants or sign long-term fixed-price purchase agreements to ensure adequate resources for all residential customers as well as nonresidential customers that do not choose an alternate supplier.

Utility Resources

The Bonneville Power Administration (BPA) has adequate resources to serve the current needs of consumer-owned utilities and partially serve the needs of residential and small farm customers of investor-owned utilities. Several Oregon consumer-owned utilities own power plants or buy power from other suppliers. BPA's customers have proposed to restructure how its low-cost resources are shared and how new resources will be developed. (See Reallocation of BPA's Power Business in this section). The Oregon Public Utility Commission, the Federal Energy Regulatory Commission (FERC) and others are examining adequacy standards.

Oregon utilities should be able to protect against shortages and wholesale price volatility by serving most of their loads with their own resources or long-term fixed-price contracts. That's what utilities did until the early 1990s.

The federal Energy Policy Act of 1992 required transmission owners to allow others to use their systems, giving utilities access to remote wholesale power markets. At the same time, FERC deregulated the price of virtually all wholesale power. Wholesale prices remained low during the 1990s; utilities and the BPA relied on wholesale power to meet load growth.

Then, from May 2000 though June 2001, wholesale prices in the West spiked to unprecedented levels. It appears that drought, lack of power plants and failure of the California deregulation system were factors. The result was large retail rate increases.

Improving Stability

Efforts are underway to improve the competitiveness and stability of wholesale markets:

- Wholesale prices will not be stable without adequate natural gas supplies. If gas-fired power plants meet most load growth, new gas supplies will be needed. Much of this new supply must come from a proposed pipeline that would run from the North Slope of Alaska through Canada. Other possible sources are new gas wells in the deep Gulf of Mexico and liquefied natural gas imports. Access to these sources may require new pipelines in the West.

- Reducing loads can moderate wholesale price spikes. Some demand response programs are underway, but more efforts are needed to assure effective wholesale competition. Programs include daily retail prices that reflect wholesale markets, on-peak and off-peak prices that reflect the cost differences of serving those loads and programs to reduce use during droughts.

- Having adequate resources can prevent price spikes. Independent power providers have financed most of the recently-built plants. Today, they are facing difficult financial challenges. Utilities will have to play a bigger role in getting power plants built.

- To ensure fair and competitive access to the transmission system, FERC is seeking to have transmission operators be independent of power providers. FERC is also proposing formation of regional transmission organizations to improve system reliability and access to the transmission system.

Even with these measures, periods of high wholesale prices are likely. After wholesale markets become more competitive, greater reliance on them could reduce costs.

New Electricity Resources Mix

New resources will be needed sometime after 2006 with projected growth in electricity demand. Conservation is less expensive than building new power plants. The delivered cost of wind generation may be more expensive than natural gas-fired power plants, but wind plants are not subject to volatile fuel prices and do not produce air pollutants or use water.

Under current policies, conservation is expected to meet about half of the growth in electricity needs. New gas-fired plants likely will meet much of the remainder. More could be done to acquire conservation and renewable resources.

Generation Choices

Even with expanded conservation efforts, some new power plants will be needed. Most new power plants run on natural gas. Natural gas prices are volatile and will increase retail price volatility. Fixed-price, long-term natural gas contracts stabilize prices, but generally are more expensive than short-term gas purchases.

Coal and wind plants offer more price stability. But new coal-fired plants produce more than twice the carbon dioxide (CO_2) of new gas-fired plants. Even with maximum control technologies, coal plants also produce significant amounts of sulfur dioxide, nitrogen oxides and mercury. New gas-fired plants do not. Both coal and natural gas plants use large quantities of water.

Coal plants take five to 10 years to complete compared to less than two years for gas-fired and wind plants. New coal plants in Oregon are unlikely, in part because of the cost of transporting coal by train. Oregon has no commercially viable coal deposits.

Smaller natural gas-fired turbines or internal combustion engines at customer sites can produce both heat and power. They are more efficient than producing heat and power separately and have fewer CO_2 emissions. They also reduce transmission line losses and can reduce the need for transmission and distribution system upgrades.

Promoting Renewable Resources

Plants that generate electricity from renewable resources have no fuel costs and usually raise fewer and less severe risks and environmental concerns.

Technology improvements are reducing wind costs, helping spur development. But other barriers remain. First, there is insufficient information on the state's wind resources for developers to make the sizable investments needed. Second, it is expensive to move the wind power from remote sites to population and industrial centers. Further, wind is an intermittent resource, and costly services are needed to balance electric loads and generation when wind plants deliver more or less power than forecasted.

The most important actions to promote development of renewable and other clean energy resources for Oregon are:

- Continue and expand federal incentives
- Adopt a federal Renewable Portfolio Standard requiring utilities to get more power from new renewable resources
- Get more support from state, federal and other sources to assess Oregon's wind resources
- Remove penalties for transmission and system integration of wind generation
- Develop a regional hourly market that wind power can use
- Institute rates and charges which encourage generation at customer sites
- Adopt statewide standards for utility grid connection of small generating systems
- Encourage adoption of model siting standards by local jurisdictions
- Eliminate federal prohibitions on combining state and federal incentives
- Expand state programs for using agricultural and forestry wastes to produce energy

Reallocation of BPA's Power Business

The Bonneville Power Administration supplies about 95 percent of the power to serve Oregon's consumer-owned utilities (COUs). It also provides some of the power or financial benefits to the investor-owned utilities (IOUs), Pacific Power and PGE.

Regional discussions are taking place concerning the renegotiation of BPA's electric power sales contracts for 2006 through 2026. These new contracts will allocate the benefits and related costs of the Federal Columbia River Power System (FCRPS) after 2005 and determine BPA's role in meeting the Pacific Northwest load growth. These contracts will impact efforts to protect fish runs in the Columbia River and its tributaries, and determine how much renewable resources and conservation the region acquires.

Energy recommends these principles:

- FCRPS benefits and costs should be allocated as fixed slices for at least 20 years.
- FCRPS benefits and costs should be allocated equitably to regional COUs, tribal and direct-served federal entities, plus residential and farm customers of IOUs.
- BPA's role in developing new resources and in augmenting the FCRPS should be severely limited.
- BPA allocations to aluminum smelters should be limited. BPA should have rights to interrupt power as long as it is fair to the companies, their workers and other BPA customers.
- BPA should manage and operate the FCRPS in compliance with all existing obligations, including fish and wildlife preservation and restoration.
- The energy efficiency and renewable energy goals of the 1980 Regional Power Act should be met through sustainable institutional arrangements.

In 2002, the region's COUs and IOUs jointly

proposed a solution for post-2006 FCRPS allocations that is generally consistent with these recommended principles. BPA has made an initial assessment of this proposal. Bonneville and the Northwest Power Planning Council will conduct regional discussions on the subject. Oregon will participate in these discussions, which should conclude in 2004.

Natural Gas Price Spikes

Oregon may experience another natural gas price spike this decade, because while natural gas distribution and transport costs are regulated, wholesale gas costs are not. Oregon wholesale natural gas prices rose 68 percent between 1999 and 2001.

The state's natural gas expenditures in 1999 were 1 percent of total personal income. Natural gas price spikes tend to harm the Oregon economy more than the U.S. economy because Oregon imports 100 percent of its natural gas, compared to 17 percent for the U.S. as a whole. Areas of the U.S. that produce natural gas see increased employment when prices spike. Oregon does not.

Natural gas prices also influence electricity prices. Because roughly 9 percent of the Pacific Northwest's electricity is generated from natural gas, gas prices influence wholesale electric prices. The share of gas-fired generation is increasing as loads grow and as most new plants are fired by natural gas. Electric utilities can reduce their exposure to fuel price spikes by developing renewable resources and buying more of their fuel in longer-term contracts. These measures can be more expensive in the near term. These tradeoffs are part of the utility least-cost planning process.

Oregonians can reduce their vulnerability to natural gas price spikes by weatherizing their homes and installing more efficient equipment in homes, buildings and factories. Expanding conservation efforts would reduce Oregon's vulnerability to natural gas price spikes.

Gasoline Price Spikes

Gasoline and other oil price increases could negatively affect Oregon's economy, which remains heavily dependent on oil. About half the energy Oregon uses is refined oil products, most of it for transportation. In 1999, Oregonians spent almost 4 percent of total personal income on all oil products and 2.3 percent on gasoline alone.

World oil prices affect what Oregonians pay for petroleum products. Middle East production strongly influences the world price. The Middle East produced 28 percent of the world's oil in 2001 and sits on two-thirds of the world's oil reserves. There have been three world price spikes in the last 30 years, in 1973, 1979 and 1990. These were due to the Yom Kippur War, the Iran-Iraq War and the Persian Gulf War, respectively. The Middle East remains unsettled.

A second potential problem is long-term price trends. World oil production may peak in the next decade and begin a long-term decline. Meanwhile, world demand for oil is expected to grow.

Reducing Vulnerability

Oregon has a contingency plan to allocate gasoline and diesel to critical emergency uses. It has little ability to mitigate the economic impacts of a fuel price spike after it occurs. Oregonians can reduce their vulnerability to oil price spikes by decreasing the miles they drive and buying vehicles that get more miles per gallon.

The most significant options to reduce vehicle

miles traveled relate to work commutes. They are increased transit use, van/carpooling and telework. Specific commuter options include:

- Incentives could be increased for employees to reduce single-occupant commuting. Employers can pay for transit passes and can develop telework sites or encourage working from home.
- Oregon could expand incentives to encourage van pooling and carpooling, such as carpool parking discounts and high-occupancy vehicle lanes.
- Commuter rail could be started along existing rail lines.

Other options to reduce vehicle miles traveled include:

- Zoning for mixed use and increased densities so it is easier for people to walk or bicycle to more activities.
- Expanding public transit.

The most significant option to improve vehicle efficiencies is to encourage improvement in the federal Corporate Average Fuel Economy (CAFE) standards. Congress is considering gradually increasing fuel economy standards; however those standards for new vehicles have remained flat since 1985.

California recently adopted a carbon dioxide emissions standard that would improve the miles per gallon of new vehicles. Oregon and other states could consider adopting California standards if Congress fails to act.

Reducing Carbon Dioxide

Carbon dioxide (CO_2) is the primary human-produced greenhouse gas. During the 1990s, Oregon's total carbon dioxide emissions increased 10 percent. A State Benchmark is to hold carbon dioxide emissions to the 1990 level. State actions to increase energy efficiency and reliance on renewable resources support that benchmark, along with Oregon's CO_2 standard for new energy facilities.

As a result of legislation adopted in 1997, the Energy Facility Siting Council requires new power plants in the state to meet a CO_2 standard. To date, all power suppliers have met the requirement by making payments to The Climate Trust. The Climate Trust is an independent, nonprofit organization that finds and contracts for projects that offset carbon dioxide. Offset projects can include generation from renewable resources, conservation or CO_2 sequestration.

Oregon is one of three states that regulate CO_2 emissions directly. The others are Massachusetts and New Hampshire, which also regulate energy facilities. California will begin regulating vehicle CO_2 emissions in 2009.

California's actions to regulate CO_2 emissions under its air quality regulations offers an opportunity for other states to do likewise in the absence of federal action to control CO_2 emissions from vehicles.

In the meantime, Oregonians can take a number of steps to reduce CO_2 emissions. They include buying more efficient vehicles, driving less, installing energy efficient equipment and buying power from renewable resources or "green energy" options.

Protecting Oregon from Hanford

Although the Hanford Nuclear Site is in southeast Washington, its location on the Columbia River

poses a potential risk to the safety of Oregonians. What steps should Oregon take to influence cleanup activities at Hanford?

A Tri-Party Agreement exists between the U.S. Department of Energy, the U.S. Environmental Protection Agency and the Washington Department of Ecology for cleaning up chemical and radiological wastes at Hanford. The State of Oregon is not a party to the agreement and has no regulatory authority over the cleanup.

The State of Oregon has a strong interest in the Hanford cleanup, because the site is adjacent to the Columbia River. Contaminated groundwater from the site currently enters the Columbia River, although river water samples do not exceed drinking water standards. *Energy's* Nuclear Safety Division provides technical and policy advice on clean-up activities.

Over the years, *Energy* has attempted to secure a more formal role in decision-making about the Hanford cleanup. It has worked with the Oregon Congressional delegation to introduce federal legislation providing the state with a decision-making role. But these efforts have been unsuccessful largely due to the State of Washington's concerns about infringement of its sovereignty and opposition by the federal government.

Energy has also worked informally with the Tri-Parties to more clearly define a decision-making role. While there have been some progress and partial victories, Oregon is still pushing for a full decision-making role. Over the past year, *Energy* participated in a small group of key Hanford regulators and stakeholders that developed plans for accelerating the Hanford cleanup. Additionally, *Energy* attends regular meetings concerning enforcement of Tri-Party Agreement cleanup requirements.

Energy intends to pursue the following actions for enhancing Oregon's ability to assure the Hanford cleanup protects Oregonians:

- Continue and expand technical input in cleanup decisions, with an increased emphasis on cleanup of contaminated groundwater.
- Continue and expand *Energy's* participation in policy decisions concerning cleanup, including Tri-Party Agreement negotiations and enforcement activities.
- Seek new federal legislation that defines a clear decision-making role for the State of Oregon.

Energy's Action Plan for 2003 and 2004

The mission of the Oregon Office of Energy (*Energy*) is to protect Oregon's environment by saving energy, developing clean energy resources and cleaning up nuclear waste. We set the following goals to achieve our mission:

- Meet a significant portion of Oregon's incremental energy needs with conservation and renewable resources.
- Reduce carbon dioxide emissions from burning fossil fuels.
- Prepare the state and counties within 50 miles of an operating commercial nuclear power plant for nuclear emergencies.
- Reach key cleanup milestones at the Hanford Nuclear Reservation.

This two-year action plan reflects these and other responsibilities.

Conservation

Households

1. **Encourage homeowner investments in cost-effective efficiency measures and renewable resources.**
   Highly efficient appliances and renewable resources for heating, hot water and electricity can significantly reduce use of fossil fuels. But the higher initial cost of many technologies is a significant barrier. Providing tax credits helps overcome this obstacle.

   Energy will continue to update standards and eligible technologies for the state's Residential Energy Tax Credit and provide information and technical help to Oregonians who use it. In addition, *Energy* will develop a recently added provision that allows a homeowner or renter to transfer the tax credit to another Oregon resident or business in exchange for cash payment.

2. **Promote energy and water-saving equipment and practices.**
   Energy has federal funds to work with communities that are encouraging residents to save both energy and water. The program provides education and information about high-performance equipment and efficiency measures in new housing, commercial developments and landscape irrigation.

3. **Continue services and incentives for weatherizing homes.**
   Weatherizing homes is a significant source of energy savings. Since 1977, Oregon law has ensured that every household in the state has the opportunity to learn which measures its home needs to make it energy-efficient, and for many measures, financial incentives to help pay for them.

   For oil-heated homes, which typically are older and less efficient, weatherization and heating upgrades reduce the impact of volatile fuel-oil prices. *Energy* provides energy audits and incentives through the State Home Oil Weatherization Program.

   In addition, *Energy* will continue to train and certify contractors to properly design and seal heating ducts and work with others to develop new incentive programs. *Energy* also will promote the Business Energy Tax Credit and State Energy Loan Program for weatherization and other efficiency upgrades for rental housing.

   For low-income households, *Energy* will continue to participate in the Oregon Housing and Community Services

Department's Advisory Committee on Energy. The committee crafts policies and procedures for weatherization and energy assistance. *Energy* will work with Oregon's Congressional delegation to advocate for an increase in federal funding for weatherizing low-income housing.

4. **Support energy-efficient building practices.** 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 implement a statewide building code that included energy standards. The energy standards have been upgraded several times since then, most recently in 1992. A home built today requires about half the energy to heat as a home built before the energy standards.

   Energy submitted and supported code change recommendations for space heating, cooling, ventilating, water heating, lighting and building envelope. New codes are scheduled to become effective in 2003 and could save 5 percent to 10 percent in new buildings. *Energy* will provide training and technical help for the building industry and local building departments.

   Energy also will work to promote energy-efficient building practices beyond code. *Energy* will continue to certify energy-efficient manufactured homes and increase their market share by working with Oregon manufacturers and others. On the national level, *Energy* will continue to represent the states on the committee that develops federal standards for appliances.

Businesses

5. **Encourage businesses to invest in cost-effective energy efficiency and renewable resources.** Tax credits are available to businesses for investments in energy efficiency and renewable resources to help them overcome the higher first-costs. *Energy* evaluates the performance of the Business Energy Tax Credit program, identifies priority target markets and implements improvements. *Energy* also will use the State Energy Loan Program and work with others to leverage tax credit benefits for Oregon businesses. The loan program is targeting at least $5 million per year in efficiency investments in commercial buildings.

6. **Upgrade energy standards for commercial buildings.** Energy standards became part of the state code for commercial buildings in 1978. The standards address lighting, heat loss and gain of the building shell, and heating, ventilating and cooling systems. The last major change was made in 1996. New technologies and practices make additional cost-effective energy savings possible.

   Energy has recommended code changes to improve heating, cooling, ventilating, lighting, controls, water heating and the building shell. Adoption and implementation of code changes is scheduled for 2003 with expected additional energy savings of about 10 percent. If the changes are approved, *Energy* will work with jurisdictions, designers and contractors; update code compliance materials; and provide technical help.

7. **Promote building commissioning as standard practice in nonresidential buildings.** The building commissioning process

ensures that the complex equipment providing lighting, heating, cooling, ventilating and other amenities in buildings works together effectively and efficiently. Studies on commissioning show savings of 15 percent to 30 percent. *Energy* leads a project to make commissioning standard practice for public buildings in the Northwest. In addition to demonstrating and documenting commissioning in 36 buildings, *Energy* provides information and commissioning guides.

Industry

8. **Apply best practices in Oregon industries and increase efficiency investments.** Industry depends on stable supplies and prices for natural gas, electricity and petroleum. Natural gas and electricity rates increased dramatically in 2001. Companies that adopt the most efficient production methods reduce energy costs, waste and emissions while they improve productivity and often product quality.

   Competition for capital is acute and fixed costs are rising. Continued business energy tax credits are critical to support investments in energy efficiency. *Energy* will provide Oregon industries with up-to-date information on best practices and help them use the state tax credit. In addition, *Energy* will assist industries in applying for national grants for research and innovative efficiency projects.

9. **Assist Oregon's largest electricity consumers to invest in energy efficiency.** Electric industry restructuring removed charges in Portland General Electric and Pacific Power rates for conservation along with the utilities' responsibility for conservation programs. They are now funded by a separate public purpose charge on customers' bills and will be provided primarily through competitive bidding. Large electricity customers may invest most of their public purpose charges in their own facilities. *Energy* will continue to provide technical help and certify that the proposed site, investments and expenses are eligible.

Public Buildings

10. **Reduce energy bills for Oregon schools.** The electric industry restructuring law 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. Funds must first go to energy audits, then to measures recommended by those audits. *Energy* helps coordinate the program and provides technical help. *Energy* also provides quality control of the audits, manages a database to track the program, and reports on expenditures and results. In the next two years, *Energy* will work with the education service districts to conduct audits and undertake $8 million to $10 million worth of energy efficiency projects.

    Energy also will continue to provide funding to schools using the State Energy Loan Program, federal monies and other sources. *Energy* identifies schools with high energy bills, conducts energy audits and makes recommendations for cost-effective efficiency measures.

11. **Develop high-performance school buildings.** *Energy* will continue training for school staff and construction vendors on building highly efficient, productive and

environmentally sound buildings. Three Oregon school districts are building schools that meet the stringent Leadership in Energy and Environmental Design (LEED) rating, and 11 districts are building schools to meet federal High Performance Schools standards. *Energy* has funds and state energy loan financing for schools to help meet the standards.

12. **Expand the use of the energy tax credit for governments and schools.**
The owner of a conservation project is allowed to transfer the state energy tax credit to an Oregon business in exchange for cash payment. The project owner may be a public institution. *Energy* will develop partnerships to promote this option for schools and local, state and federal buildings in Oregon. *Energy* will coordinate these efforts with the State Energy Loan Program to invest in public building conservation measures.

13. **Increase the energy efficiency of new and remodeled state buildings by 20 percent or better.**
State law requires that new state buildings and major renovations be at least 20 percent more energy-efficient than required by Oregon's building code. *Energy* recommends savings measures to consider in the design and reviews the plans to ensure targets are achieved. *Energy* has provided assistance for 54 new or renovated state buildings and is working on more than 40 other projects. Estimated savings for completed buildings are about $1.5 million per year.

The law further requires existing state buildings to reduce electricity use 10 percent by July 2003 compared to energy use in 2000. *Energy* will help state agencies develop and carry out conservation plans and use the State Energy Loan Program for efficiency measures to help achieve the 10 percent reduction. *Energy* will identify best practices for building design and energy-using systems and distribute its report to state agencies.

Energy also has worked with a group of state agencies to evaluate whether they could get additional savings by aggregating loads and buying power on the open market. The group determined that the market wasn't mature enough yet, and that risks outweighed potential benefits. *Energy* will continue to monitor the market.

14. **Establish energy savings performance contracting for public buildings.**
Energy savings performance contracting provides guaranteed energy savings to secure financing and pay for efficiency improvements without increasing operating budgets. Project management also is provided, reducing the need for in-house expertise. *Energy* has developed model contract documents for state and local governments and schools. *Energy* recently demonstrated energy savings performance contracting with the Department of Administrative Services at the Employment Department building. In the next two years, *Energy* will help get guaranteed savings at other public buildings through performance contracting.

15. **Continue federally funded community energy projects.**
Energy uses federal Rebuild America funds to provide technical help for resource-saving projects for schools, state agencies, local governments and others. Work includes design assistance, training, demonstration projects and technical

analysis. Energy will continue Rebuild America projects with Oregon State University, Willamette Education Service District, Portland Public Schools, Redmond School District, The Dalles Middle School, Oregon Parks and Recreation Department, Salem, Bend and Cannon Beach. A new grant provides technical help for energy savings performance contracting services for universities and K-12 schools.

Transportation

16. **Reduce drive-alone commuting.**
Reducing vehicle miles traveled for commuting is the most significant opportunity for reducing Oregon's dependence on polluting gasoline and diesel. *Energy* provides employers with information and incentives for carpooling, vanpooling and providing bus passes for employees.

    Telecommuting (or telework) is another strategy that is proving successful with minimal cost to taxpayers. *Energy* will continue to help about 100 employers a year set up effective telecommuting programs. *Energy* provides training for managers, technical help and incentives. *Energy* also is developing Internet-based training for managers and telecommuters. A technology center will be established in Grant County to foster telework.

17. **Increase purchases of hybrid gas-electric vehicles.**
Hybrid gasoline-electric vehicles hold great potential for reducing fossil fuel use and vehicle emissions. *Energy* will continue to provide tax credits and low-interest loans to encourage hybrid vehicles for business and personal use. *Energy* also will help the state motor pool buy more hybrid vehicles for the fleet.

18. **Develop alternative-fuel production and fueling stations.**
Alternative fuels such as biodiesel, ethanol, natural gas, electricity and hydrogen are less polluting and diversify our transportation fuel supply. But they cost more than diesel and gasoline. *Energy* will continue to provide information, technical help, tax credits and low-interest loans to encourage alternative-fuel production and fueling stations in the state.

Clean Energy Resources

19. **Increase the share of renewable resources serving Oregon's energy needs.**
An estimated $10 million per year through 2012 will be invested in generation from new renewable resources under Oregon's electric industry restructuring law. Large electricity customers can invest their required contributions in their own facilities. *Energy* will continue to review their proposed investments for eligibility. In addition, *Energy* will continue to provide financing for renewable energy projects through the State Energy Loan Program and tax credit services for residents and businesses. Further, *Energy* will provide the technical support the state Energy Facility Siting Council needs to review an increasing number of applications for renewable resource power plants.

20. **Advocate for federal incentives for renewable resource generation and a national Renewable Portfolio Standard.**
The federal energy production tax credit

for investor-owned utilities and other companies expires at the end of 2003, along with a related production incentive for publicly owned utilities. The incentives apply only to wind and some crop-based resources. *Energy* will continue to work with Oregon's congressional delegation to extend the incentives for at least 10 years and apply them to all renewable energy resources, including geothermal, solar and all biomass resources. *Energy* supports a federal Renewable Portfolio Standard that requires all electricity suppliers to gradually increase renewable sources used to supply power needs.

21. **Develop a registry for the Western electric grid to verify renewable energy claims.**
Power plants that use a renewable resource have two products for sale: electricity and environmental attributes such as cleaner emissions. Increasingly these products are sold separately, to different customers. Power from wind turbines, for example, is sold in the wholesale market at the same price as power from a coal or natural gas plant, and no claims are made that the generation process is any cleaner. The higher cost of the wind power is recouped through the sale of its environmental attributes to retail customers who pay a little more to increase the share of electricity that comes from renewable sources.

    To prevent fraud and ensure that customers get what they are paying for, *Energy* is working with the Western Governors' Association and Western states to develop a registry for renewable resource facilities on the Western electric grid. The registry will validate sales claims for power sources, energy production and environmental characteristics. It will also facilitate sales and maintain consumer confidence in the green or renewable power market.

22. **Support customer choice of renewable resource generation.**
The restructuring law also requires that residential and small business customers of Portland General Electric and Pacific Power have renewable resource rate options. Some 27,000 customers already have signed up for the renewable resource options, but the potential is far greater. *Energy* will work with the Public Utility Commission and the utilities further develop consumer choice and information programs.

23. **Identify and remove barriers to wind energy development.**
Oregon has sizable wind resources. Reductions in turbine and other costs and increasing natural gas prices are making wind more competitive with conventional power plants. But lack of detailed resource data, a scarcity of transmission lines near resource areas, and high-priced services to firm up power from an intermittent resource are barriers to further wind power development.

    Energy has a federal grant to lead a state Wind Working Group. The group includes farming and rural interests, developers and representatives of utilities, government agencies and environmental organizations. *Energy* will guide development and implementation of a strategic plan to overcome barriers to further wind development.

24. **Develop clean distributed resources to help meet Oregon's energy needs.**

Generating electricity at or near the place it will be used can improve reliability of the electric grid, reduce the need for utility system upgrades, and cut demand for utility power during high-cost peak hours. New combined heat and power systems, including microturbines and fuel cells, are highly efficient and provide the high-quality, reliable power that a growing number of businesses need. Many distributed generation systems, from solar panels to methane digesters, use clean renewable resources.

Energy is working with the Public Utility Commission and others to identify and remove barriers to clean distributed resources. *Energy* will pursue uniform utility interconnection standards, procedures and agreements. *Energy* also will pursue fair rates for customers who generate power on-site but need supplemental or backup power, as well as ways to encourage distributed generation where it can defer upgrades to utility distribution systems.

Energy will continue to demonstrate and document the benefits of distributed generation, provide information, technical help and incentives for consumers, train equipment installers, and offer information to policy makers and the public.

Energy Supply

Siting Major Energy Facilities

25. **Continue reviewing applications for power plants and a natural gas pipeline.** Oregon law requires a site certificate before a large energy facility, such as a power plant, transmission line, gas pipeline or storage facility, can be built or operated in the state. The Oregon Energy Facility Siting Council makes decisions about siting most large energy facilities and issuing site certificates. *Energy* serves as staff and coordinates all permits required by state and local government agencies.

    Energy has reviewed an unprecedented number of siting applications in the last two years. The high level of siting activity continues. *Energy* is reviewing additional applications representing more than 3,000 megawatts of power plant capacity and has or expects Notices of Intent for more, half of which will be wind power.

26. **If approved, carefully oversee the construction of Northwest Natural's Sherwood/Molalla pipeline.** NW Natural's proposed natural gas pipeline would run through 60 miles of farmland and sensitive habitat. If the Energy Facility Siting Council approves the pipeline, *Energy* will closely oversee its construction. *Energy* also will contract for assistance to inspect habitat and farmland restoration.

27. **Work with the Energy Facility Siting Council to identify and resolve policy issues raised by some power plant applications.** Among the issues are water supply conflicts and local air quality concerns. Natural gas-fired power plants use tremendous quantities of water, and water use has been raised in several siting reviews. In addition, many members of the public have concerns about siting power plants in areas where they may affect important visual resources or farmland.

28. **Assist the Energy Facility Siting Council to develop rules for evaluating carbon dioxide offset proposals.**
Oregon created the first legislatively mandated standard in the U.S. to reduce carbon dioxide (CO_2) emissions in 1997. The standard requires new power plants and other large energy facilities to avoid or offset a significant portion of their CO_2 emissions. As a result, it encourages developers to build the most efficient plant possible.

    To date, nine energy facilities have met the CO_2 standard, showing that a state can take regulatory action to reduce CO_2 emissions without affecting the competitive position of the region's energy industry. By developing rules for evaluating proposals, the Council will help power plant developers design their projects to continue meeting the standard.

Adequate Supplies and Fair Prices

29. **Encourage appropriate investments in electricity supplies and delivery systems.**
Oregon's investor-owned electric utilities rely in part on short-term purchases of electricity and natural gas, particularly during drought years. In light of recent price hikes, least-cost plans for Oregon utilities should include more long-term acquisitions and rely less on hydro and natural gas resources. *Energy* will encourage strategies that diversify the resource mix and reduce the utilities' reliance on the short-term market. Further, electric transmission lines, natural gas storage facilities and interstate pipelines should expand rapidly enough to support appropriate resource choices for the growing economies in the West. *Energy* is a member of the Western Interconnection Planning Work Group that is studying the need for transmission lines in the West. *Energy* will use the information to help the state Energy Facility Siting Council decide which intrastate transmission lines need to be built in Oregon.

30. **Intervene in wholesale power and transmission ratemaking, proceedings and investigations.**
The spikes in wholesale electric prices have raised concerns that competition may not be functioning effectively. To help prevent wholesale price manipulation, *Energy* will intervene in state and federal proceedings to ensure open access to distribution and transmission systems and limit the influence of the largest market players. *Energy* also will help the state Attorney General pursue refunds when abuses have occurred.

31. **Advocate for retail electric rate designs that encourage appropriate conservation, fuel-switching and load-shifting.**
Average prices of energy from the Bonneville Power Administration and Oregon's electric and natural gas utilities are set to recover past investments. Customers, however, will make the appropriate conservation and fuel-switching choices only if their bills reflect the resulting cost savings in the long run. Appropriate rate design can do that while still charging average prices that recover utility costs.

    The costs of serving electricity load are highest at times of peak system use. Reducing consumption during these periods reduces energy, transmission and

distribution costs, lowering prices for all customers.

Energy will encourage rate designs and programs that provide appropriate conservation, fuel-switching and load-shifting.

32. **Ensure Oregon can provide energy for essential services during supply emergencies.**
Oregon imports all of its petroleum and natural gas and much of its electricity. Supply problems or accidents that affect distribution could create severe or prolonged shortages for Oregonians.

Energy is responsible for Oregon's Petroleum Contingency Plan. *Energy* will review and update the plan and conduct additional drills and exercises to ensure readiness. The revised plan will include:

- A fuel allocation plan so local emergency managers throughout the state can identify fuel needs for essential services and can adopt a fuel allocation plan for petroleum emergencies.
- Development of emergency notification procedures for government, industry and law enforcement responders. The September 11th terrorist attacks showed that all of these groups must work together closely to prepare for and respond to emergencies involving the nation's critical infrastructure.
- A petroleum advisory group will be established to develop policy and direct the state's response to petroleum emergencies.

The Public Utility Commission is the lead agency in planning for electricity and natural gas emergencies. *Energy* will continue to assist in these efforts.

Nuclear Safety

33. **Advocate cleanup actions at the Hanford site that protect the health and safety of Oregonians and the environment.**
The U.S. Department of Energy's (USDOE) Hanford Nuclear Reservation in southeastern Washington is the largest environmental cleanup site in North America. The site contains more nuclear waste than any other place in the United States. *Energy* will continue to work closely with the Oregon Hanford Waste Board, USDOE, Hanford's regulators, stakeholders and tribal governments to implement sound technical and policy decisions regarding the cleanup.

34. **Continue to improve and implement the state's transportation safety plan for radiological materials.**
Energy administers the state's transportation safety program for radiological materials. *Energy* will continue to provide training, maintain equipment and disseminate shipment information to local emergency teams to ensure they can respond effectively to an accident involving radioactive materials. *Energy* also will continue to work with the federal government and other Western states — primarily through the Western Governors' Association — to develop and implement procedures governing the transport of radioactive materials to reduce the likelihood of an accident.

35. **Ensure Oregon is prepared to respond to nuclear emergencies.**
Although the risk of a nuclear emergency in Oregon is low, the consequences of such an event could be severe, particularly for the agricultural industry. *Energy* administers the state's Nuclear Emergency Response Program. The program includes planning response to incidents at the Hanford nuclear site, Energy Northwest's Columbia Generating Station (a commercial nuclear plant on the Hanford site), the decommissioned Trojan nuclear plant near Rainier, and research reactors at Oregon State University in Corvallis and Reed College in Portland. *Energy* will continue regular training and drills with state and county agencies to ensure they are ready to respond if a nuclear emergency occurs. *Energy* also will continue to refine and test execution of the state's comprehensive, coordinated response to an emergency.

36. **Obtain adequate federal funding for Oregon's Nuclear Safety Program at Hanford.**
Oregon's Nuclear Safety Program includes technical review of USDOE's waste management and cleanup plans for the Hanford site as well as emergency preparedness drills and planning activities. Federal funding covers only about two-thirds of the costs. Oregon's independent monitoring of Columbia River water quality and other needed state analysis activities have not occurred recently because of funding shortfalls. *Energy* will work with Oregon's Congressional delegation to obtain additional federal funds to allow *Energy* to adequately address all issues important to Oregon.

37. **Complete cleanup of mines in Lake County.**
Uranium was mined at the White King and Lucky Lass mines in the Fremont National Forest, northwest of Lakeview. Both mines are listed as hazardous waste sites on the National Priorities List. *Energy* is working with the U.S. Environmental Protection Agency (EPA), the Oregon Department of Environmental Quality (DEQ) and Kerr-McGee Corp. to clean up the two mine sites.

In 2001, the EPA issued a decision that spells out how the site will be cleaned up. The EPA, DEQ and *Energy* are negotiating a consent decree through which Kerr-McGee will agree to perform the cleanup work. The cleanup work should be completed in 2003.

State Program Achievements

This section looks at the main areas within *Energy*. Conservation and renewable resource program savings include the results from the Residential Energy Tax Credit and Business Energy Tax Credit programs and many others. Achievements are also included from the State Energy Loan Program, the Energy Resources Division and the Nuclear Safety Division.

Conservation and Renewable Resource Savings

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

The Oregon Legislature in 1975 first set as state goals the promotion of "the efficient use of energy resources" and the development of "permanently sustainable energy resources."

This report describes Energy's conservation and renewable resource programs, including energy loans and gives estimated savings in 2001. These are the total energy savings:

Electricity	5.2	billion kilowatt-hours
Natural gas	145.0	million therms
Oil	8.7	million gallons
Wood & other fuels	1.4	trillion Btu

The savings are from activities since Energy began its programs in 1979. Altogether, the yearly energy savings are 36 trillion Btu — enough to meet the energy needs of 430,000 Oregon homes. Those savings cut energy bills for Oregonians by $397 million a year.

Business Energy Tax Credit

Total tax credits:	**5,827**
Recipients	
Commercial firms	4,604
Manufacturers	727
Farms and ranches	496
Types of investment	
Conservation	4,335
(including 1,504 rental weatherization projects for 46,951 apartments and homes)	
Recycling	984
Renewable resources	508
Energy savings in 2001	
Electricity:	1.2 billion kWh
Natural gas:	68 million therms
Oil:	6 million gallons
Wood and other:	1.4 trillion Btu

Electricity generated in 2001: 677 million kWh

Dollar value of savings and generation in 2001: $145.7 million

Energy offers tax credits to businesses to encourage them to invest in energy conservation, renewable resources, recycling and alternative fuels. The owner of a project may transfer the tax credit to an Oregon business in exchange for cash payment. The project owner may be a public institution.

The tax credit 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 5 percent each

year thereafter. For conservation projects, the energy savings must pay back the investment in one to 15 years.

Among the most recent projects:

- An Arlington ranch earned a $1,640 tax credit for a water-pumping windmill that supplies 325 gallons of water an hour from a 320-foot well. No electricity is needed, saving about 5,000 kilowatt-hours a year.
- Snack food fryers upgraded in Marion County to help meet increased demand for one of its snack products. A tax credit of nearly $42,000 made it possible for the company to invest in high-efficiency equipment that cut natural gas use for frying by about 25 percent.
- In Boardman, a RV park earned a $2,660 tax credit for replacing a propane pool heater with a solar panel system. The project will save more than 1,200 gallons of propane each year, reducing energy use by 72 percent.
- Replacing windows at an apartment complex in Portland reduced heating needs by 16 percent. An $8,881 tax credit helped pay for the project.
- A vineyard that installed a wind machine to provide frost protection for grapes. The wind machine replaced oil smudge pots, saving 2,500 gallons of fuel oil per year. A $5,600 tax credit helped pay for the $16,000 machine.

Residential Energy Tax Credit

Total tax credits:	87,534
Renewable resource systems	
Solar water heating	17,074
Geothermal	1,842
Solar space heating	1,639
Solar electric	225
Wind	32
Hydro	20
	20,832
Appliances	
Clothes washers	32,723
Refrigerators	15,572
Dishwashers	17,377
Water heating systems*	619
Energy-efficient ducts	259
Heat pumps	13
Ventilation systems	1
Drain-water heat exchangers	1
	66,565

*Includes 300 heat pump water heaters installed under the program in the mid-1980s and highly efficient water heating technologies eligible since 1998.

Alternative-fuel vehicles	137

Energy savings in 2001	
Electricity:	60.8 million kWh
Natural gas:	1.1 million therms
Oil:	11,000 gallons

Dollar value of savings and generation in 2001: $4.9 million

As new energy-saving technologies have come on the market, the Legislature has expanded the tax credit to encourage their adoption. Highly efficient appliances, including heating ducts and certain water heating systems, were added in 1998. The program expanded in 2000 to include fuel cells and in late 2001 to include highly efficient furnaces, boilers, heat pumps, ventilation systems and air conditioning systems.

Today, the tax credit is offered to households for the following:

- Up to $1,500 for solar and wind systems; up to $900 for geothermal systems

- A tax credit based on energy savings and cost for highly energy-efficient refrigerators, clothes washers, dishwashers, and certain water heating, space heating, cooling and ventilation systems
- Up to $750 for alternative-fuel vehicles and $750 for charging/fueling systems (a total of $1,500 for hybrid gasoline-electric vehicles)
- Up to $1,500 for fuel cells

State Home Oil Weatherization Program

Energy audits:	41,550
Loans:	4,424
Loan amount:	$11.6 million
Rebates:	10,122
Rebate amount:	$6.1 million
Energy savings in 2001	
Oil:	1.9 million gallons

Dollar value of savings in 2001: $2.3 million

For households that heat primarily with oil, propane or wood, Energy's State Home Oil Weatherization Program offers free home energy audits and rebates for weatherization and heating measures. Homeowners can qualify for low-interest loans to pay for recommended 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 likely in need of weatherization and heating measures.

Energy-Efficient Manufactured Homes

Number of energy-efficient homes manufactured and sited in Oregon since mid-1995: 17,644

Energy savings in 2001

Electricity:	99 million kWh
Natural gas:	177,000 therms

Dollar value of savings in 2001: $6.4 million

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. Federal energy standards are minimal. Energy has worked with the manufactured home industry in the Northwest since 1988 to build energy-efficient homes.

Under a voluntary agreement with Oregon manufacturers, Energy certifies homes that are very efficient. Electrically heated homes that meet the standards are labeled Super Good Cents®; gas heated homes are called Natural Choice™. Compared to homes built to federal standards, these homes have more insulation, more efficient windows and doors, better sealed heating ducts, improved air sealing and a specially designed ventilation system. On average, the homes reduce the energy needed for heat by half.

Under the agreement, Energy:

- Approves design plans
- Inspects homes at the plant
- Troubleshoots for homebuyers and manufacturers on any energy-related problems
- Researches and tests new energy-efficient building practices and materials

About half of Oregonians buying a manufactured home have chosen to buy an energy-efficient model.

Oregon Telework Program

Estimated number of telecommuters: 172,000

Oregonians drove 32 billion miles in 2001 in passenger vehicles, burning about 1.5 billion gallons of gasoline and 0.11 billion gallons of diesel. Telecommuting or telework is a small piece of easing congestion and reducing gasoline use. Energy began a comprehensive program in 1991 to provide information to employers on how to make telecommuting work for their organization. As of year-end 2001, Energy had provided information to some 13,000 Oregon employers and worked one-on-one with nearly 2,500 employers.

Energy works with about 100 businesses a year to set up telework programs for their employees. *Energy* provides on-site training for managers, technical help and incentives. An Internet-based training program for managers and telecommuters is being developed. In addition, *Energy* recently helped establish three technology centers in Clackamas County that will foster telecommuting.

Residential Building Codes

Number of homes built to energy standards	
Single-family	241,000
Multi-family	138,000
	379,000
2001 energy savings	
Electricity:	870 million kWh
Natural gas:	46 million therms

Dollar value of savings in 2001:$99.4 million

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 in the nation to implement a statewide building code that included energy standards. The standards required minimum insulation levels in ceilings, walls and floors. Before that time, most Oregon homes were built with little, if any, insulation. As of year-end 2001, more than one-quarter of Oregon's 1.3 million houses and apartments had been built to energy standards.
Energy submits recommendations to the Building Code Division for cost-effective changes to the standards and provides training and technical help for the building industry and local building departments. Changes to standards for space heating, cooling, ventilation, water heating, lighting and building envelope are scheduled to take effect in 2003. They will reduce energy use 5 percent to 10 percent in new houses.

Commercial Building Codes

2001 energy savings*	
Electricity:	1.2 billion kWh
Natural gas:	12.4 million therms

(*Since 1983)

Dollar value of savings in 2001: $75.3 million

Energy standards became part of the state building code for commercial buildings in 1978. The standards address lighting, heat loss and gain of the building shell, and heating, ventilation and cooling systems.

Energy submits recommendations for cost-effective changes to the standards and provides training and technical help for designers, contractors and local building departments. If proposed changes are adopted, they would go into effect in 2003 and save about 10 percent more energy.

Energy-efficient New State Buildings

Number of energy-efficient new or renovated state buildings: 54

2001 energy savings	
Electricity:	20.6 million kWh
Natural gas:	400,000 therms
Other:	1.1 billion Btu

Dollar value of savings in 2001: $1.5 million

An Oregon law enacted in 1990 requires that new state buildings and major renovations be as energy-efficient as possible — within cost-effectiveness guidelines. The 2001 Legislature established an efficiency standard 20 percent better than building code as part of its package of energy bills responding to the energy crisis.

Energy recommends 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 2001, 54 state buildings had been built or renovated with energy efficiency measures that go beyond code requirements. Average energy savings exceed 20 percent.

Alternative Fuels

Business tax credits	
Vans/trucks (propane or natural gas)	288
Buses (propane or natural gas)	227
Forklifts (natural gas)	54
Cars (natural gas or electric)	41
Fueling stations (natural gas)	17
Residential tax credits	
New gasoline-electric cars	122
New electric vehicles	3
New natural gas vehicles	1
Electric conversions	8
Propane conversions	1
Biodiesel conversions	1
Charging system	1

Vehicles that run on alternative fuels such as natural gas, biodiesel, liquefied natural gas, 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. In 1997, the Legislature expanded the Residential Energy Tax Credit to include alternative-fuel vehicles and fueling systems.

Oregon's first publicly accessible fueling station for compressed natural gas opened in Hillsboro in February 2002. In addition, five fuel vendors are providing biodiesel, oil distilled primarily from soybeans, to fleets throughout the state. As of year-end 2001, the state fleet included more than 220 alternative-fuel cars, including compressed natural gas, ethanol and hybrid vehicles.

Schools

Oregon's electric industry restructuring law 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. *Energy* helps coordinate the program and provides technical help.

Energy also provides training for school staff and construction vendors on building highly efficient, productive and environmentally sound buildings. Energy has funds for schools to help meet the standards. Several school districts also are using construction bid specifications that Energy wrote to ensure that energy-using systems operate correctly from the start.

In addition, *Energy* developed specifications for energy-efficient portable classrooms, which many schools are using to accommodate increasing

numbers of students. The energy-efficient classrooms reduced energy bills 30 percent to 50 percent compared to similar classrooms that meet only minimum standards.

Energy has used federal Rebuild America funds to provide technical assistance for resource-saving projects for schools. Work includes design assistance, training, demonstration projects and technical analysis.

Other Programs

Information from *Energy* is available for building commissioning, energy savings performance contracting, demand-controlled ventilation, resource efficient irrigation, savings for large electricity users, and combined heat and power systems. Energy-saving ideas for businesses and homeowners have been promoted through the annual Energy Awareness campaign.

Energy also works with federal programs that set appliance standards, help industry adopt efficiency practices, promote energy-efficient technologies and support installation of solar energy systems.

Energy Loan Program

Approved by the voters in 1980, the State Energy Loan Program (also known as SELP) has made 548 loans since it began, totaling over $300 million. The purpose of SELP is to promote energy conservation and renewable energy resource development. The program offers low-interest, 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 Energy Loan Program can loan to individuals, businesses, schools, cities, counties, special districts, state and federal agencies, public corporations, cooperatives, tribes, and non-profits. Projects must be in Oregon.

In 2002, the program's first loan was paid in full. The 1981 loan was to the Confederated Tribes of the Warm Springs Reservation. They borrowed $15.3 million to build a 19.5 megawatt hydroelectric plant at the Pelton Reregulating Dam on the Deschutes River. The project was highly successful and will continue to generate electricity for years to come.

Conservation Loans

Of the 350 conservation loans made by the program, 109 have been to businesses, 78 to school districts, 59 to local governments and 29 to state government. Others receiving loans include Oregon colleges and universities.

Renewable Resource Loans

Nearly 200 loans have been made related to renewable resources, with 77 for geothermal, 57 for solar, 28 for hydro, 19 for biomass, 16 for waste heat and one for a wind project.

Energy savings in 2001

Electricity:	438 million kWh
Natural gas:	17 million therms
Oil:	1 million gallons
Wood and other:	12 billion Btu

Besides loans for proven technologies, the program showcases the innovative. One recent loan funded a methane digester that will generate electricity from manure at an 80-acre dairy in Tillamook County. The $350,000 loan is helping solve the environmental problems of handling dairy cattle waste while at the same time providing power for customers of Tillamook Peoples Utility District.

The Energy Loan Program has financed a broad range of conservation and renewable resource investments. Here is a sampling of loans made in 2001:

- $711,250 to the Oregon Institute of Technology in Klamath Falls for lighting upgrades and controls for heating, ventilating and cooling
- $420,683 for lighting improvements at five schools and a boiler upgrade at an elementary school in the Grant County School District
- $115,000 to weatherize a 44-apartment complex in Portland, lowering tenants' electric bills
- $54,408 for wind machines that provide freeze protection at an orchard in The Dalles, replacing oil smudge pots and saving about 15,000 gallons of oil a year
- $49,022 for waste heat recovery from ovens at a restaurant in Portland
- $480,104 for lighting and heating upgrades at the state Employment Building in Salem, using an innovative performance contract that pays for the improvements with guaranteed energy savings instead of the agency's operating budget
- $204,670 for including energy-saving lighting, refrigeration and cooling measures during expansion of a grocery store in Corvallis
- $11.5 million for a 14-megawatt generating system in Linn County to provide electricity and waste steam for a metals processing plant
- $600,000 for Oregon's first publicly accessible alternative fuel station, in Hillsboro, operated by a private investor
- $18,000 for solar water heating and a solar electric system at a home in Chiloquin

The loans are funded by the sale of state general obligation bonds. The program is self-supporting. Borrowers pay the costs of administering the program.

Acquiring Energy Resources

The Energy Facility Siting Process

The Energy Facility Siting Council, a seven-member citizen commission appointed by the Governor and confirmed by the Senate, makes siting decisions for large energy facilities. *Energy* serves as its technical and administrative staff. *Energy* reviews an application for Site Certificate, coordinates the review of other state agencies and local governments, and issues a proposed decision for public comment and Council consideration.

The Council has the authority to exempt proposed developments from its siting authority if certain criteria are met. High-efficiency cogeneration power plants, grain-based ethanol plants and temporary power plants are among those the Council has found to be exempt from siting. These plants have little environmental or community impacts as long as the criteria are met.

The Energy Facility Siting Council uses all relevant state and local criteria in making its siting decision. In addition to their own standards, they apply applicable Oregon Department of Environmental Quality, Division of State Lands, Oregon Department of Fish &Wildlife, Oregon Water Resources and local land use requirements.

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

New Generating Capacity in Oregon

Since 1990, *Energy* and the Council have approved nine applications for large power plants.

Five power plants have been built: Coyote Springs Power Plant, Hermiston Generating Plant, Hermiston Power Plant, Stateline Wind Plant and Klamath Cogeneration Plant. The three most recent approvals have not yet started construction: Umatilla Generating Plant, Port Westward Power Plant and Summit Westward Power Plant. One project, Newberry Crater Geothermal Plant, was cancelled because of insufficient geothermal resources at the site.

Energy has also reviewed an application for the largest natural gas pipeline the Energy Facility Siting Council has considered. The Northwest Natural pipeline through Washington, Clackamas and Marion Counties has reached the contested case phase of the Council's process in 2002.

In June 2002, the Klamath Expansion Project (a temporary 100 MW power plant), owned by PacifiCorp Power Marketing, came on-line in Klamath County. This single-cycle peaking plant will operate when demand and prices are high enough to justify its use. It will eventually become part of a new site certificate facility.

Proposals Under Review

Energy and the Council have been reviewing an unprecedented number of energy facility proposals. Three proposed power plants, the Turner Energy Center in Marion County, the Klamath Generating Project and the COB Energy Facility in Klamath County have submitted applications for a site certificate.

Two power plant proposals, the Coburg Power Project in Lane County and the Morrow Generating Project in Morrow County, were still at the initial Notice of Intent phase late in 2002. One approved site, the Stateline Wind facility, requested an amendment to its site certificate to nearly double the number of turbines and power output at a site in Umatilla County.

One facility went part way through the Council's review, the Grizzly Power Generation Project in Deschutes County. It then withdrew its application for site certificate.

Other developers are investigating possible proposals in Oregon. Wind facilities in Coos, Sherman and Gilliam Counties, a peaking plant in the Portland area and industrial cogeneration proposals are possibly in line for Council review beginning in 2003.

The number of proposed power plants reflects developers' hopes to build for the competitive wholesale electricity market. Capacity for gas and electricity transmission, availability of capital and market prices will affect decisions to build power plants. Not all of the facilities reviewed will be built.

Site Certificates Approved

In 2001, the Council approved site certificates for both the Oregon portion of the Stateline Wind facility and the Umatilla Generating plant. Stateline Wind, built in Umatilla County and Walla Walla County, Wash., is Oregon's largest wind power plant. It was on-line by the end of 2001. The Umatilla Generating plant in Umatilla County, a 550 MW plant fired by natural gas, is owned by Pacific Gas & Electric's National Energy Group.

In 2002, the Energy Facility Siting Council approved site certificates for the Summit Westward Energy Project owned by Summit Energy and the Port Westward Generating Project owned by Portland General Electric. These two Columbia County gas-fired power plants will produce 520 MW and 650 MW respectively.

Amendments

Council amendments to site certificates for existing energy facilities have been reviewed and

approved as well. Northwest Natural's Mist underground gas storage facility in Columbia County was approved for expansion in October 2001. In May 2002, the Council approved a major expansion of the Stateline Wind facility in Umatilla County.

Exemptions

Several high efficiency cogeneration facilities, temporary power plants or biomass fuel plants have been granted exemption from Council jurisdiction. These plants have not yet gone forward because wholesale prices have been too low for them to operate profitably. These include the Columbia River Energy project (43 MW), West Linn Paper project, (between 42 and 94 MW) and the Cascade Grain Ethanol plant in Columbia County.

Administrative Rule Changes

As a result of legislation in the 2001 session, and in response to the energy market upheaval of 2000-2001, the Council adopted a number of rule changes, including a new expedited review process for facilities that meet certain criteria. This process should allow some natural gas power plant proposals to proceed through the review process more quickly if the proposed facility:

- does not need a new water right,
- can dispose of wastewater by transfer to a city or industrial port,
- is on or adjacent to industrial land, and
- does not need significant new transmission lines or gas pipelines.

In addition, the Council's jurisdiction over renewable power facilities was changed from 25 nominal MW to 35 average MW. This will allow additional projects to be built with only county approval. Other changes to Council rules were made to clarify requirements and improve the process.

Model Siting Ordinance

Energy has been working on a model land use ordinance to assist local governments in the siting of energy facilities not under Council jurisdiction. Oregon can expect to see more small energy facilities as technology improves for microturbines, fuel cells and other combined heat and power applications. The ordinance covers gas and electric transmission and distribution lines, cogeneration, wind and solar installations and hydroelectric facilities.

Biomass

Biomass includes plant and other organic matter, and it can provide electricity, heat and transportation fuel. *Energy* publishes annually a directory of Oregon biomass energy facilities and publishes on its Web site information about biomass energy technology, uses and resources in the state. *Energy* also conducts studies, educational events, and provides technical assistance and secures federal funding for Oregon biomass projects. *Energy* is conducting an assessment of forest and agricultural resources for electricity generation and ethanol production in Wallowa, Union and Baker Counties and funding a research project on cellulose-ethanol technology. In 2001, *Energy* published a report on the potential use of Western Oregon forest resources for energy production. *Energy's* tax credits and loans have funded a number of biomass energy projects.

Nuclear Safety Priorities

Hanford Cleanup

Energy continues to work towards a formal role in cleanup of chemical and radioactive waste at the Hanford Nuclear Site. Through meetings and presentations, *Energy* is keeping Oregonians informed about Hanford clean-up decisions. The Oregon Hanford Waste Board held three meetings

in communities along the Columbia River and developed recommendations for protecting the river. *Energy* also serves on the Hanford Advisory Board and as members of the Hanford Natural Resources Trustee Council. National participation includes the National Governor's Association and the State and Tribal Government Working Group.

To protect Oregonians and the Columbia River, Oregon joined a lawsuit against the U.S. Department of Energy (USDOE) in 2002. The lawsuit challenges an internal USDOE order allowing the department to redefine some high-level radioactive waste as incidental low-level waste. Among Hanford's more than 1,500 waste sites are 177 aging underground storage tanks that hold about 53 million gallons of highly radioactive and chemically hazardous waste. At least 67 of these tanks have already leaked more than one million gallons of waste to the soil. Some of that waste has reached the groundwater.

In 2001 and 2002, *Energy* participated with USDOE's Hanford managers, regulators and contractor representatives to develop recommendations for accelerating the Hanford cleanup. The group's recommendations describe how to hasten cleanup at Hanford. The Hanford Site's approach became a model for other proposals from USDOE clean-up sites across the country.

Emergency Preparedness

Energy participates regularly in planning meetings and drills to make sure that the State of Oregon is prepared to respond to an incident at a nuclear facility. *Energy* participated in 11 nuclear emergency preparedness drills and exercises in 2002. The Federal Emergency Management Agency's preliminary review of *Energy's* performance was complimentary.

In the arena of terrorism preparedness, *Energy* worked with USDOE headquarters and Hanford Site staff to integrate the new federal color code warning system into USDOE threat levels. *Energy* also participates in the Oregon Domestic Terrorism Policy and Working Group.

Transportation Safety

Energy leads state agencies in regulating the transport of radioactive materials in Oregon and maintaining an effective capability of responding to a transportation incident. From January through June 2002, there were 83 radioactive shipments in Oregon and no accidents.

Energy contracts with the Oregon State Health Division to provide radiological response training for emergency responders. Through the end of July 2002, 241 firefighters, police officers and paramedics received this training. *Energy* also contracts with Oregon State University's Radiation Center to provide advanced training in radiological response to members of Oregon's regional Hazardous Material Response Teams. State Police officers and emergency responders from other state and local agencies occasionally participate in this training.

Energy has begun discussions with USDOE regarding procedures for the proposed shipment of radioactive waste to Hanford from Ohio and California for temporary storage. Those shipments are expected in late 2002 and early 2003.

Appendix A *Electric Utilities Serving Oregon's Counties*

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, Hermiston Energy Services
Union	Oregon Trail Electric Cooperative, Umatilla Electric Cooperative
Wallowa	Pacific Power
Wasco	Central Electric Cooperative, Wasco Electric Cooperative, Northern Wasco County PUD
Washington	West Oregon Electric Cooperative, City of Forest Grove Power & Light Dept. Portland General Electric
Wheeler	Wasco Electric Cooperative, Columbia Basin Electric Cooperative, Harney Electric Cooperative, Columbia Power Cooperative
Yamhill	West Oregon Electric Cooperative, McMinnville Water & Light, Portland General Electric

Appendix B *Energy Glossary*

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.

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

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

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

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

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

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

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

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.

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—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.

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.

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.

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.

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.

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.

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.