

State of Oregon

Energy Plan 2007-2009



OREGON
DEPARTMENT OF
ENERGY

2007 - 2009
State of Oregon

Energy Plan



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DEPARTMENT OF
ENERGY

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2007-2009 Biennial Energy Plan

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Oregon's Energy Agenda



This Energy Plan continues the progress that Oregon has made over the last five years in reducing our dependence on foreign oil and achieving real energy independence, which has resulted in Oregon emerging as a leader in the development, production and use of renewable energy.

The 2007 legislative session in particular accelerated our efforts to lead the nation in clean energy. Now we not only have the laws, but we have the will and the momentum to achieve this ambitious goal of freeing ourselves of dependence on foreign oil.

One day we will look back on 2007 as one of the most important years for Oregon's environment and quality of life. A year where we advanced policies that will have lasting impacts on the quality of air that our children breathe and the quality of life we all cherish and want to protect for generations to come.

In the absence of federal leadership on this critical issue, Oregon passed laws that will reduce greenhouse gas emissions and establish renewable electricity and biofuels standards.

The renewable electricity standard requires that at least 25 percent of our new energy resources come from renewable sources and when combined with our existing sources of electricity, will ensure that by 2025, over 60 percent of our electricity will come from non-fossil fuel sources. This sends a clear signal to our utilities and energy developers and will spur them to invest in projects that bring renewable energy to market over the next two decades. It also sends a clear signal to the manufacturing sector that Oregon is a favorable place to manufacture renewable energy products.

The biofuels standard capitalizes on Oregon's emerging biodiesel and ethanol markets. Its focus on policies and incentives to create markets for agricultural production and feedstock as energy resources, and has sparked development of biodiesel and ethanol production facilities.

Another important measure taken during the 2007 session establishes greenhouse gas reduction goals, specifically by 2020 to achieve greenhouse gas levels 10% less than 1990 levels and by 2050 to achieve greenhouse gas levels 75% below 1990 levels. These are among the most ambitious reduction goals in the country and puts Oregon in a leadership position in combating global warming.

As Governor, I also created one of the nation's first action plans to combat global warming. In addition to the reduction goals, our plan includes adoption of the strictest standards for tailpipe emission of greenhouse gases and toxic pollutants. Through all of these efforts, we are making significant progress in reducing our dependence on foreign oil, a reliance that has caused spikes in energy costs and real hardship for Oregon consumers and businesses, and improving the quality of our air and our environment so that future generations can enjoy the Oregon we are proud to call home. We are also carving a new economic niche in the industry of green energy, creating economic opportunities for urban and rural Oregon alike.

Our plan is ambitious but achievable and puts Oregon on an aggressive pursuit of energy options that maximize economic, environmental and consumer benefits. I am proud of our work and invite you to learn about the scope of our initiatives, which are outlined in this Energy Plan.

A handwritten signature in black ink that reads "Theodore R. Kulongoski". The signature is written in a cursive, flowing style.

THEODORE R. KULONGOSKI

Oregon's Energy Supply and Demand

The mission of the Oregon Department of Energy (ODOE) is to ensure Oregon has an adequate supply of reliable and affordable energy and is safe from nuclear contamination, by helping Oregonians save energy, develop clean energy resources, promote renewable energy and clean up nuclear waste.

Overview

Conservation

Energy conservation is the foundation of Oregon's energy policy. The Oregon Department of Energy provides information to consumers, demonstrates new energy-saving technologies and offers a variety of programs encouraging Oregonians to conserve energy.

Since 1978, the Department's programs have saved enough electricity, natural gas, oil, wood, and diesel to meet the energy needs of about 677,000 Oregon homes.

Oregonians who have invested in conservation through Department programs save about \$733 million on their annual energy bill.

Renewable Energy

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

ODOE provides tax credits and low-interest loans for renewable resource projects. Large wind, geothermal and biomass facilities also qualify for federal production incentives.

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 by small fuel cells, which can run on natural gas or methane, a biomass byproduct.

Recent additions to Oregon's renewable resource development include approval of more than 700 megawatts of wind power with more than 1,300 additional megawatts under review in the last half of 2006.

Looking to the Future

New technologies, such as wave energy off Oregon's coast, are generating attention and drawing the interest of potential developers.

In July 2006, Ocean Power Technologies filed a permit application for a 50 megawatt wave-power generation project in Oregon. The application is for the first utility-scale, wave-power project in the U.S. World-class wave research is being conducted by Oregon State University. Others who have filed with the Federal Energy Regulatory Commission include Finavera Renewables, Lincoln County, Douglas County, Energetech America and the Tillamook Intergovernmental Development Entity.

The Oregon Department of Energy has heard from developers, researchers and the coastal communities in the discussion of Oregon's potential wave power.

Energy Use and Trends

Oregonians spent nearly \$10 billion on energy annually. This does not include energy used to generate power or to transport natural gas in pipelines. Total energy use in 2003 was 707 trillion British thermal units (Btu), up 9 percent from 1990. However, the per capita energy use in Oregon fell 12 percent from 1990 to 2003, primarily due to reduced industrial energy use and because ocean vessels purchased less fuel in Oregon.

In 2003, gasoline use was 62 percent of transportation energy and 27 percent of total energy use. Gasoline use increased by 13 percent between 1990 and 2003 while per capita use declined by 4 percent. The per capita decline was largely because of the higher efficiency of new vehicles, relative to the fleet of existing vehicles. The number of miles driven per capita was about the same for both years.

2003 Overall Energy Use

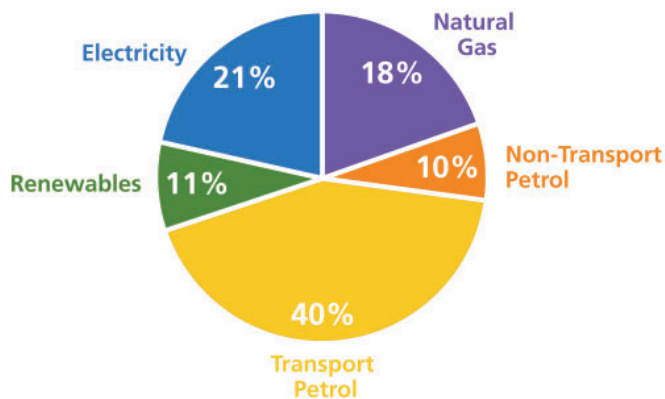


Figure 1: Oregon energy end uses

Fifty percent of the energy Oregon uses is from petroleum products, primarily for transportation. Direct-use renewable resources include geothermal, hogged fuel (bark, sander dust and other wood-related scrap), pulping liquor and wood burned in homes. Figures from 2003

Fuel Price and Use

Petroleum and Natural Gas

Oregon prices for residential heating oil, residential natural gas and regular gasoline increased 129, 84 and 115 percent, respectively, from 1999 to 2005 (prices without taxes). General inflation from 1999 to 2005 increased 14 percent.

Figure 2 shows the Oregon retail prices for residential heating oil and natural gas in dollars per million Btu (without tax) from 1998 through part of 2006. These prices have not been adjusted to remove the effects of general inflation.

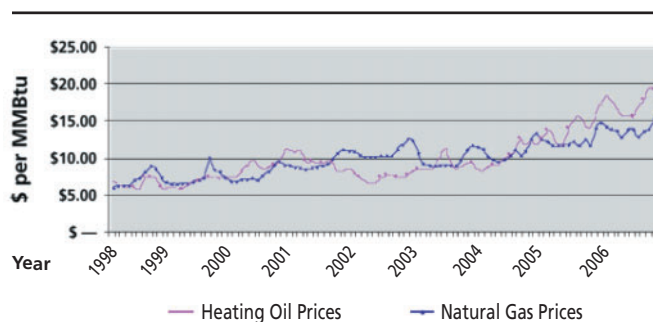


Figure 2: Residential Natural Gas and Heating Oil Prices

This shows the volatility of retail home heating prices.

Prices for these fuels have been volatile and increasing, which is likely to continue given declining supplies of North American natural gas and world crude oil. Oregon prices have followed national trends and will continue to be linked to world oil prices.

Electricity

Depending on hydro conditions, between 7 and 15 percent of Oregon’s electricity is generated from natural gas. 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, multiple year contracts. These measures can be more expensive in the near term, but these tradeoffs are part of the utility least-cost planning process.

From 1999 to 2005, average retail electricity prices rose 32 percent. The increase was 26 percent for residential customers and higher than the average for larger customers. Both investor-owned utilities (IOUs) and consumer-owned utilities (COUs) were affected.

Oregon's IOUs consist of Portland General Electric (PGE), Pacific Power and Idaho Power. The COUs are made up of People's Utility Districts, Rural Electric Cooperatives and Municipal Electric Utilities.

Oregon utilities face substantially higher costs for new electricity resources compared to the costs of existing resources. For 1999 through 2005, residential use grew 2 percent and combined commercial and industrial use fell 12 percent. These values do not include the closure of large aluminum smelters in Troutdale and The Dalles since 1999. Retail electric price increases in 2005 were modest compared to earlier years, in-part because demand growth has slowed.

Due to higher natural gas prices, wholesale electric prices in 2005 were up sharply from 2003. This had only a modest impact on retail prices. Oregon IOUs generate most of their own power.

Oregon COUs buy most of their power through the Bonneville Power Administration which markets power from dams and the Columbia Generating Station (a commercial nuclear power plant at Hanford, Washington).

Fossil Fuel Resources

Petroleum

Supply

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

Figure 3 maps the major sources and distribution of Oregon's petroleum products. Four refineries in the Puget Sound area of Washington provide more than 90 percent of Oregon's refined petroleum products. The Washington refineries transport their products to Oregon and Washington markets via the Olympic Pipeline and barges.

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

The Western Canada Sedimentary Basin is another significant source of crude oil for the refineries. The remaining crude, less than 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 on tanker ships from California and the Pacific Rim countries of Indonesia, South Korea and Japan.

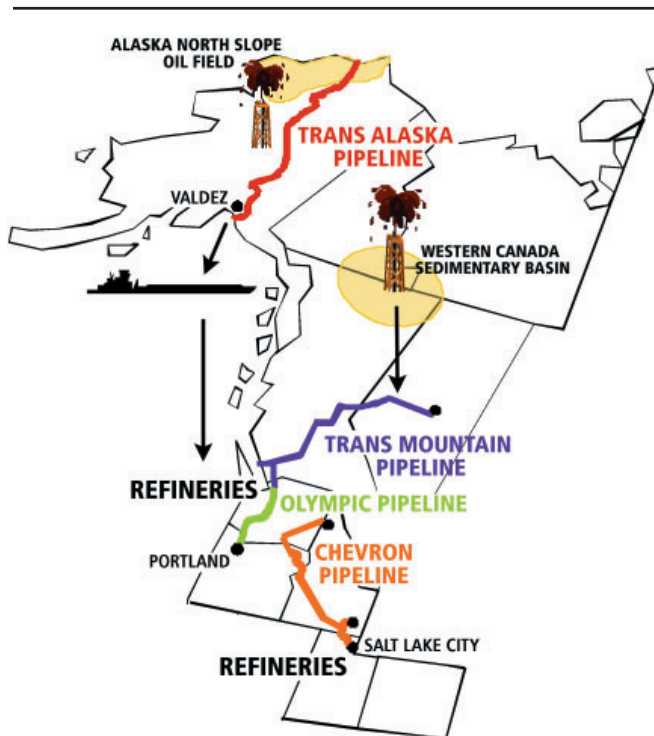


Figure 3: Sources of Oregon's petroleum
 This shows the interconnection of the source, refineries and transportation of Oregon's petroleum. The majority of the crude oil comes from Alaska.

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

In northeastern Oregon, some portion of all petroleum products enters by truck or rail from Pasco, Wash. The Pasco delivery station receives refined product from a pipeline that starts in Salt Lake City, travels through southern Idaho and crosses through northeastern Oregon along Inter-

state 84. In southeastern and southern Oregon, a portion of petroleum products is trucked from Idaho and northern California respectively.

Approximately 170 registered motor vehicle fuel dealers distribute petroleum products statewide from 89 wholesale fuel storage terminals. Oregon has 1,699 fueling outlets or sites, which have 28,440 registered fuel dispensers at those retail and commercial card-lock stations.

Petroleum Contingencies

Growing use of transportation petroleum in the West puts pressure on an already tight supply system. Petroleum supply constraints may result from natural disaster, unexpected infrastructure failure, or extended maintenance of the aging petroleum supply system.

To mitigate the effects of a petroleum supply or distribution emergency, the Oregon Department of Energy (ODOE) maintains the Oregon Petroleum Contingency Plan.

The plan specifies alert and notification procedures as well as actions to assure gasoline and diesel supply to emergency services for vehicles, generators and onsite storage.

The plan identifies fueling locations for emergency service agencies and defines the contract relationships necessary to allow for fuel allocation for critical services during a petroleum supply constraint.

Several conditions of Oregon's supply and infrastructure heighten the need for this planning. Regional petroleum pipeline systems, although well maintained, are three decades old. Petroleum tanker trucks rely on intact roads and bridges. Oil refineries in PADD V all operate at maximum capacity simply to keep up with current demand.

In particular, the Valdez terminus of the Trans Alaska Pipeline System, which supplies 80 percent of the petroleum used in Oregon, can only store up to 386 million gallons of crude oil. This repre-

sents, at most, one week of the main pipeline's current output. Some 1,000 miles of pipelines on the North Slope of Alaska oil fields distribute crude oil from well heads to collector stations that supply the main pipeline.

This pipeline system, completed in 1976, began to show signs of age in 2006 with an unscheduled shutdown of more than half the collection capacity. Additional re-investment in this system, beyond routine maintenance, can be expected and may require more prolonged pipeline shutdowns.

The Puget Sound refineries have operated above 95 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.

Over 90 percent of the petroleum used in Oregon is delivered from the Puget Sound refineries to Portland through a 400 mile long pipeline complex called the Olympic Pipeline, originally constructed in 1969.

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 have been converted to produce only products meeting California Air Resources Board standards. Increasing demand in California for these products makes it less likely these refineries could 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.

Local terminals in the Portland area (Portland Delivery Station) 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. The storage system in Eugene receives petroleum from the Portland Delivery Station through a 97-mile pipeline. The other local storage areas rely solely on tanker trucks for fuel delivery. Fewer than 200 tanker trucks serve Oregon retailers, with truck tanks for 6,000 gallons and trailers of 10,000 gallons each. Local service station availability and retail prices are sensitive to supply, demand and delivery schedules.

Twice during the 2005-2007 biennium, some distributors limited allocations of fuel to service stations. When demand for fuel exceeds the stocks on hand and outstrips the re-stocking rate at distributor's facilities, distributors increase prices and/or limit allocations in order to bring supply and demand into balance.

Typical Oregon service stations store between 25,000 and 40,000 gallons on site, sell between 20,000 to 40,000 gallons per week, and receive delivery of 10,000 to 15,000 gallons two or three times per week. Delays in this just-in-time delivery system, unusual consumer buying (frequent topping off), or limits on the amount delivered, may force service stations to increase price on short notice or to curtail retail hours.

Higher petroleum cost and curtailed retail sales may be expected by consumers in times of diminished petroleum supply or unusual increases in demand for whatever reason. Oregon's planning process anticipates all these considerations and conditions.

Natural Gas

Supply

Oregon imports 100 percent of its natural gas. Oregon receives natural gas from British Columbia, Alberta, Wyoming, Colorado and New Mexico. Two connected interstate pipelines deliver the natural gas (Figure 4).

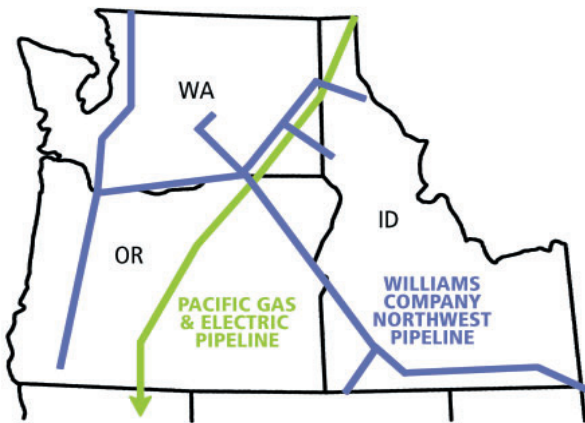


Figure 4: Pipelines serving Oregon

Two natural gas pipelines serve Oregon customers. The Williams Company pipeline and the Gas Transmission Northwest (GTN) pipeline owned by TransCanada bring product from the Rocky Mountains and Canada. The TransCanada line was formerly owned by Pacific Gas and Electric National Energy Group.

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

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

Three natural gas utilities serve Oregon:

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

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

Avista obtains natural gas from the Williams Company's Grants Pass lateral as well as the TransCanada's GTN pipeline and the Medford lateral.

Cascade customers from Madras to Chemult receive natural gas from TransCanada's GTN pipeline. The Williams Northwest pipeline serves Cascade customers from Umatilla to Ontario.

Cascade and Avista either own or have contracts to use natural gas storage facilities.

LNG

To make up for declining domestic production, the U.S. is looking to import natural gas from abroad. Natural gas produced overseas must be liquefied for ocean transport.

It is expensive to liquefy, transport, and then convert to a gas again (regasify), and it will take time to build the tankers and production facilities. One liquefied natural gas (LNG) regasification plant is proposed for the Coos Bay area, known as Jordan Cove. Others are being discussed for Columbia and Clatsop counties (Bradwood and Oregon LNG).

A consortium of pipeline companies has proposed the Pacific Connector Gas Pipeline to transport gas from the proposed Jordan Cove LNG terminal near Coos Bay to the Williams Northwest pipeline near Myrtle Creek and TransCanada's GTN line at Malin, near the California border.

In addition to LNG, two possible new sources could supply the U.S.:

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

These will require huge investments and may take many years to develop. Natural gas prices for Oregon and the U.S. likely will remain volatile even after these new sources are available.

Regulation

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

The Oregon Public Utility Commission (PUC) regulates the rates Oregon's natural gas utilities charge their retail customers. Wholesale natural gas prices are not regulated. Many industrial customers buy directly from the wholesale market.

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

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

Natural Gas Contingencies

A sustained loss of pipelines connecting Oregon to any of its 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

Supply

Figure 5 shows the mix of resources for Oregon's utilities. This also includes biomass self-generation by retail customers and renewable energy certificates (green tags) purchased by customers or on their behalf by their utility.

2005 Oregon Electric Fuel Mix

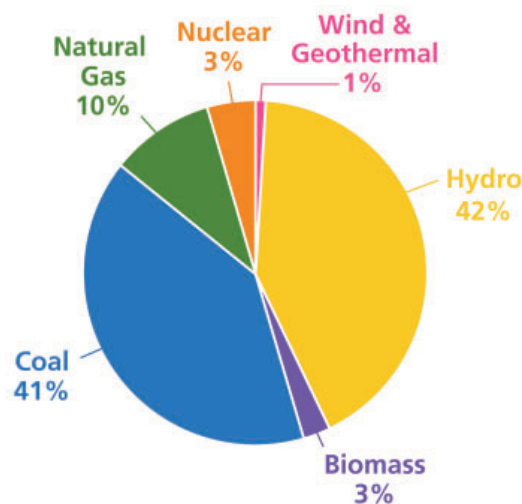


Figure 5: Where Oregon gets its electricity.

Oregon's 2005 fuel mix shows that electricity comes mainly from hydropower and that generated by in-state and out-of-state coal.

Oregon's fuel mix varies based on hydro conditions. For example, natural gas generation in 2003 was 7 percent. This was about half the 2001 level of 15 percent. In 2005, natural gas was 10 percent of supply. In 2001, hydro generation was down and gas generation filled much of the gap.

Coal power comes from Portland General Electric's (PGE) Boardman plant in Oregon and from plants in Utah, Wyoming, and Montana. Nuclear power is from the Columbia Generating Station at Hanford, Washington. The coal percentage includes municipal solid waste generation from the plant in Marion County and generation from petroleum coke.

Biomass refers to generation from pulping liquors at paper factories, wood waste and waste methane gas. Significant new wind facilities have been added since 2001. For the first time, wind generation was greater than one percent of total generation.

Power supply should be adequate for several years, even in a drought. However, adequate resources do not guarantee stable wholesale prices. The West depends on natural gas-fired power plants. If natural gas prices spike, power prices likely will follow.

Conservation

If the Oregon Department of Energy's tax credit programs are any measure, electric energy conservation has increased significantly over the last few years. Since the 2000-2001 biennium, electric energy savings from the Business Energy Tax Credit (BETC) program have quadrupled, and savings from the Residential Energy Tax Credit Program have doubled. This dramatic increase in electric energy savings can be attributed to several factors including:

- Energy prices have increased significantly. Between 2000 and 2005, average Oregon electricity rates increased 28 percent, average

natural gas rates increased 63 percent and retail gasoline prices increased 48 percent. During this same period general U.S. inflation was 13 percent.

- Electricity generation projects, such as co-generation, wind, and solar electricity (photovoltaics), have become more competitive and more people are making the investment.
- Energy efficiency efforts have been expanded, in part because of legislative action. This includes raising the cap on individual projects eligible for the Business Energy Tax Credit to \$10 million, establishing the Pass-through mechanism to allow many non-profits, public agencies, tribes and others to benefit from the BETC, and the creation of the Energy Trust to help fund electric conservation projects of PGE and Pacific Power customers.

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.

The federal Bonneville Power Administration (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. The Oregon Department of 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

The Oregon Department of Energy (ODOE) provides tax credits and low-interest loans for renewable resource projects. Large wind and other types of renewable facilities may also qualify for federal production incentives.

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

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

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

Biomass

Energy Production, Services and Development

Biomass resources include wood, plant and animal waste, other organic matter, or gasses from the decomposition of that matter. In Oregon, biomass provides fuel for generation of electricity, heat and transportation. In 2004, biomass provided 79 trillion Btu of energy or approximately 6 percent of Oregon's total energy supply.

More than 90 percent of Oregon's biomass energy comes from forest or urban woody biomass and paper mill pulping liquor (see glossary). The remaining biomass energy is from landfill and wastewater treatment gas or waste grease and seed oils converted to biodiesel.

The Oregon Department of Energy (ODOE) maintains an inventory of Oregon biomass energy facilities, their biomass use and energy production.

The Oregon Department of Energy assessed forest and agricultural resources in detail for electricity generation and ethanol production in Willamette, Union and Baker counties. The report showed that the use of biomass for electric power or ethanol production would have net economic benefits, including an estimated six jobs created for each megawatt of biomass power capacity that is installed. There is more than 50 megawatts of opportunity in those three counties alone.

ODOE and the State of Montana are collaborating to fund research and prototype demonstration of enzymatic cellulose-to-ethanol production. Current work proves that it is cost competitive on an energy content basis to produce ethanol using Oregon grass seed straw, when petroleum is \$3.50 per gallon. Further development of this enzymatic market, as well as the dilute and strong acid cellulosic conversion technology, is to be undertaken in Oregon. Oregon State University (OSU) has pioneered a new microchannel reactor (engineering on a small scale) that has proven to

substantially reduce biodiesel production costs. ODOE and OSU are identifying ways to accelerate that fuel production market.

Woody Biomass

Biomass facilities produce electricity and heat or steam from wood and fiber-laden pulping liquor at paper mills. About 40 percent of Oregon biomass energy comes from wood waste burned at 49 industrial sites. In addition to producing steam and process heat, ten of these sites generate power totaling about 866,000 megawatt-hours (MWh) of electricity.

Another 46 percent of the total biomass energy comes from combustion of pulping liquor at six pulp mills. Two of these pulp mills produced 310,000 MWh of electricity in 2004.

Most of western Oregon's construction and urban wood waste is separated, chipped and used as a biofuel. Four facilities produced over 100,000 tons of pressed wood logs, wood pellets and char briquettes for mostly residential thermal energy use. An estimated one-half million cords of hard and soft firewood were used for residential space heating in 2004.

Woody biomass markets are growing. These include forest biomass residues from timber harvest at logging landings, reduction of Juniper habitat expansion, and forest thinning. These markets include and rely upon value-added products such as small dimension finished wood, chips for paper or paneling, grape stakes or fence rail, and wood pellets for stoves.

The lower value residue from these markets is used as chipped woody biomass boiler fuel (hogged fuel) in wood products facilities in central and eastern Oregon, and for a dedicated electric energy generation facility in southern Oregon.



Figure 6: Oregon biomass production

Biomass resources include wood, plant and animal waste, and other organic matter.

Biogas from Waste Biomass

Three landfills in Oregon tap waste methane gas to generate 37,000 MWh of electricity and provide industrial fuel, with a fourth under construction in southern Oregon. Another landfill collects gas and sells it to an adjacent nursery for heating greenhouses. Twenty-nine wastewater treatment plants use methane to generate 26,000 MWh of electricity and provide heat for sewage treatment. Two facilities produce about 500 MWh of electricity from cow manure.

Two additional landfills have designed gas recovery and energy generation facilities planned for construction beginning in 2007. Three wastewater treatment facilities were undergoing expansion in late 2006.

Ethanol and Biodiesel Fuels from Biomass and Crops

Biomass can be used to produce biofuels for transportation or stationary equipment. Ethanol and biodiesel are the most commonly used in Oregon. Ethanol is an alcohol fuel primarily distilled from corn. Biodiesel is an ester of alcohol with characteristics of petroleum diesel. Canola, rapeseed, mustard, soy and other crops, along

with waste grease from the food service and food processing industry, can be refined into oil suitable to fuel diesel vehicles and oil furnaces, and to be used as a lubricant.

Ethanol is the main oxygenate additive in Oregon's fuel supply. It is blended with gasoline at a concentration of up to 15 percent. In 2006, Oregonians used more than 95 million gallons, up from 60 million gallons in 2002. This represents just less than 5 percent of Oregon's gasoline supply. The ethanol was produced in the Midwest.

Pacific Ethanol at the Port of Morrow began producing ethanol in 2007. A 100-million gallon per year bio-refinery in Clatskanie will begin production in 2008 using Midwest corn. Oregon's summer nighttime temperatures are too low to grow the high sugar content corn found in the Midwest. Several ethanol production plants are either planned or under construction in Oregon. The plants may use local soft wheat or barley or Midwest corn.

In 2006, Oregonians used more than 1.5 million gallons of biodiesel. A small portion of that fuel is produced from soy and imported from the Midwest. In 2005, a new plant in Salem began producing more than one million gallons of biodiesel, with plans to move to five million gallons per year. This Oregon biodiesel is blended with petroleum diesel as a transportation fuel and to a lesser extent to replace home heating oil. The feedstock is Oregon commercial food processing waste yellow grease with a lesser amount of eastern Oregon grown canola, an oil seed crop of the rapeseed family).

Several other biodiesel facilities ranging from 10-to-40 million gallons per year are planned. The plants could use imported Midwest soy oil and jatropha or palm oil.

Biofuel suppliers are developing an Oregon customer base of public and commercial fleets. In late 2006, Sequential Biofuels opened the first

retail station in Oregon dedicated to biofuels. The Eugene station sells biodiesel-petroleum blends of B-5 (or 5 percent biodiesel), B-20, and B-99. It also sells ethanol-gasoline blends of E-10 (or 10 percent ethanol) and E-85. Oregon is working with California, Washington and fuel suppliers to develop biofuel stations along the I-5 corridor.

The State of Oregon Department of Administrative Services (DAS) buys B-20 for the state fleet and used 150,000 gallons in 2006. The DAS motor pool operates two E-85 fueling stations and fuels all of its flex-fuel vehicles with E-85, exceeding 50,000 gallons of E-85 per year. Flex-fuel vehicles can run on either E-85 ethanol or petroleum gasoline. Numerous other private and public fleets use some blend of biofuels dispensed at their own or cardlock facilities.

Research is currently underway on biofuels from a wide range of Oregon biomass products. In the near future, ethanol may be produced from ligno-cellulosic (plant material) feedstock such as woody forest biomass and grass or wheat straw, orchard or nursery pruning, or other agricultural plant wastes. Biomass based oils, suitable for re-refining into various chemicals and transportation fuels or for use in certain stationary boilers, may be produced at competitive prices using various thermochemical processes.

Geothermal

Geothermal resources include high-temperature (100 degrees Celsius or 212 degrees Fahrenheit and higher) for electricity generation, intermediate-temperature (100 – 50 degrees C) for industrial, agricultural and municipal applications and low-temperature heat pump applications. Most areas of high heat flow are in the Cascades, central and southeast Oregon, and parts of northeast Oregon.

From the beginning of the residential tax credit in 1978 to the end of 2005, about 2,200 ground-

source heat pumps had received a tax credit for space and water heating for Oregon. The City of Klamath Falls uses geothermal energy for its downtown district heating system. Geothermal sources elsewhere in Oregon supply heat for buildings, swimming pools, resorts and industrial uses. All of these applications fall into the “direct use” category, as opposed to geothermal for electricity generation.

Geothermal electric generation could provide important renewable base load generation, a constant source of electricity. Geothermal experts consider the area outside the Newberry National Volcanic Monument to be a commercial prospect for high-temperature geothermal electricity production in the Pacific Northwest. To date, limited exploration drilling has measured temperatures up to 315 degrees C. Interest in commercial power generation is occurring in Lake and Malheur counties as well.

Hydroelectricity

In a normal water year, hydropower meets about 44 percent of Oregon’s electricity demand. “New” large hydro would be a small player in any likely renewable-generation growth scenario. The future of hydropower lies in developing micro-hydro (or “seasonal” hydro), such as piped irrigation systems.

Run-of-the-river technology, which involves no storage and does not reduce river flows, could also make a contribution in many areas of rural Oregon. Several projects, generally ranging from under 1 MW to 12 MW, are currently in the planning and permitting stages on reservoir facilities around the state.

Ocean Wave

Generation of electricity through conversion of ocean current, swell, wave action, tidal gradients,

and thermal gradients is being successfully demonstrated around the world. Most promising applications are offshore use of the consistent rise and fall of swells along deep-water shorelines where there is significant year-round wave action.

A report by the Electric Power Research Institute identified seven sites along the Oregon coast as being potentially suitable for siting a wave energy power plant. Oregon was the site of the nation’s first filing for a commercial wave energy park with the Federal Energy Regulatory Commission (FERC). The FERC has jurisdiction to site wave facilities under the Energy Policy Act of 2005. To date, eight applications for projects proposed by developers and coastal counties have been filed with FERC.

Oregon hopes to replicate the responsible development of wave energy by working with local governments, utilities, state and federal agencies, tribes and others to identify optimal sites and locations.

Ocean wave energy could provide over 500 megawatts of electricity over the next ten years as the industry continues to develop.

Solar

Solar energy is Oregon’s largest renewable energy resource. Northwestern Oregon receives roughly the same solar resources as the national average and that of Europe. The eastern and southern parts of Oregon receive roughly the same annual solar resource as that of northern Florida.

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

Using solar directly in buildings as daylight and heat can improve occupant comfort and reduce

energy needs by 10-30 percent. The life-cycle cost can be lower than conventional energy sources if solar is installed when the building is constructed.

Using solar to heat water can supply about half the hot water for a typical Oregon home. Residents have installed more than 17,600 solar water heating systems in the last 25 years. These technologies continue to improve. Current state incentives mean a solar water heating system can generate energy at a price comparable to conventional sources.

Solar photovoltaics (PV) generate electricity directly from sunshine. Solar electric systems are virtually maintenance free, have power warranties in excess of 25 years and can directly interface with the utility grid.

The world market for solar electric power is doubling every 24 months. With each doubling, the manufacturing cost has fallen by 18-22 percent. Currently, several hundred systems are connected to utilities and a several thousand “off-grid” systems have been installed in Oregon. In addition to supporting market developments, Oregon has recently been able to attract large manufacturers of solar photovoltaic technology.



Figure 7: A bright future for solar energy
This installation of photovoltaic (PV) panels in Eugene is just one example of the use of solar electricity.

Wind

Wind-generated electricity is increasingly cost competitive as the price of natural gas increases, and the federal wind production tax credit continues. Oregon now has several large and many smaller wind projects operating with a total capacity of about 450 MW. Due to the variable nature of wind, the wind machines generate, on average, about a third of the maximum output or capacity.

Many new wind projects and expansions are in various stages of review and development. This development is taking place primarily in the central and eastern Columbia River area and in northeastern Oregon.

Transmission capacity between eastern and western Oregon remains an important barrier for further large-scale development of wind. Integrating such a large wind capacity with variable power output into the power grid is of concern as well. A group of energy stakeholders evaluated this issue in 2006 for the Northwest Power and Conservation Council and BPA. They found, among other things, that the 6,000 megawatts of wind expected to be operational by 2024 should be able to use the region’s existing transmission system.

Smaller locally owned or community-owned wind farms are also under development in various areas of the state. The economics of smaller projects are more challenging due to the higher cost of installing small numbers of utility-scale wind turbines. But local economic benefits are potentially higher with such developments than the large wind farms.



Figure 8: Wind Energy in Oregon
(D.A. Black) Most of the wind development in Oregon is taking place in the northeastern counties

Alternative Transportation Fuels

Alternative 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 various types of biomass (plants and other organic matter).

Following ethanol, compressed natural gas and propane are Oregon's most common alternative fuels. The Cherriots bus fleet in Salem, Rogue Valley Transit serving the Medford and Ashland

area, and parking shuttle busses at the Portland International Airport use mainly natural gas. The State of Oregon operates about 150 compressed natural gas vehicles in its fleet.

Hybrid vehicles, using both a gasoline engine and electric motor, may 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 the electric motor that assists the gasoline engine. The Oregon Department of Transportation, Driver and Motor Vehicle Services Division (DMV), says that as of Jan. 1, 2007 there were 14,291 registered hybrid vehicles. The DMV says the number of hybrids being registered is nearly doubling every year. More than 90,000 vehicles registered in Oregon are capable of using ethanol fuels of up to 85% alcohol content (E-85 flex fuel).

About 140 all-electric vehicles registered for roadway use. Most all electric vehicles are registered as low-speed electric vehicles and limited to operation on roadways with 35 miles per hour maximum speed. Tri-Met's MAX light rail transit system in the Portland area operates on electricity.

Nuclear Cleanup and Emergencies

Nuclear facilities in or near Oregon are: the Hanford Nuclear Site in Washington; the Columbia Generating Station nuclear power plant near Richland, Washington; the shut-down Trojan nuclear power plant near Rainier; abandoned uranium mines in Lakeview; and small university-owned nuclear reactors used for research in Portland and Corvallis.

The Oregon Department of Energy (ODOE) is responsible for overseeing Hanford and uranium mine cleanup; for regulating Oregon's operating

research reactors; and for nuclear and energy-related emergency preparedness.

Hanford Nuclear Site

For more than 40 years, the federal government produced plutonium for nuclear weapons at the Hanford Nuclear Site, located on the Columbia River in southeast Washington. The processes to produce plutonium created huge amounts of radioactive and chemically hazardous wastes.

Production ended at Hanford in 1988, and the 586 square mile site is now home to the world's largest environmental cleanup project. The U.S. Department of Energy (USDOE) owns and operates the site.

The Hanford Site includes more than 1,900 waste sites, ranging from small areas of surface contamination to 177 underground tanks holding more than 53 million gallons of highly radioactive waste. Hanford's tank wastes pose the greatest health and environmental threat.

At least 67 of the tanks have leaked more than one million gallons of highly radioactive waste into the soil. The tank leaks, combined with intentional releases into the soil, have resulted in extensive contamination of the groundwater beneath the site.

Cleanup began at Hanford in 1989. Over the years of cleanup, there have been a number of significant accomplishments and considerable progress in many areas. However, major challenges remain.

The remaining cleanup will take decades and cost tens of billions of dollars. 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 affect 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.

Trojan Nuclear Power Plant

The Trojan Nuclear Power Plant stood on the banks of the Columbia River in Columbia County. Portland General Electric (PGE), the plant's majority owner and operator, permanently closed Trojan in 1993.

In April 2005, the Oregon Energy Facility Siting Council found that PGE had fulfilled all of the requirements of its approved decommissioning plan. There will continue to be demolition of some structures, including the containment building, during the next two years.

The buildings and other structures at Trojan are radiologically clean, but PGE still wants to remove them so that the site can be used for another industrial purpose. The cooling tower was imploded in May 2006.



Figure 9: Trojan cooling tower
The Trojan Nuclear Power Plant cooling tower was imploded in May 2006 as part of the plant's decommissioning.

Lakeview Abandoned Uranium Mines

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

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

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

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 ODOE.

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 a 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.

ODOE works with local, state and federal agencies to ensure the safe transportation of these wastes. ODOE also works to ensure swift and appropriate response to a radioactive material transportation accident, providing training for emergency responders along the transport corridors.

Energy Issues Facing Oregon

Meeting the Challenge of Climate Change

Oregon Strategy for Greenhouse Gas Reductions

In 2004, Governor Kulongoski appointed the Governor's Advisory Group on Global Warming to develop the *Oregon Strategy for Greenhouse Gas Reduction*. This strategy complements the agenda of the West Coast Governors' Global Warming Initiative undertaken by the governors of California, Oregon and Washington to address greenhouse gas emissions at a state and regional level.

Goals

The Governor's Advisory Group on Global Warming also set a number of goals, which became law in 2007 with the Legislature's passage of HB 3543.

The Advisory Group proposed:

- By 2010, arrest the growth of Oregon's greenhouse gas emissions (including, but not limited to CO₂) and begin to reduce them, making measurable progress toward meeting the existing benchmark for CO₂ of not exceeding 1990 levels.
- By 2020, achieve a 10 percent reduction below 1990 greenhouse gas levels.
- By 2050, achieve a "climate stabilization" emissions level at least 75 percent below 1990 levels.

The goals offer a pathway to climate stabilization that requires vigorous action, but also allows time for necessary individual and business adjustments.

Climate Change Integration Group

In 2006, Governor Kulongoski established the Governor's Climate Change Integration Group. The Governor established the Integration Group to continue and expand on the work of the Governor's Advisory Group on Global Warming.

The Governor's charge to the Climate Change Integration Group (CCIG) was to continue and expand on the work of the Global Warming Advisory Group to develop a climate change strategy for Oregon that provides long-term sustainability for the environment, protect public health, consider social equity, create economic opportunity, and expand public awareness.

The Governor asked the Integration Group to address four areas:

- Receive reports from state agencies and other implementers, and make additional recommendations to achieve the goals of the *Oregon Strategy for Greenhouse Gas Reductions*.
- Assess the current state of knowledge about the sensitivity, adaptive capacity, and vulnerability of natural as well as human economic and social systems to climate change in Oregon and prepare recommendations about how the state can become more resilient and adapt to unavoidable changes.
- Stimulate new research programs on mitigation and adaptation strategies in collaboration with the Oregon University System.
- Provide a clearinghouse for sharing information with citizens about climate change impacts and the opportunities in Oregon to address those impacts in an environmentally and economically sustainable manner.

The most immediate responsibility assigned to the group was to make a preliminary assessment of the how the state should prepare for adaptation to the impacts of climate change.

In preparing for a final report to the Governor at the end of 2007, the CCIG included:

- Development of specific recommendations for climate change adaptation strategies, processes, and policies.
- Evaluation of and proposals for economic development strategies for expanding the local production and sales of low-carbon goods and services.
- Development and implementation of a measurement and monitoring system for the *Oregon Strategy for Greenhouse Gas Reductions*.

Western Climate Initiative

In February 2006, five states, including Oregon began a climate change effort, which quickly added new members and is known as the Western Climate Initiative. The Governors of Arizona, California, New Mexico, Oregon and Washington started the joint strategy to reduce greenhouse gas emissions.

Peak Oil and Gas

Much has been written about the concept of “peak oil” in recent years. Peak oil does not mean that no more oil exists. It means that about half the Earth’s supply of oil has been used. Once the peak is reached, global oil production can no longer be maintained or increased. Annual oil production will level out and begin a long-term decline. Production will no longer be able to meet growing demand as it has in the past.

Peak oil typically encompasses the idea of peak natural gas as well. Natural gas follows a production curve similar to oil. World natural gas is expected to peak perhaps a decade or two later than oil. However, the U.S. is expected to experience the effects of declining natural gas produc-

tion sooner than that. North American gas production appears to have peaked in the past few years and, unlike oil, it is more difficult and expensive to import replacement natural gas from overseas — it has to be liquefied for transport and storage and then re-gasified for distribution.

Oil accounts for about 40 percent of the energy we use, and natural gas accounts for another 25 percent. Oil provides virtually all our transportation energy; natural gas heats nearly half our building space and generates 7-15 percent of Oregon’s electricity. In addition, oil and natural gas are used for numerous industrial processes, including as a feedstock for thousands of products such as asphalt, fertilizers, pesticides, plastics, chemicals, paints, medical products, vinyl, and shoes and apparel.

Opinions differ as to when production will peak. Some experts believe the peak is imminent or has already happened. Many believe it will occur before 2020. The most optimistic opinions place the peak around 2030. The primary difference revolves around estimates of the Earth’s ultimately recoverable reserves and the effect of prices in stimulating advanced recovery and development of unconventional resources.

Among the observations are the following:

- Discoveries fell below production in the mid-1980s and have continued to fall. The world currently finds one barrel for every four or more that it uses.
- Higher oil prices and increased drilling have not resulted in increased discoveries. New discoveries have tended to be fewer, smaller, deeper, more remote, and more costly. The largest, most easy-to-find deposits are likely to already have been found.
- About two-thirds of oil-producing nations have already peaked and are in decline, including the U.S., Mexico, and the North Sea (U.K. and Norway). At least two of the

world's five largest fields ever found — Burgan in Kuwait and Cantarell in Mexico — have peaked and begun to decline, and there is concern that Saudi Arabia is having difficulties maintaining production from the world's largest field, Ghawar.

- Estimates of existing reserves are unreliable. Reserve estimates of OPEC member nations were increased about 60 percent in the late 1980s. This was likely due to a link between proved reserves and production quotas. In the past two years, Shell Oil and Kuwait downgraded their estimates of proved reserves by 20 and 50 percent, respectively.

Several forces other than peak oil could also create conditions that would require the U.S. to cut oil use:

- Geopolitical events may affect production of fossil fuels. Most of the remaining oil and natural gas is in nations that are either unstable or hostile to the U.S., and several scenarios could limit productive capacity or output.
- Global warming concerns may force a sharp drop in the production and use of fossil fuels.
- A decline in the value of the dollar could reduce its purchasing power and force the U.S. to reduce its use to levels commensurate with its share of the world population. The U.S. has about 5 percent of the world's population but uses about 25 percent of the world's oil production.

Robert Hirsch, co-author of the highly regarded SAIC (Science Applications International Corporation) report completed for the U.S. government entitled “Peaking of World Oil Production: Impacts, Mitigation, and Risk Management,” concludes that peak oil is going to happen, although the timing is uncertain, and that it could cost the U.S. economy dearly. The report further concludes that to have substantial impact,

mitigation options must be initiated more than a decade in advance of peaking and will cost in the range of \$1 trillion.

While alternatives will be used, they are unlikely to fully replace oil and natural gas. Oil and natural gas have been cheap and easy to produce, but the alternatives will be difficult and expensive to produce. As a result, more capital and energy will have to be allocated to produce alternative sources. In addition, many of the alternatives produce electricity rather than liquid transportation fuels. It could take decades to replace a significant amount of declining oil and natural gas reserves.

In addition to alternative supplies, it will be necessary to increase the efficiency of the energy used. With the peak of world oil production approaching, major improvements in the energy efficiency of cars, homes and buildings, lights, appliances, and industrial processes are needed. In addition, major savings can be achieved by walking and bicycling more often, changing land use patterns to reduce transportation needs, and investing more in long-distance rail and mass transit.

The solution will require a massive effort. It took decades to develop coal, oil, and natural gas into significant energy sources. Energy efficiency and renewable energy technologies will provide jobs and profits in the post-peak oil economy and can serve as an economic development tool for Oregon.

Nuclear and Coal Power Plants

Nuclear Power Plants

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

No new plants have been ordered in the United States since the mid-1980s, following the accident at Three Mile Island in Pennsylvania in 1979 and the Chernobyl disaster in 1986, which raised new safety and environmental concerns about nuclear energy.

The U.S. has 103 operating nuclear reactors at 65 sites in 31 states. They provide about 19 percent of the nation's electricity generation.

One nuclear power plant is operating in the Pacific Northwest — the Columbia Generating Station, owned by Energy Northwest. It is located north of Richland, Washington, and is the only one of five nuclear reactors to be completed after the Washington Public Power Supply System began an ambitious program in the late 1970s to construct five nuclear plants at once.

The Trojan nuclear plant, located about 40 miles northwest of Portland, operated from 1976 until 1992. It was permanently shut down in January 1993 and has since been decommissioned.

Nuclear plants are not likely to be approved in Oregon in the near term. Oregon voters approved an initiative in November 1980 that establishes in law limits on the licensing of a new nuclear power plant. The plant may be licensed only with voter approval and only if a permanent repository exists for disposal of high-level waste produced by the plant.

Below is the text of the Oregon Revised Statutes established by voters:

469.595 Condition to site certificate for nuclear-fueled thermal power plant. Before issuing a site certificate for a nuclear-fueled thermal power plant, the Energy Facility Siting Council must find that an adequate repository for the disposal of the high-level radioactive waste produced by the plant has been licensed to operate by the appropriate agency of the federal government. The repository must provide for the terminal disposition of such

waste, with or without provision for retrieval for reprocessing.

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

Federal Action

The federal government continues to struggle to establish a permanent spent fuel disposal facility. The U.S. Department of Energy (USDOE) is preparing a license application to develop a geologic repository at Yucca Mountain in the Nevada desert north of Las Vegas. However, plans for opening the facility have repeatedly been delayed. USDOE recently revised its schedule for Yucca Mountain to March 2017. Support in Congress for Yucca Mountain remains mixed.

The Bush Administration has proposed federal legislation on the Yucca Mountain repository that would help expedite the siting process, and would also preempt state authority for transportation of spent nuclear fuel and high-level radioactive waste. This preemption disregards 20 years of cooperative planning between the states and USDOE.

Governor Kulongoski has expressed opposition to the legislation. Safe and uneventful transport can be achieved through cooperative planning and enforcement between the states and USDOE. For example, the Oregon Department of Energy (ODOE) has helped lead cooperative efforts to develop and operate a comprehensive national transportation safety program that has seen more than 5,300 shipments travel safely, including more than 300 shipments through Oregon.

The Bush Administration announced in late 2006 that the Hanford Site in Washington State might become a location for storage and processing of commercial high-level nuclear waste. This was in part as a result of the difficulty in opening the Yucca Mountain facility and in part in response to the Global Nuclear Energy Partnership (GNEP). However, Hanford already is extensively contaminated and cleanup will need to continue for the next several decades.

The proposal to develop new reactor or new reprocessing technologies could hamper Hanford cleanup. Trucking additional waste to Hanford would also increase the risk of exposure to Oregonians.

Coal Power Plants

Burning coal involves significant health and environmental impacts. Coal power plants release large amounts of sulfur dioxide, nitrogen oxides and mercury, and contribute significantly to global warming by releasing carbon dioxide. Any new plants will be required to meet standards for these pollutants as well as Regional Haze standards administered by the Oregon Department of Environmental Quality (DEQ).

Mercury

Mercury is a persistent, toxic pollutant. Its emissions can reside in waters and accumulate in fish, which is the primary means of human exposure.

To reduce mercury emissions from coal-fired power plants in Oregon, the DEQ in 2005 adopted regulations stronger than federal mercury rules.

Federal rules establish a cap-and-trade system for mercury emissions and allocate “emission credits” to each state. Owners of coal power plants can either cut mercury emissions or buy credits from plants in other states.

The new Oregon Utility Mercury Rule limits mercury emitted from new plants and sets new mercury standards for Oregon’s only coal-fired electricity generating plant near Boardman in eastern Oregon. The new standards require reduction in mercury from the plant of 90% by 2018. The standards establish maximum annual emissions limits and provide the path to meet the limits. DEQ estimates a cost to the average PGE residential customer of 40 cents per month.

In addition to mercury limits, the Boardman plant is subject to federal Regional Haze rules that require installation of controls to reduce other air pollutants that contribute to haze. These include sulfur dioxide and nitrogen oxide.

Oregon’s new mercury rule will make it more expensive to build and operate new coal plants by requiring advanced technologies to reduce emissions. After 2018, the number of new plants will be limited by restrictions on credits and by a federal cap on combined mercury emissions from both existing and proposed plants.

Carbon Dioxide

Coal power plants are a significant source of carbon dioxide, which contributes to global warming. To reduce the global warming impact,

developers are seeking ways to sequester the carbon released from coal plants.

Geologic sequestration involves the capture and storage of carbon dioxide to prevent its release into the atmosphere. The main method being considered to sequester the carbon dioxide is geologic storage via deep injection into saline aquifers and other structural traps.

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

Energy Policy Act of 2005

The Energy Policy Act of 2005 (EPAct) was the most substantial federal energy legislation since 1992. EPAct contains provisions that affect all sectors of the U.S. energy industry. The driving forces leading to EPAct were the California electricity crisis of 2000-2001, rising natural gas prices, constraints in the electric transmission grid, and the August 2003 East Coast power failure.

There are too many provisions to summarize the entire bill. In addition, several major areas have few or no implications for Oregon. Below is a list of provisions that affect Oregon and Oregonians.

Liquefied Natural Gas (LNG)

The EPAct gives the Federal Regulatory Energy Commission (FERC) exclusive jurisdiction for siting, construction, expansion and operation of LNG terminals and requires FERC to consult with state and local authorities.

The state siting process is pre-empted. However, states may conduct safety inspections and provide notice of any violations to FERC. States also

retain delegated authority under the Clean Air Act, Clean Water Act, and Coastal Zone Management Act.

The Oregon Department of Energy will be reviewing FERC's environmental documentation of LNG terminals proposed for the state.

Renewable Energy

- EPAct re-authorizes the renewable energy production tax credits through 2007 for solar, wind, geothermal, and biomass, and expands it to include landfill gas, livestock methane, and ocean energy. This incentive is critical to attracting renewable energy projects, but the incentive needs to be extended for ten years or more to provide certainty to manufacturers and developers. Extensions have been for one of two years at a time. Adding ocean energy and agricultural and cellulosic biomass could be particularly helpful to Oregon with its abundant ocean and biomass resources.
- Creates Clean Renewable Energy Bonds (CREBs) to finance capital expenditures for renewable energy generation.
- Triples the amount of ethanol to be sold in the United States to 7.5 billion gallons by 2012, representing about 4 percent of transportation fuel. This amount was later increased by President Bush to 35 billion gallons by 2017.
- Provides a small producer biodiesel and ethanol tax credit, and a credit for installing alternative fuel refueling property.

Energy Efficiency

- Provides tax incentives to homeowners and businesses for energy-efficient construction and a variety of energy-efficient purchases.

These federal incentives can complement state tax credits and utility incentives. The combination of federal tax credits, state tax credits, utility incentives, and rising energy prices make many investments in energy efficiency attractive.

- Provides a tax credit to manufacturers of energy efficient appliances, with expectation that the value of the credits will be passed on to consumers in the form of low prices in addition to the energy savings.
- Establishes efficiency standards for a number of energy consuming appliances and equipment. It sets first-time energy efficiency standards for 14 large appliances and raises the efficiency standards for others. States are allowed to set standards for appliances that are not regulated by the federal government.
- It authorizes \$5 billion per year for three years for Low-Income Home Energy Assistance Program (LIHEAP) and \$500 million per year for the Weatherization Assistance Program. These programs help low-income households pay their utility bills and assist states in weatherizing low-income homes. Also authorizes \$100 million per year for the State Energy Program, which funds cost-shared state energy efficiency and renewable energy operations and programs.
- Authorizes U.S. Department of Energy research, development, demonstration and commercial application programs to increase the efficiency of buildings and industrial processes, including fuel cells, turbines, or hybrid power or power storage systems.

Electricity Transmission

- Authorizes the federal government to designate an area as a “national interest transmission corridor” if it is experiencing

electric energy transmission capacity constraints. Initial focus is on 11 western states.

- Establishes an Electric Reliability Organization (ERO) to establish and enforce reliability standards for the bulk-power system. States may adopt additional standards to protect the safety, adequacy and reliability of electric service that are not inconsistent with the ERO standard.
- Requires states and non-regulated utilities to consider standards to make net metering and interconnection services available to any consumer that has an on-site generating facility. They are also to consider offering all customers a time-based rate schedule, such as time-of-use pricing, critical peak pricing, or peak load reduction credits.
- Directs the Federal Energy Regulatory Commission (FERC) to encourage deployment of advanced transmission technologies, including distributed generation.

Transportation Technologies

- Directs the National Highway Transportation and Safety Administration to study the feasibility of significantly reducing fuel use for automobiles by model year 2014. However, the bill does not make improvements to Corporate Average Fuel Economy (CAFÉ) standards.
- Creates a federal/industry partnership to improve aircraft engine and locomotive railroad fuel efficiency.
- Extends funding for the “Clean Cities” program, which promotes alternative fuels and alternative fuel vehicles in designated corridors. The Oregon Department of Energy coordinates this program in Oregon.

- Establishes a program to reduce engine idling in heavy vehicles. This will save fuel and improve air quality. Oregon is already working with truckers and major truck stops to adopt these technologies.
- Provides authority and funding for broad-based research on hydrogen and fuel cell development, hybrid flexible fuel vehicles and plug-in hybrid flexible fuel vehicles.

Oil, Gas, Coal, and Nuclear Energy

- Provides for programs to ensure that nuclear energy remains a major component of the nation's energy supply. Among other incentives, it extends the Price-Anderson Act liability protection through 2025, and provides a production tax credit for new nuclear power facilities.
- Provides tax credits, loans and grants for clean coal research and deployment, including carbon dioxide (CO₂) sequestration.
- Provides a variety of incentives, authorizations and research, and development programs to encourage refinery investments, advanced oil recovery, and production of oil and natural gas from deepwater wells, public lands, oil shale, tar sands, methane hydrates (methane locked in ice), and other sources.

Utility Acts

Repeals the Public Utility Holding Company Act of 1935 (PUHCA). This broadens the ownership of electric generation, transmission, and distribution companies and gas distribution companies to include foreign companies and non-utility private companies. In addition, holding companies will not be limited in the types or size of non-utility businesses in which they invest. PUHCA eliminates the requirement that utility operations be

limited to a single integrated system.

Repeals the provisions of Public Utilities Regulatory Policy Act of 1978 (PURPA) that obligate utilities to purchase electric power from Qualifying Facilities (QFs) at state-established avoided cost rates, provided that the QF has access to competitive wholesale markets for the sale of energy and capacity. No utility is required to enter into a new contract to purchase electricity from or sell electricity to a facility that is not an existing cogeneration facility unless it meets new criteria established by FERC.

Federal Energy Use

- Sets a goal of reducing energy intensity (energy use per square foot) of federal buildings by 2 percent per year from 2006-2015.
- Requires federal agencies to purchase products rated for energy efficiency.
- Extends the Energy Savings Performance Contracts (ESPC) program for federal buildings through 2016.
- Directs new federal buildings to use at least 30 percent less energy than mandated by either the ASHRAE Standard (set by the American Society of Heating, Refrigerating and Air-Conditioning Engineers) or the International Energy Conservation Code (IECC).
- Requires federal "dual-fueled" vehicles to be run with alternative fuel, as opposed to using just gasoline.

Maintaining Hanford Cleanup Progress

The Hanford Nuclear Site in southeastern Washington State is only 35 miles from the Oregon border. Since the extent of contamination problems at Hanford first became public knowledge in 1986, the state of Oregon — through its Department of Energy — has worked for cleanup of the site.

Oregon has a tremendous stake in ensuring the safe and timely cleanup of Hanford. The Columbia River flows through the Hanford Site — including the Hanford Reach, a major spawning area for Chinook salmon and steelhead — then continues downstream past prime Oregon farmlands, fisheries and recreation areas. The threat to the Columbia River from Hanford’s radioactive and chemical wastes is Oregon’s greatest concern at Hanford.

One of the keys to Hanford cleanup is the completion of massive facilities to immobilize more than 50 million gallons of high-level radioactive waste stored in 177 underground tanks. That project is in serious jeopardy. Due to a number of technical issues and other problems, operation of these facilities has been delayed by a decade — to 2019 — and the construction costs have increased to more than \$12 billion dollars.

The delay in getting these treatment facilities built will result in waste staying in the tanks much longer than planned, increasing the risk of further leaks. The huge cost increases have tested the patience of Congress, which has traditionally been supportive of Hanford cleanup funding. Oregon continues to advocate for sufficient funding to complete construction of these facilities so that waste in Hanford’s aging tanks can be immobilized before a tank suffers a catastrophic failure.

In addition to the tank waste, numerous other major challenges remain, including cleaning up extensive groundwater contamination, cleaning up highly radioactive buried materials, and cleanup and

demolition of heavily contaminated buildings.

Despite Oregon’s strong interest in Hanford cleanup, Oregon has no regulatory authority over Hanford cleanup. A Tri-Party Agreement between the U.S. Department of Energy (USDOE), the U.S. Environmental Protection Agency and the Washington Department of Ecology contains the legally binding schedule for cleanup of chemical and radiological wastes at Hanford.

Over the years, the Oregon Department of Energy (ODOE) has attempted to secure a more formal role in decision-making about the Hanford cleanup. While these attempts have so far been unsuccessful, Oregon’s “bona fide interest in Hanford matters” has been recognized and acknowledged by both USDOE and its regulators. Oregon has memorandums of understanding with both the Washington Department of Ecology and USDOE that provide for access to certain information and consultation on certain decisions.

Oregon will continue its aggressive efforts to gain a more formal role in the Hanford cleanup process.

Emergency Preparedness

The Oregon Department of Energy (ODOE) is responsible for planning, preparedness, and response to nuclear emergencies, petroleum disruptions or shortages, and electricity emergencies involving the state’s consumer-owned utilities. ODOE developed and maintains comprehensive emergency plans and procedures to ensure the protection of public health and safety in the event of nuclear or energy emergencies.

During times of crisis, ODOE will direct the state’s overall response to nuclear and energy emergencies from the agency’s Emergency Operations Center (EOC). ODOE will issue emergency notifications, assess the severity of an event and determine the impacts to Oregonians, advise the

Governor on appropriate protective actions for the public, provide timely and accurate emergency information to the public and news media, and seek federal assistance.

To ensure readiness, ODOE partners with industry and government to train decision-makers and emergency responders. ODOE also designs and implements drills and exercises to test federal, state and local coordination in response to nuclear and energy emergencies to ensure a collaborative response.

The Federal Emergency Management Agency routinely evaluates ODOE's Emergency Preparedness and Response Program to ensure the state can effectively protect its citizens from nuclear and energy emergencies that may impact Oregon.

Nuclear Emergency Preparedness

Hanford/Columbia Generating Station

Hanford in south-central Washington contains more nuclear waste than any other site in the United States. Cleaning up the site will take decades. In the meantime, Hanford poses a serious threat to public health and safety. The site covers 586 square miles of desert and is about 30 miles from the Oregon border. A fire, an explosion, or other accident involving any of Hanford's underground waste storage tanks or plutonium manufacturing or storage facilities could cause the release of radioactive materials to the environment endangering Oregonians, the Columbia River, the region's natural resources, and the Northwest economy.

Also located on the Hanford Site is the region's only operating commercial nuclear power plant. An accident at the Columbia Generating Station could cause an airborne radioactive material release to reach Oregon. About 25,000 Oregonians live in the communities of Boardman, Irrigon, Hermiston, and Umatilla that are within the 50-mile nuclear emergency-planning zone for both Hanford and the

Columbia Generating Station.

The state's primary concern with a radioactive release from Hanford or Columbia Generating Station is protecting people from consuming contaminated water or agricultural products and restricting movement of these products into the food chain. Other concerns include the economic and environmental effects from radiation contamination of agricultural and dairy operations.

Trojan

The 791 spent nuclear fuel assemblies from the dismantled Trojan nuclear power plant are stored at the site in 34 large concrete and steel storage containers. The fuel will be stored securely at the plant site until a national spent-fuel repository opens. The federal government plans to construct a repository at Yucca Mountain in Nevada. The project, however, has suffered a number of delays, and is not scheduled to open until March 2017 at the earliest. Portland General Electric (PGE) will be required to maintain a site certificate from the Oregon Energy Facility Siting Council as long as spent nuclear fuel remains at Trojan.

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. ODOE works with Columbia County and PGE to ensure continued preparedness to respond to an emergency at Trojan.

Radioactive Material Transport

For the past decade, the number of shipments of radioactive materials through Oregon has been fairly steady, generally between 250 and 450 such shipments a year. Shipments to and from Hanford are a significant portion and typically travel on more than 200 miles of Oregon highways.

In 1999, the U.S. Department of Energy designated Hanford to receive tens of thousands of truckloads

of waste from other federal cleanup sites around the country. Litigation has prevented those shipments. However, a court settlement has cleared the way for USDOE to begin the shipments once it completes a comprehensive Environmental Impact Statement scheduled for 2008. Without specific information about which sites might ship to Hanford and when, Oregon cannot determine the full impact. Regardless, ODOE will continue its work to ensure that emergency responders along the shipping routes are prepared and equipped to respond to an accident involving any of these shipments.

Energy Emergency Preparedness

The national focus on security of critical infrastructure has significantly increased ODOE's responsibilities in emergency planning, preparedness and response. Protecting the health and safety of Oregonians from severe petroleum disruptions and electricity emergencies involving the State's consumer-owned utilities is the responsibility of ODOE.

ODOE and the Oregon Public Utility Commission (PUC) operate under a Memorandum of Understanding that defines roles and responsibilities in energy emergencies. While ODOE is responsible for petroleum contingency planning and the PUC for natural gas planning, the two agencies have joint responsibilities in planning and responding to electricity emergencies.

ODOE is responsible for providing information to Oregon's consumer-owned utilities while the PUC regulates the State's investor-owned utilities. ODOE and PUC co-chair regular meetings of the Energy Emergency Management Team, a group of industry and local, state and federal agencies to **plan for energy emergencies.**

Petroleum

ODOE continues to expand and restructure its Petroleum Contingency Plan. ODOE works directly with the U.S. Department of Energy's

Office of Energy Assurance, Oregon's petroleum suppliers, law enforcement, other state agencies, and the state's 36 counties to ensure a coordinated response to petroleum emergencies.

ODOE's Petroleum Contingency Plan includes fuel allocation procedures to ensure adequate fuel is provided to the state's emergency and essential services providers even in a worst case oil crisis. ODOE maintains a database of fuel consumption, designated emergency fueling stations, and maps of emergency routes to simplify and speed up the process to apply for and deliver emergency fuel during a crisis.

Electricity

The Bonneville Power Administration (BPA), Pacific Power and PGE have contingency plans for short- and long-term electricity shortages. The PUC approves plans from Pacific Power and PGE.

ODOE and Oregon Emergency Management notify and provide event information to local agencies in case of emergencies.

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

In a short-term emergency, utilities may ask their customers to make voluntary reductions. If necessary, utilities can establish rotating outages (or rolling blackouts) by shutting down individual substations for one or two hours.

Natural Gas

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

Action Plan for 2007-2009 Biennium

The following goals help to achieve the Oregon Department of Energy's mission:

- Meet a significant portion of Oregon's incremental energy needs with conservation and renewable resources.
- Help reduce carbon dioxide emissions through incentives and other programs.
- Regain and maintain progress on key cleanup milestones at the Hanford Nuclear Site.
- Maintain preparedness for the state and counties in the event of a nuclear emergency, a transportation accident involving radioactive materials, or an energy-related emergency.

This two-year action plan seeks to meet the above goals. A number of these actions appeared in the 2005-2007 Plan and are ongoing.

Conservation

Households

1. **Encourage homeowner investments in cost-effective efficiency measures and renewable resources.**

Highly efficient appliances and renewable resources for space heating, water heating 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.

ODOE will continue to update standards and eligible technologies for the state's Residential Energy Tax Credit program and provide information and technical help to Oregonians.

In addition, ODOE will implement a Governor's directive to bring the tax credit application process on-line.

2. **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. Oregon has financial incentives for many of these measures.

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

In addition, the Oregon Department of Energy will continue to train and certify contractors to properly design and seal heating ducts and work with others to develop new incentive programs. ODOE 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, ODOE 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. ODOE will work with Oregon's congressional delegation to advocate for an increase in federal funding for weatherizing low-income housing.

3. Support energy-efficient residential building codes.

Oregon's statewide residential building code includes significant energy-efficiency measures. The Oregon Department of Energy will continue to provide training and technical support for the building industry, local building departments, and building owners. ODOE will assist the Building Codes Division with recommendations from the *Oregon Strategy for Greenhouse Gas Reductions* and the West Coast Governors' Global Warming Initiative to propose upgrades to the energy code.

4. Encourage energy-efficient building practices beyond code levels.

ODOE will pursue technologies and standards of practice that exceed minimum code requirements. "High Performance Homes" represent an emerging market that integrates optimal energy efficiency with on-site renewables. The concept includes a super-efficient building shell, solar equipment, advanced heating and ventilation systems, and electronic controls to help homes approach zero net energy use. ODOE is providing technical and tax credit support to builders of high performance homes.

For the conventional market, ODOE administers the Environmental Protection Agency's (EPA) Energy Star Home program in Oregon. The program requires sealing of heating and cooling ducts, more efficient heat pumps or natural gas furnaces, and improvements to windows and floor insulation.

The Oregon Department of Energy (ODOE) will also encourage more energy-efficient manufactured housing through the Northwest Energy Efficiency Manufactured Housing (NEEM) program. Oregon produces 75

percent of the manufactured homes in the region. ODOE and its NEEM partners work with the industry to design and market NEEM energy-efficient manufactured homes under the Energy Star brand name. ODOE will continue administering the regional program and work to increase market share.

Businesses

5. Encourage businesses to invest in cost-effective energy efficiency and renewable energy.

Oregon offers tax credits to businesses for investments in energy efficiency and renewable energy to help them overcome the higher first-costs. ODOE evaluates the performance of the Business Energy Tax Credit program, identifies priority target markets and implements improvements. ODOE 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.

State code for commercial buildings sets minimum standards that require new buildings to include all practicable energy efficiency measures. ODOE will provide training and materials to code officials, designers, distributors, and contractors to help ensure compliance with the code. ODOE will propose upgrades to the energy code in response to the *Oregon Strategy for Greenhouse Gas Reductions* and the West Coast Governors' Global Warming Initiative. The goal is to save 15 percent over the existing energy code. New technologies and practices make additional cost-effective energy savings possible.

7. Promote building commissioning as standard practice in non-residential buildings.

The building commissioning process ensures that the complex equipment providing lighting, heating, cooling, ventilating and other amenities in buildings works together efficiently. Studies on commissioning show that the practice provides savings of 15 to 30 percent. ODOE continues to lead a project to make commissioning standard practice for public buildings in the Northwest.

In addition to demonstrating and documenting commissioning in 36 buildings, ODOE provides information and commissioning guides.

Industry

8. Apply best practices in Oregon industries and increase efficiency investments.

To remain competitive, industry depends on stable supplies and prices for natural gas, electricity and petroleum. 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. The federal tax structure supports the write-off of energy cost expenditures, while capital investments in energy-efficient or renewable energy technology are recovered through depreciation of equipment. Continued business energy tax credits are critical to support investments in energy efficiency. ODOE will provide Oregon industries with up-to-date information on best practices and help them use the state tax credit.

ODOE will work with Washington and Idaho agencies to provide training and

assessments to industries in the region. The Oregon State University Industrial Assessment Center is a key partner in Oregon's plan.

9. Assist Oregon's largest electricity consumers to invest in energy efficiency.

Oregon law (Senate Bill 1149) allows large electricity consumers to directly invest much of the public purpose charge on their utility bills in energy efficiency and the above-market cost of renewable energy.

Under Senate Bill 1149, PGE and Pacific Power must collect a public purpose charge from both residential and business consumers within their service areas, equal to three percent of the total revenues from electricity services. The law went into effect on March 1, 2002.

Large electric consumers (over one average megawatt or 8,760,000 kilowatt hours a year) may be eligible to self-direct portions of their public purpose charges. The Oregon Department of Energy is directed to review and certify applications by large electric consumers for conservation projects and renewable energy resources. ODOE will continue to certify that the proposed site, investments, and expenses are eligible as provided by law.

ODOE will also continue to provide technical help to Oregon's largest energy-using industries on efficiency opportunities. ODOE will promote all services and incentives available to the largest electricity consumers to encourage industry investments.

10. Assist Oregon's energy efficiency and renewable fuels manufacturers to invent, produce, and sell state-of-the-art services and equipment

Many Oregon businesses invent, design, manufacture, and deliver energy efficiency equipment, including wind energy generators, fuel cells and reformers, inverters for solar electric systems, controls, premium efficiency light fixtures, hybrid vehicle controls, renewable transportation fuels, and more. These businesses are creating jobs and helping Oregon's economy grow. ODOE will help find the latest information, develop networks of experts, and use the state's incentive programs to assist them.

Public Buildings

11. Reduce energy bills for Oregon schools.

Oregon law sets aside funds for improving the energy efficiency of K-12 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. The Oregon Department of Energy helps coordinate the program, provides technical help and quality control, manages a database to track the program, and reports on expenditures and results. Many of the audits already are completed. In the next two years, ODOE will work with the education service districts to implement \$8 million to \$10 million in energy efficiency projects.

In addition, the Oregon Department of Energy (ODOE) manages \$1 million from an overcharge settlement to fund energy efficiency measures in Oregon K-12 public schools served by municipal utilities, people's utility districts, and electric cooperatives. Using separate funding, ODOE will provide

technical assistance for energy audits and project specifications.

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

12. Develop high-performance school buildings.

Through 2005, eight Oregon schools had been built to meet the stringent Leadership in Energy and Environmental Design (LEED) rating. Fourteen more schools have been or are being built to meet federal High Performance Schools standards. For the 2007-2009 biennium, ODOE's goal is to help five schools build to LEED certification and 13 schools to LEED-level standards. These high performance schools will achieve annual energy savings of more than \$200,000.

ODOE will continue training for school staff, construction vendors, administrators and facility managers on the advantages of building high-efficiency, environmentally sound buildings. ODOE provides technical assistance and funding via the State Energy Loan Program and the Business Energy Tax Credit Pass-through to help schools finance high performance energy-efficiency measures and meet the standards.

13. Expand the use of the energy tax credit for governments and schools.

In 2001, the Legislature created the Pass-through provision of the Business Energy Tax Credit (BETC). 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. ODOE will continue to develop partnerships to promote this option for schools and local, state and federal buildings in Oregon. ODOE will coordinate these efforts with the State Energy Loan Program to invest in public building conservation measures.

14. 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 energy code. ODOE works with the state agencies and their design teams to ensure the projects meet the intended goals. Estimated savings for completed buildings are more than \$2 million per year.

15. Help state agencies achieve 20 percent savings in existing buildings

Governor Kulongoski's Executive Order 06-02 requires the reduction of energy use in existing state buildings by 20 percent compared to energy use in 2000. ODOE will continue to provide assistance to state agencies to achieve the 20 percent reduction. ODOE has developed a database to monitor state agency energy use.

16. 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. An energy savings performance contract is an agreement between an energy services company (ESCO) and a building owner.

The owner uses the energy cost savings to reimburse the ESCO and to pay off the loan that financed the energy conservation projects.

ODOE has developed model contract documents for state and local governments and schools. ODOE demonstrated energy savings performance contracting with Oregon State University and several public school districts.

ODOE will work with the Department of Justice and Department of Administrative Services to establish a Request for Qualifications (RFQ) to pre-qualify Energy Savings Performance Contract (ESPC) providers for public projects. ODOE will continue to provide technical and program assistance to public building owners using ESPC.

17. Continue federally funded community energy projects.

ODOE 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.

ODOE plans to continue Rebuild America projects with Oregon State University, Willamette Education Service District, Portland Public Schools, Redmond School District, Canby School District, Salem-Keizer School District, Condon School District, The Dalles Middle School, Oregon Parks and Recreation Department, and the cities of Salem, Bend and Cannon Beach. Using grant funds, ODOE provides technical help with energy savings performance contracting services for universities and K-12 schools.

Transportation

18. Reduce drive-alone commuting.

Reducing vehicle miles traveled and single-occupant vehicles for commuting is the most effective way to cut Oregon's dependence on imported gasoline and diesel. ODOE provides employers with information and incentives for vanpooling, shuttle services, transit passes, ride-sharing matching services and for developing innovative transportation options.

ODOE coordinates the Columbia-Willamette Clean Cities Coalition. The group consists of fleet managers and alternative fuel industry representatives. The goal is to inform fleet managers about the benefits of clean fuels and vehicles, and reducing vehicle miles traveled.

19. Increase purchases of hybrid gas-electric vehicles.

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

20. Foster 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 often cost more than diesel and gasoline. ODOE will continue to provide information, technical help, tax credits and low-interest loans to encourage alternative fuel production and fueling stations in the state. Legislation introduced by Governor Kulongoski (House Bill 2210)

and passed in the 2007 Legislature will add incentives for biofuel production and use.

21. Reduce truck idling.

Interstate heavy-duty diesel trucks idle during rest stops to operate refrigeration units, maintain cab comfort, provide power to domestic appliances and accessories, and perform other functions. ODOE will participate in state and regional efforts to reduce energy use and air pollution impacts of long-duration idling. ODOE will also provide information, technical help, tax credits, and low-interest loans to encourage the reduction of truck idling.

For example, ODOE has approved tax credit and loans for the Lane Regional Air Pollution Authority program to install alternative power units on long-haul diesel trucks and for Shurpower to install plug-in electric service in three Oregon truck stops to eliminate idling. ODOE has also worked with the non-profit Cascade Sierra Solutions to reduce emissions and save fuel for trucks along the Interstate 5 corridor. Their first outreach center opened in Coberg.

Renewable Energy

22. Implement the Governor's Renewable Energy Action Plan.

At the direction of Governor Kulongoski, the Oregon Department of Energy (ODOE) led the formulation of the Oregon Renewable Energy Action Plan. The Plan's purpose is to encourage and accelerate the production of energy from renewable sources, stimulate economic development (particularly in rural areas), and improve the environment. The Plan sets long- and short-term goals for both electricity generation and transportation

fuels. The Plan proposes a number of administrative actions to encourage renewable energy.

In early 2006, the Governor created the Renewable Energy Working Group (REWG), consisting of a wide range of stakeholders. This group has been charged with accomplishing many of the goals outlined in the Renewable Energy Action Plan. ODOE serves as lead coordinator and technical expert for the Renewable Energy Working Group and other working groups focused on wind, geothermal, biomass and ocean power formed to accomplish the goals set in the Plan.

As a result of the Plan and efforts of the REWG, the Governor introduced to the 2007 Legislature a package of bills to boost renewable energy production and use. The Legislature passed many energy-related bills including a Renewable Portfolio Standard, a Renewable Fuels Standard, an increase in Business Energy Tax Credit for renewable energy projects and an increase in the Residential Energy Tax Credit for wind and fuel cell investments.

23. Implement the Governor's Climate Change Initiatives

Governor Kulongoski charged the Climate Change Integration Group with tracking the State's progress on greenhouse gas emission reductions and looking at future economic and societal implications of climate change and global warming. The group met numerous times in 2006 and legislation passed in 2007 created a permanent group called the Global Warming Commission. The staff role is to work with the co-chairs to produce the meeting materials, to develop climate change adaptation strategies and policies for the State of Oregon, and respond to the data requests from the group.

Governor Kulongoski also appointed a Carbon Allocation Task Force to examine the feasibility of, and develop a design for, a load-based carbon allowance standard for Oregon. A carbon allowance standard would reduce total amounts of carbon dioxide and other greenhouse gas emissions due to consumption of electricity, petroleum and natural gas by Oregonians. Staff worked with the group to develop a report on reducing emissions.

The Greenhouse Gas Emissions Interagency Team, created in the Governor's Executive Order No. 06-02, is developing a greenhouse gas emission baseline-assessment and will recommend best practices for reducing these emissions. The Renewable Energy Division provides staff support.

24. Implement a Renewable Portfolio Standard.

The Renewable Energy Action Plan called for an assessment of the feasibility of a state Renewable Portfolio Standard (RPS), which would require all electricity suppliers to gradually increase renewable resources used to supply power needs. In 2006, the Renewable Energy Working Group focused on drafting an RPS proposal for submission to the 2007 legislative session of 25 percent new renewable energy by 2025. The legislation, known as Senate Bill 838 passed the 2007 Legislature and will be implemented by both the Oregon Department of Energy and the Oregon Public Utility Commission.

25. Support working groups evaluating renewable energy options for Oregon.

The Renewable Energy Working Group (REWG) was created from the Governor's Renewable Energy Action Plan (REAP). The 35-member REWG is tackling a list of more

than fifty action items identified in the REAP.

Other groups include the Oregon Biomass Coordinating Group, the Oregon Wind Working Group, the Oregon Geothermal Working Group, and the Oregon Wave Energy Trust. Solar energy and micro-hydro working groups may also be formed. The working groups provide the state of Oregon with a high level of demographically distributed public participation, citizen input and support throughout the decision-making process.

26. Renewable Energy for State Agencies

In 2006, the Governor announced an accelerated goal of 100% renewable energy for State government by 2010. The Oregon Department of Energy will work with a group of State agencies to design the plan to achieve the Governor's goal.

27. Support rural community development through biomass and other renewable resources.

In early 2005, ODOE, the Oregon Department of Forestry, the Oregon Forest Resources Institute and others formed the Forest Biomass Working Group. The group identified biomass energy and value-added forest products markets as crucial to many forest health and restoration projects.

The Forest Biomass Working Group determined that by combining forest and energy industry interests, the potential to break through the forest health-biomass energy market and cost barriers is significantly improved. The Oregon Departments of Energy, Agriculture and Environmental Quality are working with the Farm Bureau and Oregon Sanitary Services Industries to similarly address agriculture and urban biomass opportunities.

ODOE will continue to maintain an inventory of Oregon biomass energy facilities, their biomass use and energy production. Biomass data and resources are listed on the ODOE website. ODOE will provide project-by-project technical assistance to Oregonians developing biomass resources. ODOE also will conduct studies and educational events, provide technical assistance, and secure federal funding for Oregon biomass projects. ODOE's tax credits and loans are expected to fund a number of biomass energy projects.

Biomass includes plant and other organic matter that can be used first and foremost for value-added products with residues used to provide thermal energy, for direct use or conversion to electricity, or to be refined into liquid fuels and organic chemicals.

ODOE identifies the energy resource potential of the various urban, agricultural and forest biomass supplies, sets goals, identifies and addresses market barriers, and helps business, individuals and institutions acquire and/or demonstrate the potential.

Providing research, technical assistance, policy evaluation, financing, grant application assistance and access to incentives has enabled Oregon to capture additional thermal and electrical energy. Since January 2005, newly developed biomass energy supplies provide the equivalent of the annual energy demand of more than 5,000 new homes.

28. Work cooperatively with other agencies to develop biomass and other renewable energy projects.

ODOE participates in Oregon Solutions biomass projects such as the Oregon Sustainable Agriculture Center being developed in cooperation with Oregon State University

and the Lakeview forest biomass project. ODOE involvement includes providing technical assistance, funding and helping project developers apply for grants or other incentives. In 2006, ODOE forged a partnership with the state of Montana, and researchers in that state, to advance the science on enzymatic conversion of grass seed straw to ethanol. The near-term future use of waste Oregon grass and wheat straw for alcohol fuel production looks very promising.

Developing Oregon's biomass resources keeps Oregon energy dollars in the state, significantly reducing carbon dioxide and other greenhouse gas emissions and providing up to six new jobs for every megawatt of electrical capacity added, or every 10 million gallons of biofuel produced.

29. Increase the share of renewable resources serving Oregon's energy needs.

ODOE will continue to provide loans and tax credits in coordination with incentives offered by the Energy Trust and Bonneville Power Administration. ODOE will provide technical support for the Energy Facility Siting Council's review of applications for renewable resource power plants, and provide information and technical assistance to local governments on model siting standards.

30. Support federal incentives for renewable energy generation.

The federal government has discontinued funding for the Pacific Northwest Biomass Partnership, "Million Solar Roofs," GeoPowering the West, and other programs and demonstration projects. Some of this federal support has been discontinued after two decades and the loss of that support will have a significant impact.

Federal energy production tax credits for renewable resources are expanded by the 2005 Energy Policy Act. Recently, the application for those credits was extended through 2008. Production credits for petroleum, coal or nuclear investments were extended for more than a decade. Tax incentives for publicly owned utilities were converted to Clean Energy Renewable Bonds (CREBs). The bonds are only funded through 2008 and are subject to a revenue impact cap of \$800 million.

ODOE will continue to work with Oregon's congressional delegation to reinstate funding for successful programs that are needed now.

31. 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, ODOE is working with the Western Governors' Association and Western states to develop a Western Renewable Energy Generation Information System (WREGIS). The WREGIS will serve as an independent, regional electricity generation tracking system that will issue and track renewable

energy certificates (known as WREGIS certificates).

The system will meet the tracking and verification needs of regulators, utilities, generators, marketers, and other stake-holders in the West. 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.

32. Support customer choice of renewable resource generation.

Oregon law requires Portland General Electric and Pacific Power to provide renewable resource rate options to their residential and small business customers. As of 2005, PGE ranked second in the U.S. in green power sales, and Pacific Power ranked fourth. The utilities regularly provide Oregon households and businesses with information on the environmental impacts and costs of electricity from renewable energy sources compared to fossil fuels. ODOE will continue to work with the Public Utility Commission, utilities, and third-party providers to enhance consumer choice and information programs.

33. Remove transmission barriers to renewable energy development.

Oregon has sizable wind resources. But a scarcity of transmission lines between the resource areas (such as northeastern Oregon) and load centers (urban areas in western Oregon) is a barrier to further development of wind power and potentially for other renewable resources, such as geothermal power.

ODOE will advocate that the Bonneville Power Administration (BPA), other transmission providers and project developers build

the long-distance transmission system needed to support resource development and give renewable resources preferential access to the transmission currently available. BPA's policy on open capacity should give preference to electricity generated from renewable resources.

The Oregon Department of Energy will also urge that electricity system upgrades target renewable resources, including transmission for new, smaller generation that serves local needs. Support will also be provided to develop local renewable resources and combined heat and power generation resources, which reduce the need for transmission.

34. Encourage renewable energy research and demonstration projects.

The work of Oregon's universities and community colleges on renewables helps Oregon businesses gain a national and international leadership role in the renewables market. ODOE will work with the universities and community colleges.

ODOE will work with the Oregon Department of Geology and Mineral Industries (DOGAMI) to establish a statewide database of geothermal systems in Oregon using a Geographic Information System (GIS). The principal goal is to integrate DOGAMI's geothermal data into an electronic format, which will be developed, researched, preserved, displayed, interpreted, and promoted. This information will assist the geothermal industry, state and federal agencies and research institutions in the development of geothermal resources throughout the state.

ODOE encourages continued funding for the University of Oregon's solar resource assessment work and Oregon State University's wave energy research.

35. 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 very 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 energy.

These projects qualify for the State Energy Loan Program and the Business Energy Tax Credit. ODOE 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. ODOE will help the dairy, wood, food, and paper products industries turn wastes or underutilized feedstock residues into renewable resource fuels for highly efficient combined heat and power.

ODOE is working with the Public Utility Commission and others to identify and remove barriers to clean distributed resources. ODOE participates in PUC proceedings seeking to assure that these projects are economically viable.

Establish a renewable energy project feasibility study funding process for private sector projects.

With funds from the Oregon's Attorney General, ODOE will be able to establish a Community Renewable Energy Feasibility fund. This will help businesses, residents, communities and governments evaluate the economic feasibility of potential renewable

energy projects. The funds stem from a series of settlement agreements with energy companies after investigations of allegations of price manipulation and antitrust violations in 2000 and 2001 during the West Coast energy crisis.

ODOE will set up and administer a fund to help private sector developers evaluate renewable energy project feasibility.

Energy Supply

Siting Major Energy Facilities

37. Continue reviewing applications for power plants and proposed Liquefied Natural Gas (LNG) terminals.

Oregon law requires a site certificate before a large energy facility, such as a power plant, transmission line, gas pipeline or natural gas 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. ODOE serves as staff and coordinates all permits required by state and local government agencies.

With the decline of natural gas production in North America developers responded by proposing the siting of liquefied natural gas (LNG) terminals in Oregon. These facilities were subject to Oregon's siting law, however the federal government pre-empted Oregon's siting standards with the Energy Policy Act of 2005. In response, Governor Kulongoski appointed ODOE as the State's lead agency to work with the Federal Energy Regulatory Commission (FERC) to adopt Oregon's rules and standards adopted to assure protection of public health and Oregon's unique environment.

ODOE will continue to review an unprecedented number of siting applications, continuing a trend that began in 2001. ODOE is actively processing more than 1,300 megawatts of wind power projects, a number of biofuel production facilities and discussing potential geothermal projects.

38. 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, local air quality concerns and cumulative air impacts. 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. Standards will be reviewed to address concerns.

Adequate Supplies and Fair Prices

39. Encourage needed 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 renewable energy. ODOE will encourage strategies that diversify the resource mix and reduce the utilities' reliance on the short-term market.

Also, 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. ODOE is a member of the Western Interconnection Planning

Work Group that is studying the need for transmission lines in the West.

40. Intervene in wholesale power and transmission investigations and ratemaking proceedings.

The Oregon Department of Energy (ODOE) will continue to participate in investigations by the State Attorney General to pursue refunds when abuses have occurred. Under the Williams Settlement, ODOE received \$1 million of the \$15 million total. The funds are being used to improve the energy efficiency of schools in Grant, Malheur, Union, Harney, Baker, Klamath, Gilliam, Lane, Tillamook, Columbia and Washington counties.

The spikes in wholesale electric prices have raised concerns that competition may not be functioning effectively. To help prevent wholesale price manipulation, the Oregon Department of 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.

41. Ensure Oregon is prepared to respond to energy-related emergencies.

ODOE will continue to expand and restructure its Petroleum Contingency Plan. ODOE works directly with the U.S. Department of Energy's Office of Energy Assurance, Oregon's petroleum suppliers, law enforcement, other state agencies, and the state's 36 counties to ensure a coordinated response to petroleum emergencies.

ODOE will continue to develop and refine a database with information on fuel consumption, designated emergency fueling stations, and maps of emergency routes in the state to

simplify and accelerate the overall application process for emergency fuel during a crisis. ODOE will also continue to work with its federal, state, local, and industry counterparts to ensure a comprehensive response to electricity emergencies affecting Oregon.

Nuclear Safety

42. Advocate cleanup actions at the Hanford site to protect the health and safety of Oregonians and the environment.

ODOE's Nuclear Safety Division will continue to work closely with the U.S. Department of Energy, Hanford's regulators, the Oregon Hanford Cleanup Board, stakeholders, and with tribal nations to implement sound technical and policy decisions on Hanford cleanup.

The Board provides policy advice to Oregon's Governor and Legislature on a wide range of issues regarding cleanup of the Hanford Site. Part of the Board's mission is to protect the Columbia River and Oregon from possible contamination. The Board is composed of citizens, a representative of the Confederated Tribes of the Umatilla Indian Reservation, Governor's Office representative, state agency representatives and state legislators.

The Oregon Department of Energy will continue to review the cleanup plans proposed by USDOE and provide Oregon's perspective. To help ensure sufficient funding for cleanup, ODOE will involve Oregon's Congressional delegation.

43. Improve and implement the state's plan for safe transport of radiological materials.

ODOE administers Oregon's transportation safety program for radiological materials. ODOE will continue to provide training, maintain equipment and disseminate shipment information to local emergency response organizations to ensure they can respond effectively to an accident involving radioactive materials.

Efforts will also continue with the federal government and other Western states – primarily through the Western Governors' Association and the Western Interstate Energy Board – to develop and implement procedures governing the transport of radioactive materials to reduce the likelihood of an accident.

44. Prepare Oregon to respond to nuclear emergencies.

ODOE administers the state's Nuclear Emergency Response Program. 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. ODOE will conduct regular training and drills with state and county agencies to ensure they are ready to respond if a nuclear emergency occurs.

Investing in Oregon

The 1975 Oregon Legislature set as state goals the promotion of “the efficient use of energy resources” and the development of “permanently sustainable energy resources.” The Oregon Department of Energy (ODOE) is evaluated by the Legislature using benchmarks and performance measures to ensure it meets its goals. What follows is a look at energy savings, renewable energy development and energy safety issues. The numbers track the return on what ODOE invests in communities through programs, policies and people.

Energy Savings and Investments

Conservation is a cornerstone of Oregon’s energy policy because it is the most environmentally clean resource and, over the long run, it is the cheapest. ODOE 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.

This section describes ODOE’s conservation and renewable resource programs, including energy loans, and gives estimated savings and electricity generation in 2005.

Below are the total energy savings, generation, production and displacement from activities since ODOE began its programs in 1979.

Electricity	7 billion kilowatt-hours
Natural gas	221.8 million therms
Oil	9.4 million gallons
Wood and other fuels	1.5 trillion Btu
Gasoline & Diesel	2.6 trillion Btu
Biofuels	21.1 billion Btu

Altogether, the yearly energy savings and electricity generated are 52 trillion Btu or enough to meet the energy needs of 677,000 Oregon homes.

Those savings cut energy bills for Oregonians by \$733 million a year.

Business Energy Tax Credit

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

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

The Business Energy Tax Credit (BETC) is 35 percent of the eligible cost of the project. The tax credit may be taken in one year for projects under \$20,000. For larger projects, businesses take 10 percent of the credit in the first and second years and 5 percent each year thereafter. For conservation projects, the energy savings must pay back the investment in one to 15 years.

The 2007 Legislature increased the BETC to 50 percent for renewable energy projects.

Total number of tax credits:
10,189 — Since the program began

Recipients:	
Commercial firms	8,231
Manufacturers	1,250
Farms and ranches	708

Types of investment:	
Conservation	8,526
Recycling	1,022
Renewable resources	641

Energy savings in 2005:

Electricity	2.2 billion kWh
Natural gas	107.9 million therms
Oil	5.9 million gallons
Wood/other	1.4 trillion Btu
Gas/Diesel	2.5 trillion Btu

Electricity generated in 2005:

1.2 billion kWh

Value of savings and generation in 2005:

\$312.7 million

Among the most recent projects that received a Business Energy Tax Credit are:

- A manufacturer of motor coaches in Junction City completed a \$4,340 lighting upgrade replacing T12 fixtures with efficient T8 fixtures. The project earned a \$1,519 tax credit.
- Midstate Electric Cooperative in La Pine installed a 7kW solar electric system on its new administrative building. The 40 panels are expected to save about \$2,200 annually in electricity. The administrative building was designed to LEED Silver standards. The Co-op also received a Business Energy Tax Credit for lighting upgrades to its new warehouse and vehicle maintenance building.
- The Central Linn School District in Brownsville completed a lighting upgrade throughout the elementary school. Using the Pass-Through Option program, the School District invested \$69,000 and received a cash payment of \$17,580 from their pass-through partner. The pass-through partner received a \$24,129 tax credit.
- A large farm in Pendleton received a \$47,000 tax credit on a \$135,000 project that involved installing three center pivot irrigation systems to replace 12 less-efficient wheel lines. This project will save 156,000 kWh of electricity annually.
- SeQuential-Pacific Biodiesel, LLC built Oregon's first biodiesel processing plant in

Salem and is planning to expand its production capabilities. The facility was made possible, in part, because of loans from the State Energy Loan Program (SELP) and a Business Energy Tax Credit.

- A company in Bend that develops fuel cell systems received a \$1.6 million tax credit for their Research, Development and Demonstration (RD&D) project for fuel cell research.
- A transportation company in Coos Bay installed an Auxiliary Power Unit (APU) on a heavy-duty, long-haul truck and received a \$3,000 tax credit. The APU cost \$8,600.

Residential Energy Tax Credit

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 1997.

The program expanded in 2000 to include fuel cells and in late 2001 to include high-efficiency furnaces, boilers, heat pumps, ventilation systems and air conditioning systems. In 2005, the Legislature increased the solar electric tax credit to \$6,000, which is \$1,500 taken over four years. In 2007, wind systems and fuel cells also went to \$6,000 taken over four years.

Total number of tax credits:

234,895 — Since the program began

Renewable resource systems

Solar water heating	18,047
Heat Pump/Water Heaters	300
Geothermal	2,221
Solar space heating	1,680
Solar electric	642
Wind	40
Hydro	20
Total	22,950

Appliances

Clothes washers	110,591
Refrigerators	19,753
Dishwashers	57,740
Water heaters	1,869
Furnaces and Boilers	15,307
Energy-efficient ducts	2,216
Heat pumps/air cond.	1,750
Ventilation systems	10
Drain-water heat exchangers	88
Total	209,324

Alt. fuel/hybrid vehicles 2,621

Energy savings in 2005:

Electricity	104.1 million kWh
Natural gas	2.8 million therms
Oil	11,000 gallons
Gas/Diesel	464,579 gallons

Value of savings and generation in 2005:

\$12.0 million

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

- Up to \$6,000 (\$1,500 per year) for four years for solar electric (photovoltaic) system; up to \$1,500 for other solar applications 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 and for sealing duct work
- Up to \$750 for alternative fuel vehicles and \$750 for charging/fueling systems (a total of \$1,500 for hybrid gasoline-electric vehicles)

State Home Oil Weatherization Program

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

About 110,000 Oregon homes are heated with oil or propane. Most of them were built before energy standards were part of the building code and are often in need of weatherization and heating measures.

Energy audits:

44,093 — Since the program began

Loans	4,426
Loan amount	\$11.6 million
Rebates	12,573
Rebate amount	6.9 million

Energy savings in 2005:

1.9 million gallons of oil

Value of savings in 2005:

\$4.1 million

Energy-Efficient Manufactured Homes

Unlike homes and apartments built on site, manufactured homes are not subject to Oregon's building code. Instead, federal law governs energy efficiency and other aspects of manufactured homes. Federal energy standards are minimal. ODOE has worked with the manufactured home industry in the Northwest since 1988 to build energy-efficient homes.

Under a voluntary agreement with 20 regional manufacturers, ODOE certifies homes that are very efficient. Homes that meet the standards are labeled Energy Star®. 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, ODOE:

- 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
- Provides marketing assistance

More than 60 percent of Oregonians buying a manufactured home have chosen an energy-efficient model.

Number of energy-efficient homes manufactured and sited in Oregon since mid-1995: 28,947

Energy savings in 2005:

Electricity	150.7 million kWh
Natural gas	1.4 million therms
Value of savings:	\$12.6 million

Transportation Program

ODOE works with business and public entities to increase use of public transit, carpools, vanpools, car sharing and bicycles. The Oregon Department of Energy encourages adoption of telework, employer financial incentives, transit passes, shuttle services, ridesharing matching services and innovative initiatives to change travel behavior through customized educational programs.

Project Type	Vehicle Miles Reduced
Commuter Pool Vehicles	25,536,846
Transportation Management Association	65,336,948

Transit Passes	289,223,988
Transit-Shuttles	894,729
Transit Providers	59,899,023
Transportation RD&D	91,467,924
Financial Incentives	43,346,625
Bicycles	2,894,777
Telework	8,129,587
Car Sharing	2,437,352
Total:	589,167,799

Residential Building Codes

The cheapest and most effective way to ensure a home is energy-efficient is to build it that way. In 1974, Oregon became the first state to include energy standards in a statewide building code. The standards required minimum insulation levels in ceilings, walls and floors. Before that time, most Oregon homes were built with little, if any, insulation. Almost one-third of Oregon's 1.4 million existing houses and apartments are built to energy standards.

The energy standards have been raised several times since then. Changes to standards for space heating, cooling, ventilation, water heating, lighting and building envelope took effect in 2003. The changes will reduce energy use 5 to 10 percent in new houses. A home built today requires about half the energy to heat as a home built before the energy standards.

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

Number of homes built to energy standards

Single-family	321,000
Multi-family	<u>164,000</u>
	484,000

2005 energy savings

Electricity	1,051.1 million kWh
Natural gas	72 million therms
Value of savings:	\$166.2 million

Commercial Building Codes

Building envelope along with heating, ventilation and air conditioning (HVAC) standards became part of the state building code for commercial buildings in 1978. The standards address lighting, the heat loss and gain of the building shell, and the efficiency of heating, ventilation and cooling systems. The standards were raised in 1988, 1995, and 2003. Changes that took effect late in 2003 are estimated to save about 10 percent more energy than the previous code.

The Oregon Department of Energy submits recommendations for cost-effective changes to the standards and provides training and technical help for designers, contractors and local building departments. Oregon's commercial code is about 5 percent more energy-efficient than the national standard.

2005 energy savings*

Electricity	1.6 billion kWh
Natural gas	15.0 million therms
(*Since 1983)	
Value of savings:	\$120.8 million

Large Electric Consumer Public Purpose Program

Under Senate Bill 1149, Portland General Electric and Pacific Power must collect a public purpose charge from both residential and business consumers within their service areas. The public purpose charge is three percent of the total electric costs charged to a customer. It went into effect on March 1, 2002.

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

Projects completed 112

2005 energy savings

Electricity	161.6 million kWh
Value of savings:	\$6.7 million

Energy-Efficient New State Buildings

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

ODOE recommends 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 2005, nearly 100 state buildings had been built or renovated with energy efficiency measures that go beyond code requirements. Average energy savings exceed 20 percent.

Energy-efficient new or renovated state buildings: 98

2005 energy savings

Electricity	32.1 million kWh
Natural gas	700,000 therms
Other	30.1 billion Btu
Value of savings:	\$3.1 million

Alternative Fuels

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 addition, hybrid vehicles and efficient truck technologies including truck stop electrification projects are 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. Hybrid vehicles have rapidly increased in market share since being introduced in the late 1990s.

Oregon's first biofuel production facility became operational in 2005 with a small commercial used cooking oil-to-biodiesel plant in Salem. Several private and public fleets are using blends of biodiesel.

The State of Oregon's Department of Administrative Services has locations in Portland and Salem dispensing E85 blend of ethanol. There are four retail locations also dispensing E85.

Business tax credits

Vans/trucks (propane or natural gas)	336
Buses (propane or natural gas)	262
Forklifts (natural gas)	57
Cars (natural gas or electric)	216
Fueling stations (natural gas)	30

Residential tax credits

New gasoline-electric cars	2,584
New electric vehicles	5
New natural gas vehicles	2
New propane vehicles	1

Electric conversions	15
Propane conversions	4
Biodiesel conversions	3
Charging systems	7

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. The Oregon Department of Energy (ODOE) provides technical oversight for the energy audits and projects to ensure consistency statewide with the program guidelines.

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

Buildings completed since 1997: 717

Total incentives: \$6.2 million

2005 energy savings

Electricity	71.1 million kWh
Natural gas	5.7 million therms
Oil	121,000 gallons
Other	35.0 billion Btu
Value of savings:	\$11.4 million

High Performance Schools

The Department offers technical assistance for the design of energy and resource efficient new school facilities. A High Performance School facility features energy and water efficiency measures, an enhanced learning environment through natural

daylighting, good indoor air quality and improved occupant comfort. These facilities are easy to maintain and operate and therefore provide long term operational savings. Schools are 30 percent more efficient than the current Oregon energy code.

Schools completed since 2002: 18

Total incentives	\$1.5 million
Total energy savings	23,534 MMBtus
Annual energy savings	\$310,000

Williams Oil Settlement

The Oregon Department of Energy (ODOE) received \$1 million in Settlement Funds, for funding energy efficiency measures in Oregon K-12 public schools served by consumer-owned utilities. ODOE has provided energy audits for 21 schools and technical assistance for completing energy efficiency projects in 9 schools.

Schools completed since 2004: 9

Total incentives:	\$60,000
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2005 Energy Savings

Electricity:	584,000 kWh
Natural gas:	1,608 therms
Value of energy savings:	\$42,199

Other Programs

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

ODOE 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 Loans

Approved by the voters in 1980, the State Energy Loan Program (SELP) has made about 700 loans since it began, totaling \$335 million. SELP's purpose is to promote energy conservation and renewable energy development. The program offers fixed-rate, long-term loans for projects that:

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

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

Conservation loans

Of the 466 conservation loans made by the program through 2005, 202 have been to businesses, 82 to school districts, 61 to local governments and 35 to state government. Others receiving loans include private residences, Oregon colleges and universities, and tribal governments.

Renewable resource loans

Through 2005, SELP made 217 loans for renewable resource projects, including 77 for geothermal, 68 for solar, 30 for hydro, 20 for biomass, 16 for waste heat and one for wind.

Energy Savings and Generation in 2005:

Electricity	447.5 million kWh
Natural Gas	16.34 million therms
Oil/Diesel	1.46 million gallons
Wood/other	17.4 billion Btu
Electric Generation	545.74 million kWh
Fuel	21.14 billion Btu

Value of savings and production: \$80.56 million

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

- A \$600,000 loan funded a new heating and cooling system including digital controls for the historic Portland Hollywood Theater building.
- A Willamette Valley poultry grower borrowed \$50,000 to install radiant heat units, upgraded ventilation fans, and increased insulation for walls and ceilings.
- The Lane Regional Air Pollution Authority used an \$860,000 loan to install auxiliary power units in long-haul trucks to reduce diesel fuel use and exhaust emissions when idling.
- Three private residences took advantage of the loan program to install solar electric, solar thermal and micro-hydro systems with loans totaling \$98,000.
- With a loan for \$1.4 million, the Pronghorn golf resort in Eastern Oregon installed a 157.5 kW photovoltaic system to power irrigation needs and community lighting.
- Agri-Plas, Inc., an agricultural plastics recycler in Brooks, used a \$1.6 million loan to construct three new buildings thus expanding their capability to accept increased amounts and more varied recyclable materials.

- OnTo Technology in Bend is recycling lithium batteries at a pilot facility built with a \$99,000 energy loan.

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. The Oregon Department of Energy (ODOE) serves as its technical and administrative staff. ODOE 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 exempted from siting standards.

The 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 (DEQ), Department of State Lands, Oregon Department of Fish and Wildlife, Oregon Water Resources and local land use requirements. Only DEQ’s federally-delegated water and air quality permits are excluded from Council review.

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 requirements. A siting decision can only be appealed to the Oregon Supreme Court. Oregon’s consolidated siting process is a powerful tool for state consideration of these complex proposals.

New Generating Capacity in Oregon

Since 1990, ODOE and the Council have approved nine applications for large power plants. Six power plants have been built: Coyote Springs Power Plant, Hermiston Generating Plant, Hermiston Power Plant, Stateline Wind Plant, Klamath Expansion Project and Klamath Cogeneration Plant. The Port Westward Power Plant began operation in early 2007.

Proposals Under Review

The Council is actively reviewing site certificates applications for renewable energy and fossil fuel plants. Applications for renewable energy projects have dominated the Council's agenda for most of 2005, with hundreds of megawatts approved.

At present, ODOE is reviewing an application for a 750-to-900 megawatt wind farm in Gilliam and Morrow counties (Shepherds Flats), a 279-megawatt wind farm in Gilliam County (Leaning Juniper) and a 60-megawatt wind farm in Wasco County (Cascade Wind).

The Council has begun review of the Lower Columbia Clean Energy Center, a 520-megawatt coal-fired project proposed for the Port Westward Site. The new generation design is known as an integrated gasification combined cycle or IGCC energy facility.

Site Certificates Approved

The Council approved two renewable energy projects in 2005 that have the potential to produce more than 700 megawatts wind power. The Biglow Canyon project, at 450 MW, was purchased by Portland General Electric from the original site certificate holder. PPM was awarded a site certificate to add 272 megawatts at its Klondike III wind project near Wasco.

Amendments

The Council approves multiple amendments to energy facility siting certificates, ranging from ownership changes to fundamental design changes.

The Council processed changes to several wind projects, including the Stateline Project, the Klondike III Project and the Biglow Canyon Project.

Exemptions

The Energy Facility Siting Council has recently granted seven exemptions for renewable energy facilities. Those include the Cascade Grain ethanol plant near Clatskanie and the Pacific Ethanol plant near Boardman, the proposed Treasure Valley ethanol plant near Ontario, and the Altra Ethanol and Oregon Ethanol facilities, both located at the Port of Morrow near Boardman.

Administrative Rule Changes

In late 2005, the Council directed ODOE to update the administrative rules to more clearly incorporate renewable energy projects and to update the monetary offset rate applied to emissions of carbon dioxide from facilities that burn fossil fuels.

Renewable Energy and Alternative Fuels

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

New technologies, such as wave energy off Oregon's coast, are generating attention and drawing the interest of potential developers.

In July 2006, Ocean Power Technologies filed a permit application for a 50 megawatt wave-power generation project in Oregon. The application is for the first utility-scale, wave-power project in the U.S. World-class wave research is being conducted by Oregon State University. The Oregon Department of Energy has heard from developers, researchers and the coastal communities in the discussion of Oregon's potential wave power.

Powering vehicles with natural gas, electricity, methanol, ethanol, propane or hydrogen can improve air quality and conserve petroleum. The Oregon Department of Energy provides tax credits, loans and technical advice to spur investments.

Renewable Energy Division

To meet the growing interest and development of renewable energy, the Oregon Department of Energy (ODOE) reorganized and created a Renewable Energy Division on July 1, 2005. The mission of the Renewable Energy Division is to encourage greater use of renewable energy and alternative fuels in Oregon. Policies that increase usage and attract renewable energy manufacturers are the focus of the Division.

The Renewable Energy Division is the lead division within the Department of Energy for implementing the Governor's Renewable Energy Action Plan (REAP). The plan is designed to encourage production of energy from renewable sources, demonstrate a variety of technologies, and remove barriers. Renewable resource development provides energy independence, helps protect Oregonians from high-energy prices, and promotes economic growth.

In the 2005-2007 biennium, the division staffed the 35-member Renewable Energy Working Group (REWG), which is implementing the REAP, and three subcommittees focusing on biofuels, economic incentives and community-scale development. Among the tasks being

worked on by the REWG is a proposal to develop a Renewable Portfolio Standard.

The division is also the lead for implementing those portions of the West Coast Governors' Climate Change Initiative that pertain to renewable energy and alternative fuels, and the Report of the Governor's Advisory Committee on Global Warming.

In the 2005-2007 biennium, the division staffed the Governor's Advisory Group on Global Warming, the Carbon Allocation Task Force, the Climate Change Integration Group, and various subcommittees.

The 2007 Legislature created the Global Warming Commission, which the division will also staff.

The Renewable Energy Division brings together technical experts and policy advisors, who focus the Department's efforts on developing renewable energy projects. This includes helping customers use the State's tax credit and loan programs, streamlined siting process, federal funds, and utility and other incentives.

ODOE has already helped finance small hydro-electric power plants, solar-powered pumping systems for livestock watering, cogeneration power plants at paper and lumber mills, methane digesters that generate electricity from manure, and wind machines to protect agricultural crops from frost.

Recent projects include:

- Pronghorn Investors, LLC is installing a large solar electric (photovoltaic) array in Bend. The project consists of 900 modules and was awarded a SELP loan of \$1.4 million.
- SeSequential-Pacific Biodiesel, LLC built Oregon's first biodiesel processing plant in Salem. They received an \$861,000 loan from the State Energy Loan Program.

- Carson Oil of Portland plans to modify its fueling station so it can sell B20 and B99 blends of biodiesel. Carson expects to displace about 700,000 gallons of diesel annually.
- In 2006, the Jackson County Fairgrounds dedicated its new solar pavilion. The solar panels are a 24 kW system, which generates about enough electricity for three homes. The Oregon Department of Energy, Pacific Power and several Southern Oregon businesses, including SierraPine-Medite, Harry & David, Timber Products, Eastman Kodak, Asante Health System, CertainTeed, Boise Building Solutions, Providence Medford Medical Center, Cascade Wood Products and S&B James Construction worked together on the project.

Nuclear Safety

Hanford Cleanup

From the beginning of Oregon's involvement at Hanford, it was clear that the most likely threat to Oregon was contaminated groundwater entering the Columbia River. Groundwater was not initially a top priority for the U.S. Department of Energy (USDOE) or the regulators. Oregon's steadfast insistence that contaminated groundwater should be a priority at Hanford ultimately elevated the issue with the regulators and USDOE.

Oregon's position has consistently been that action needs to be taken to keep contaminants out of the river and to eventually clean up the groundwater and return it to beneficial use. ODOE's technical reviews and policy recommendations continue to help shape the direction of groundwater cleanup.

Oregon is now seeing some focused attention towards resolving some of the groundwater contamination problems. A number of new

technologies are being tested at Hanford to contain several groundwater plumes and keep them from entering the Columbia River.

Hundreds of abandoned wells have been sealed that were providing a pathway for surface water to enter the subsurface and push the contamination deeper.

Efforts are also underway to identify and remove previously unknown sources of chemicals and radionuclides (such as plutonium and uranium) that have contributed to the groundwater contamination.

ODOE does not view all cleanup decisions by USDOE as fully protective of the environment.

In July 2004, ODOE exercised its rights as a Trustee of Hanford's natural resources by joining with the state of Washington to file a notice of intent to sue USDOE over its failure to adequately assess natural resource injury.

In July 2006, Oregon moved forward to intervene as a plaintiff in this litigation, which was previously filed by the Yakama Indian Nation and joined by the State of Washington.

Transportation Safety

ODOE regulates the transportation of radioactive materials in Oregon and helps maintain an effective capability of responding to a transportation incident. Since January 2005, there have been more than 530 radioactive shipments in Oregon and no accidents.

ODOE contracts with Oregon State Health Services to provide radiological response training for emergency responders. Since January 2005, about 1,245 firefighters, police officers, paramedics and hospital emergency room staff received this training.

ODOE also provided advanced radiological response training in 2005 and 2006 to members of Oregon's regional Hazardous Material Response Teams through its contract with Oregon

State University's Radiation Center.

In addition, OSU routinely calibrates and maintains the radiation detection equipment provided by ODOE to local emergency response agencies.

ODOE continues to support shipments of transuranic waste from the Hanford Site to the Waste Isolation Pilot Plant in New Mexico. Since these shipments began in July 2000, USDOE has successfully made 308 such shipments (163 since January 2005). The Oregon Department of Transportation stops and inspects a sampling of these shipments.

Trojan

Decommissioning of the Trojan nuclear power plant is complete. In April 2005, the Oregon Energy Facility Siting Council found that Portland General Electric (PGE) fulfilled all of the requirements of its approved decommissioning plan.

PGE performed a final radiological survey that demonstrated radioactive contamination from plant operations had been removed from the site. The final survey demonstrated that the Trojan site meets all standards for unrestricted use.

There will continue to be demolition of some structures, including the containment building, during the next two years. The buildings and other structures at Trojan are radiologically clean, but PGE wants to remove them so that the site can be used for another industrial purpose.

The cooling tower implosion of May 2006 was one important step. These activities are relatively standard industrial demolition. They pose no public hazard because the concrete is free of radiological or other hazardous material.

Cleanup of Abandoned Uranium Mines

Uranium was mined at the White King and Lucky Lass mines in the Fremont National Forest,

northwest of Lakeview. Cleanup of the abandoned mines was mostly completed in 2006.

The U.S. Environmental Protection Agency (EPA), the Oregon Department of Environmental Quality (DEQ) and ODOE had negotiated a consent decree in which Kerr-McGee Corp. agreed to perform the cleanup work. The project included consolidating and stabilizing about one million tons of mine rock waste and neutralizing the acidic water in the White King mine pit. In fall 2006, ODOE verified completion of the cleanup.

Management of surface water and groundwater may require long-term attention. ODOE will participate with other state and federal agencies to oversee actions to assure that surface and ground water resources are protected, along with restoration of wetlands and productive cattle grazing areas.

Emergency Preparedness

To ensure a timely and effective response to nuclear, petroleum and electricity emergencies, ODOE maintains the capability to coordinate its emergency operations from within its offices.

ODOE's Emergency Operations Center is equipped with backup power, communications equipment, and other necessary resources to ensure 24/7 coverage of energy emergencies from initial notification to event termination.

The Federal Emergency Management Agency recertified ODOE as a fully functional emergency center after a five-hour evaluation of its setup and operation in September 2006.

Nuclear Emergency Preparedness

ODOE participates regularly in planning meetings and drills with the U.S. Department of Energy

(USDOE), Energy Northwest, State of Washington, and the affected counties in Oregon and Washington to ensure that the State of Oregon and the region are prepared to respond to an incident at a nuclear facility.

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

ODOE participated in eight nuclear emergency preparedness drills and exercises in 2006. The Federal Emergency Management Agency gave a positive review of ODOE's performance.

Petroleum Emergency Preparedness

The Oregon Department of Energy also participates regularly in planning meetings and drills with the U.S. Department of Energy's Office of Energy Assurance, other western states, Oregon's petroleum suppliers, law enforcement, other state agencies, and the 36 counties. To improve the fuel allocation process during a crisis, ODOE developed and continues to refine a database with sensitive information on fuel use, designated emergency fueling stations, and maps of emergency routes for the state's emergency and essential services providers.

In May 2006, ODOE participated in the Pacific Peril exercise to test the Petroleum Contingency Plan and its fuel allocation procedures under catastrophic conditions. The exercise was sponsored by the U.S. Department of Transportation and the Oregon Department of Transportation. It was designed to test and stretch federal, state, and local coordination and resources in response to a 9.5 earthquake with resulting tsunamis. ODOE

worked with USDOE, petroleum suppliers, state agencies, and five counties to coordinate and emergency fuel distributions. The lessons from Pacific Peril enabled ODOE to refine the state's Petroleum Contingency Plan to ensure effective response to a severe and long-term petroleum emergency.

Working with the Public Utility Commission

ODOE and OPUC are responsible for ensuring public health and safety during energy emergencies. While ODOE is responsible for petroleum contingency planning and the PUC for natural gas, the two agencies have joint responsibilities in planning and responding to electricity emergencies.

In November 2006, ODOE and the Oregon Public Utility Commission (PUC) convened a forum to develop a statewide energy assurance plan. As a result, in January 2007, the two agencies convened the Energy Emergency Management Team (EEMT). It includes private industry in all key energy sectors — electricity, petroleum, and natural gas — as well as state and federal agencies including Oregon Emergency Management, Oregon Department of Homeland Security, and the Bonneville Power Administration.

The goal of the EEMT is to achieve collaboration among energy suppliers and state agencies to coordinate emergency planning, preparedness, response, and recovery.

The EEMT will promote energy assurance and emergency management practices before, during and after times of crisis by identifying and resolving planning and response gaps, strategies, and concerns.

Appendix A *Government to Government Report*

Oregon Department of Energy – 2007 Summary

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The mission of the Oregon Department of Energy (ODOE) is to ensure Oregon has an adequate supply of reliable and affordable energy and is safe from nuclear contamination, by helping Oregonians save energy, develop clean energy resources, promote renewable energy, and clean up nuclear waste.

Nuclear Safety and Energy Siting Division

Part of the work of this division is to protect Oregonians from potential threats from the Hanford Nuclear Site, and its potential to leak chemical and radioactive waste into the Columbia River.

The Hanford Site in southeastern Washington State used to produce plutonium for nuclear weapons. The production process resulted in large amounts of chemical and radioactive waste. These wastes pose a long-term threat to the Columbia River. The Oregon Department of Energy is responsible for the technical review of the Hanford cleanup and assessment of potential impacts on the Columbia River and Oregon. Water testing of the Columbia River determined that there is no current radioactive threat.

Through this division, the State of Oregon continues to work closely with the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) regarding Hanford policy and technical issues. This is done under a Memorandum of Understanding (MOU) coordinating efforts related to

the Columbia River, groundwater protection, radioactive material transport, public information and emergency preparedness.

ODOE technical staff consults and coordinates with CTUIR technical staff on nearly a weekly basis on Hanford issues. On Hanford policy, we also coordinate and consult with the CTUIR.

Acting as staff to the siting council, the Oregon Department of Energy consults with tribes regarding the proposed siting of new energy facilities and pipelines.

Renewable Energy Division

The Renewable Energy Division focuses ODOE's efforts on developing renewable energy projects and helps projects use state incentives, federal funds, and utility and other incentives more extensively. The division has provided information, presentations and technical assistance to a number of tribal meetings and conferences.

We met with the Coquille Tribe on a proposed biomass facility. Information included the increase in the Business Energy Tax Credit for renewable energy projects, the benefits in woody biomass utilization, and the outcomes of sustainable, successful forest biomass recovery.

We are currently working with the Confederated Tribes of the Umatilla Indian Reservation regarding tribal greenhouse gas emissions inventories.

The State is developing reporting requirements on greenhouse gas emissions under the Governor's climate change strategy; maintaining an inventory is part of that process.

The Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians are participating in an Oregon Solutions process to develop this wave energy near Reedsport. Concerns have included the protection of tribal and cultural resources.

Wave energy was the topic when staff gave a presentation at Tribal Energy in the Northwest conference in Seattle.

The Governor's Renewable Energy Working Group (REWG) meets to help implement the Governor's Renewable Energy Action Plan. Jim Manion of Warm Springs Power Enterprises (Confederated Tribes of Warm Springs) is a REWG member and participant in developing renewable energy policy and legislation.

Warm Springs Forest Products Industries is a member of the Forest Biomass Working Group, which is looking at barriers and opportunities for forest biomass development that will expand Oregon's energy independence, promote healthy forests, improve air quality, and benefit the state's economy, especially in rural areas.

The Oregon Department of Energy heads up the Oregon Wind Working Group (OWWG), which helps identify and overcome obstacles to wind development. The Confederated Tribes of the Warm Springs Reservation and the Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians have attended OWWG meetings.

The Oregon Geothermal Working Group, through the federal GeoPowering the West effort, is reaching out to tribes. Geothermal energy has numerous direct uses in Oregon including home heating, and the potential for electricity generation.

Staff attended the Hydropower for Community Development training hosted by the Confederated

Salish and Kootenai Tribes of Montana. The session included the history of Indian Water and Hydropower.

Public Information and Outreach

In 2007, we again signed an Intergovernmental Agreement with the Confederated Tribes of Coos, Lower Umpqua and Siuslaw Indians (Scott Hansen) to setup, advertise and hold energy fairs. Booths, workshops and information were presented in July at SolWest in John Day, at Tsalila (the Umpqua River Festival) in Reedsport, and at the Oregon State Fair in Salem. Scott gave out more than 1,000 Teachers' Energy Packets.

In October, we sponsored and provided logistical support for Scott's Second Annual Tribal Energy Conference in Spokane. The topics included tax credits and renewable energy.

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

State Energy Loan Program (SELP)

The Oregon Department of Energy Loan program offers low-interest, long-term loans for energy efficiency and renewable resource projects to tribes, individuals, businesses and non-profits.

SELP is working with a number of tribes on funding of potential renewable energy projects. The Confederated Tribes of the Umatilla Reservation have been looking at financing a possible investment in a wind energy project.

Several discussions have been held with the Confederated Tribes of Warm Springs regarding the financing of the transmission line for their new wood-fired cogeneration plant sited at their lumber mill.

SELP has been working on a number of possible biodiesel production facilities, which would diversify the tribes' economic activities.

Conservation Division

The Residential and Business Energy Tax Credit programs make tax credits available for tribes and

others without a tax liability through the pass-through provision. The State Home Oil Weatherization (SHOW) program provides incentives for homes heated with oil and wood. We also help schools cut energy costs by reviewing new school plans and older building facilities.

Appendix B *Key Document Summaries*

Renewable Energy Action Plan

Governor Kulongoski called for an Oregon Renewable Energy Action Plan, which was released in 2005. The Governor believes renewable energy offers a stable, affordable supply of energy critical to Oregon's economic recovery. The plan was the basis for the Governor's Renewable Portfolio Standard.

The Plan's purpose is to encourage and accelerate the production of energy from renewable sources, stimulate economic development (particularly in rural areas), and improve the environment. The draft sets specific long- and short-term goals for both electricity generation and transportation fuels. The plan calls for a number of actions that state agencies can take administratively to encourage renewable energy.

A Framework for Addressing Rapid Climate Change

Governor Ted Kulongoski appointed the Climate Change Integration Group (CCIG) to develop a framework for making well-informed choices. The CCIG had to 1) create a preparation and adaptation strategy for Oregon, 2) implement and monitor mitigation measures from the 2004 Oregon Strategy for Greenhouse Gas Reductions (and devise new ones if appropriate), 3) serve as a clearinghouse for Oregon climate change information, and 4) explore new research possibilities related to climate change for Oregon's universities.

Oregon Strategy for Greenhouse Gas Reductions

Governor Kulongoski has committed to carry out the West Coast Governors' Global Warming Initiative (now the Western Climate Initiative). The initiative, undertaken by the governors of California, Oregon and Washington, addresses greenhouse gas emissions at a state and regional level. As part of

that commitment, the Governor appointed the Governor's Advisory Group on Global Warming early in 2004 to develop an Oregon strategy. The Advisory Group's citizen members include businesses that both deliver and use energy, farmers, environmentalists, scientists and others.

Public input was received on a draft strategy. The final report, the *Oregon Strategy for Greenhouse Gas Reductions*, will be issued in early 2005. The strategy outlines goals and actions that Oregon can take to reduce greenhouse gas emissions. Recommended actions cover energy efficiency, renewable energy, electric generation, transportation and other areas.

Petroleum Contingency Plan

To better respond to a severe or longterm emergency in Oregon's petroleum supply and distribution system, ODOE is restructuring the Oregon Petroleum Contingency Plan to ensure a coordinated response with the state's petroleum suppliers, law enforcement, other state agencies, and the state's 36 counties. ODOE is developing a database with sensitive information on fuel consumption, designated emergency fueling stations, and maps of emergency routes in the state.

Electricity Emergency Plan

ODOE has signed a memorandum of understanding with the Oregon Public Utility Commission that defines roles and responsibilities in electricity emergencies. The goal is to improve the coordination and response between the two agencies when addressing potential rotating outages and other severe electricity emergencies.

ODOE's Sustainability Plan

Early in 2004 ODOE and other state agencies responded to the Governor's Executive Order by preparing plans for first steps toward operating as

a sustainable organization. The plans were reviewed by the Oregon Sustainability Board.

ODOE's programs all are related to sustainability. However, we have identified four sustainability actions to highlight and report results to the Sustainability Board. The highlighted action areas are High Performance Schools, Renewable Energy Development, West Coast Governors' Global Warming Initiative, and State Agency Assistance. These actions will influence Oregon's environment, economy, and community.

ODOE's Economic Action Plan

Oregon's natural resource agencies prepared action plans for stimulating Oregon's economic recovery. ODOE's plan asserts that reliable, affordable energy is necessary to drive an expanding economy and that a significant portion of Oregon's incremental energy needs can be met with conservation and renewable resources. The goal of the plan is to help stimulate Oregon's economy by promoting a high level of investment in energy efficiency and conservation and to responsibly siting energy facilities and cleaning up the Hanford nuclear site. The plan lists the programs that ODOE manages to meet the goal.

Biomass Plan for Northeast Oregon

The goal of this biomass resource assessment was to promote the cost-effective, sustainable use of biomass energy in Baker, Union and Wallowa Counties. The assessment focused on the use of biomass for electric power generation or conversion to ethanol fuel. The objectives were to identify how much biomass is generated in the region, determine how much biomass is available, and evaluate the economic and environmental impacts of biomass use.

The assessment concluded that the use of biomass for electric power or ethanol production would have net economic benefits. These economic benefits would include increased employment in a rural, natural resource-based economy. An estimated six jobs are created for each megawatt (MW) of biomass power capacity that is installed.

Appendix C *Summary of Energy Legislation Passed by the 2007 Legislature*

Governor Kulongoski's Renewable Energy Package

Senate Bill 838 — Renewable Portfolio Standard (RPS)

Senate Bill 838 establishes a Renewable Portfolio Standard (RPS) for electricity. The bill requires that 25% of Oregon's electric load come from new renewable energy by 2025. The RPS sets interim targets of 5% by 2011, 15% by 2015 and 20% by 2020. The RPS requirement of 25% by 2025 applies to electric utilities and any electricity service suppliers that serve at least 3% of Oregon's electric load. This covers Oregon's three largest electric utilities with over 75% of Oregon's electric load. Depending on load growth, this will likely cover most of the new resources needed to meet these utilities' new load.

Oregon's 31 smallest consumer-owned utilities that serve less than 1.5% of Oregon's electric load are exempt from the 25% standard but must meet 5% of their load from new renewable energy by 2025. Utilities which serve between 1.5% and 3% of Oregon's load must meet 10% of their load from new renewable energy by 2025. These lower targets for the smaller utilities require these utilities to avoid new acquisition of coal, except for limited circumstances.

Eligible renewable resources include wind, solar, ocean, geothermal, biomass, hydropower and other renewable resources that were operational after January 1, 1995. Eligible generating facilities do not have to be located in Oregon, but can be anywhere in the 14 western states which are members of the Western Electricity Coordinating Council.

No utility will be required to give up access to low-cost firm power from BPA or low-cost hydro contracts with the Mid-Columbia dams owned by Washington PUDs. The RPS is not expected to increase rates; but a cost cap is built in as a backstop

to limit any possible cost impact. Compliance with the RPS can occur by owning eligible resources, by buying the output of resources developed by others, or by acquiring a limited number of unbundled Renewable Energy Certificates.

The public purpose charge is extended through 2025. Use of the renewable energy portion of the public purpose charge is limited to small-scale renewable energy projects 20 megawatts or less to encourage a diversity of the types of renewable energy resources developed. There is a non-binding goal that one-third of the renewable energy resources will be small-scale renewable energy projects. The bill also authorizes investor-owned utilities to provide financing for energy conservation beyond what is provided by utilities through the public purpose charge.

House Bill 2210 — Biofuels Fuels Package

House Bill 2210 provides a package of measures to encourage greater development, distribution and use of agricultural and forest material for biofuels, for electricity and for other forms of biomass energy use. The bill expands property tax incentives for biofuel and certain fuel additive production facilities, establishes a new tax credit for producers and collectors of biofuel raw materials, based on Btu content of feedstock, and creates an income tax credit for consumer use of biofuel.

House Bill 2210 also establishes a Renewable Fuel Standard for biodiesel and ethanol based on in-state production, prohibits the sale of gasoline that contains MTBE and certain other additives, provides a mandate on State agencies regarding biodiesel for backup power generation, modifies the site certificate exemption criteria for ethanol and biodiesel production facilities to preclude coal-fueled facilities, and allows certain farm biofuel production facilities on land zone for exclusive farm use (EFU).

House Bill 2211 – (Included in House Bill 3201). Business Energy Tax Credit (BETC).

House Bill 2211 amends the Business Energy Tax Credit to provide greater incentives for renewable energy. It was added to House Bill 3201, which contains a number of other tax credits. The bill increases the tax credit for renewable energy systems installed by businesses from 35% to 50% and increases the project cost limit from \$10 million to \$20 million. It also provides that the costs of constructing facilities to manufacture renewable energy systems and components are eligible for the increased tax credit for renewable energy.

House Bill 2211/ House Bill 3201 also makes combined heat and power projects (CHP) eligible for the increased tax credit, increases the size of hydro projects eligible for the tax credit from 1 megawatt to 10 megawatts for hydro projects meeting state and federal requirements for fish and wildlife, and repeals the offset of federal tax credits for projects which receive a federal and state credit.

The bill also clarifies the ability of investor-owned utilities to serve as pass-through partners for purposes of transferring the tax credit to others with little or no tax credit liability. It also provides an incentive to builders of high performance homes that reduce purchased energy use to near zero on an annual basis and makes homebuilders eligible for installation of renewable energy systems in new homes but at the value of the Residential Energy Tax Credit.

The bill applies to any project constructed or installed after January 1, 2007.

House Bill 2212 – (Included in House Bill 3201) Residential Energy Tax Credit (RETC).

House Bill 2212 was also included in House Bill 3201. It allows use of the residential energy tax credit for more than one qualifying item in the same year, e.g. for a solar water heater and for a

solar electric system, and/or for multiple energy-efficient appliances. The bill also increases the maximum tax credit for fuel cells and for wind generation from \$1,500 to \$6,000 over four years.

The bill applies to any project constructed or installed after January 1, 2007.

Other Senate Bills

Senate Joint Memorial 1 – Hanford Resolution.

SJM 1 urges Congress to provide the necessary funding to clean up the nuclear weapons wastes at the US Department of Energy's Hanford Site. SJM 1 also urges a role for the State of Oregon in decisionmaking at Hanford, including a role in the Hanford Tri-Party Agreement.

Senate Bill 118 — Abnormal Market Disruptions.

Senate Bill 118 authorizes the Governor to declare an abnormal disruption of market under certain circumstances. Certain essential consumer goods and services are covered including petroleum products and diesel fuel. During the period of a declared abnormal disruption of market limits are imposed on the price increase allowed for goods and services covered by the declaration.

Senate Bill 375 — Appliance Efficiency Standards.

Senate Bill 375 establishes energy efficiency standards for certain appliances and electrical equipment, based on standards adopted by California and other states. The bill covers bottle-type water dispensers, commercial hot food holding cabinets, compact audio products, digital versatile disc players and recorders, portable electric spas, and walk-in refrigerators and freezers. The bill also gives rulemaking authority to the Department of Energy to adopt additional efficiency standards under certain circumstances.

Senate Bill 461 — Low Income Energy Assistance.

Senate Bill 461 increases from \$10 million to \$15 million annually the amount paid by PacifiCorp and Portland General Electric to the Department of Housing and Community Assistance for low income energy assistance.. This amount is in addition to the public purpose charge paid by these utilities for energy efficiency and renewable energy.

Senate Bill 479 — School Light Fixture Bill.

Senate Bill 479 requires schools to remove all R type metal halide or mercury vapor light bulbs with T type light bulbs or with alternative lighting such as fluorescent lights by January 1, 2008. The T type and other alternative lighting are less hazardous and more energy-efficient than R type metal halide lights.

Senate Bill 790 — Off-shore Leasing.

Senate Bill 790 prohibits leases within the state territorial sea (up to three miles seaward from the coastline) for any form of exploration, development or production of oil, natural gas or sulfur. The ban does not apply to exploration for scientific or academic research or for geologic survey purposes.

Senate Bill 812 — PUD Statute Changes.

Senate Bill 812 makes a number of changes to the statutes governing peoples' utility districts (PUDs) so that PUDs can implement the Renewable Energy Standard contained in SB 838. These include the authority under certain circumstances to acquire renewable energy resources, to purchase renewable energy certificates, and to undertake other measures.

Senate Bill 814 — Biofuels Bill Changes.

Senate Bill 814 makes two changes to the biofuel producer tax credit contained in House Bill 2210. It removes corn grain as an eligible feedstock

from the biofuel producer tax credit and delays for two years wheat from eligibility for the producer tax credit. It does not preclude use of corn stalks, wheat wastes and similar material for the tax credit for cellulosic conversion to biofuel.

Senate Bill 819 — Tax Credit / Kicker Refund Adjustment.

Senate Bill 819 makes revisions in the Oregon tax code so that purchasers of tax credits do not have the value of their tax credits reduced by a kicker refund due to revenues greater than 2% of the revenue forecast. This change benefits pass-through partners for the Business Energy Tax Credit as well as individuals and businesses who are transferred other tax credits for cash payment.

Senate Bill 875 — Ocean Energy Rules.

Senate Bill 875 authorizes the Department of State Lands to develop rules relating to wave energy facilities. The rules may include requirements for site restoration and that the operator of a wave facility has evidence of financial assurance to meet the site restoration requirements. Senate Bill 875 also clarifies that ocean wave energy is distinct from hydroelectric energy and qualifies for the Business Energy Tax Credit as a separate form of renewable energy.

Other House Bills***House Bill 2272 — Vehicle Emission Standards.***

This legislation requires that new vehicles, beginning with the model year 2009, must comply with low emission standards of the Environmental Quality Commission in order to register the vehicle. In addition, the bill authorizes the Oregon Department of Transportation to deny registration to 2009 or later model year vehicles that do not comply with the new standards. This bill

provides additional enforcement for the tailpipe emissions rules that the Oregon's Environmental Quality Commission (EQC) adopted in June 2006 requiring that new vehicles meet California auto emission standards. Besides cleaner air the standards result in increased vehicle efficiency.

House Bill 2565 — Appliance Efficiency Standards.

House Bill 2565 makes technical changes to two classes of equipment adopted as part of a package of appliance efficiency standards in 2005 by House Bill 3363. The changes are to single-voltage external AC to DC power supplies, and to incandescent reflector lamps. The changes make the requirements consistent with those adopted by California and other states which were modified after the adoption of House Bill 3363 in 2005.

House Bill 2565 also gives the Department of Energy the authority through rule to make modifications in energy efficiency standards to be consistent with the standards and the timing of the effective date of such standards in adjoining states and under other limited circumstances.

House Bill 2620 — Solar Energy in Public Buildings.

House Bill 2620 provides that a state or local government must devote at least 1.5% of the cost of constructing a new building or renovating an existing building to solar energy technologies if the building receives state funds. Passive solar energy investments can meet the requirement if passive solar reduces energy use by at least 20%. The Department of Energy will establish rules and forms for determining the appropriateness and cost-effectiveness of the 1.5% requirement.

The 1.5% solar requirement carries over to future projects by the agency if the project is determined to be inappropriate or not cost-effective for solar use. This requirement is also in addition to the

existing statutory requirements of state agencies to design and build state buildings to meet energy efficiency savings requirements.

House Bill 2628 — Outdoor Lighting Brightness.

House Bill 2628 directs the Department of Energy to evaluate state statutes and building codes regarding outdoor lighting impacts on energy efficiency and night brightness. Upon release of a model lighting ordinance by the International Dark-Sky Association and the Illuminating Engineering Society of North America the Department shall review the ordinance and make recommendations for adoption of the ordinance in the state building code and in local ordinances. The Department will make its findings available in a report to the Legislature by October 1, 2008. In enacting the bill, the Legislative committee encouraged the Department to establish a broad-based stakeholder group to assist in review of the model ordinance.

House Bill 2925 — Small Wave Energy Facility Licensing Exemption.

House Bill 2925 provides that a wave energy project located within Oregon's Territorial Sea is exempt from a water right permit and related licensing requirements of the Water Resources Department if the project does not exceed 5 megawatts and if a federal license is not required under the Federal Power Act to construct or operate the project.

House Bill 3244 — Sustainability Board

House Bill 3244 reestablishes the Sustainability Board as a statutory board. The Sustainability Board is directed to identify, evaluate and recommend changes in laws, rules and policies to sustain, enhance and protect the quality of the environment, economy and community for the

present and future benefit of Oregonians.

House Bill 3488 — Solar Incentives.

House Bill 3488 expands the property tax exemption for residential use of solar energy to business and other uses of solar and other renewable energy systems, including systems which can be used for net metering. The exemption sunsets July 1, 2012. The bill also authorizes the Public Utility Commission to establish tariffs and rules to further encourage investor-owned utilities to invest in renewable energy beyond what is provided by utilities through the public purpose charge.

House Bill 3488 also includes a provision related to House Bill 2210, the biofuels bill. It provides the Governor with the direct authority to suspend the renewable fuel standard for ethanol in the event of the unavailability of ethanol fuel under certain conditions. The Department of Energy must make findings verifying the unavailability of ethanol before the Governor can suspend the standard.

House Bill 3543 — Global Warming Actions.

House Bill 3543 takes a number of actions to reduce global warming emissions. The bill codifies Governor Kulongoski's greenhouse gas reduction goals: namely by 2010 to begin to reduce greenhouse gas emissions, by 2020 to achieve greenhouse gas levels 10% less than 1990 levels and by 2050 to achieve greenhouse gas levels 75% below 1990 levels.

The bill also establishes a Global Warming Commission. The Commission is responsible for recommendations to meet the greenhouse gas reduction targets. The Commission is also responsible for examining cap and trade systems, for developing an educational strategy on global warming issues, for tracking global warming impacts on Oregon and other issues. The bill also creates the Oregon Climate Research Institute in the Oregon University System.

House Bill 5005 — Bond Limitation Bill.

HB 5005 provides authorization for state agencies to issue state bonds for various purposes. The bill authorizes \$150 million for the Energy Loan Program to issue low-interest loans for renewable energy and energy efficiency. This is an increase of \$25 million over the previous biennium. This will allow the Energy Loan Program to make more loans for renewable energy projects and will also allow over \$35 million in new loans for university and community college energy-savings projects.

House Joint Memorial 22 — Wave Energy

This memorial recognizes the great potential that Oregon has for wave energy. The memorial also expresses the strong support of the Oregon Legislature for the development of wave energy as a renewable energy resource with great potential to reduce dependence on oil and other fossil fuels. The memorial further express concern to Congress about the disagreement among federal agencies as to who has lead federal authority. The memorial urges Congress to resolve that issue and direct establishment of a review process specific to wave energy.

House Resolution 1 — Hydrogen Resolution.

House Resolution 1 supports development of renewable energy sources of hydrogen and recommends that hydrogen be a top priority of current and future renewable energy research, policy and programmatic initiatives by the State of Oregon. The resolution also encourages private — public partnerships like the Northwest Hydrogen Alliance.

Appendix D *Oregon's Counties and the Electric Utilities That Serve Them*

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

Appendix E *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.

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

Base Load — The minimum amount of electric power or natural gas delivered or required over a given period of time at a steady rate. The minimum continuous load or demand in a power system over a given period of time usually not temperature sensitive.

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

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

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

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

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

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

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

KV — A kilovolt equals 1,000 volts.

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

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

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

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

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

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

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

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

NO_x — 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 — 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.

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