



OREGON OFFICE  
OF ENERGY

## **Conservation Program Savings**



# 1. INTRODUCTION

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

The opportunities to become energy efficient come from virtually every house, building, industrial plant, appliance, machine and piece of equipment that uses energy. In tapping these opportunities, the Oregon Office of Energy provides information to consumers, demonstrates new technologies, and offers a variety of programs to encourage Oregonians to conserve energy and use renewable resources.

The Oregon Legislature in 1975 first set as state goals the promotion of “the efficient use of energy resources” and the development of “permanently sustainable energy resources.” Throughout a variety of economic conditions and political climates, every legislature since that time has reaffirmed the importance of the state’s commitment to conservation and renewable resources by extending the sunset dates of the state’s energy programs or expanding eligibility to include new technologies.

This report describes activities of the Office of Energy and gives estimates of the energy they saved in 2000. These are the total yearly savings\*:

Electricity	4.5	billion kilowatt-hours
Natural gas	128	million therms
Oil	8.4	million gallons
Wood and other fuels	1.3	trillion Btu

Altogether, yearly savings are 32 trillion Btu.† For comparison, the yearly savings are roughly equivalent to the amount of energy used by a city the size of Salem each year.

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\*Savings from major programs, starting in 1979.

†Includes savings from programs that are no longer offered.

- Business Energy Tax Credit
- Residential Energy Tax Credit
- Energy Loan Program
- State Home Oil Weatherization Program
- Energy-efficient manufactured homes
- Oregon telecommuting program
- Residential building codes
- Commercial building codes
- Energy-efficient new state buildings
- Alternative fuels
- National Industrial Competitiveness Through Energy, Environment and Economics
- Other programs



## 2. BUSINESS ENERGY TAX CREDIT

The Office of Energy offers tax credits to businesses to encourage them to invest in energy conservation, renewable resources, recycling and alternative fuels.

The tax credit is 35 percent of the cost of the investment. The tax credit may be taken in one year for projects under \$20,000. For projects over \$20,000, 10 percent of the credit is taken in the first and second years and 5 percent each year thereafter. The energy savings of conservation measures must pay back the investment in one to 15 years.

More than 5,500 tax credits have been granted to Oregon businesses since the program began in 1978. The tax credits have gone to a wide range of businesses for a variety of investments in energy efficiency.

Among them:

- Manufacturers for improving the energy efficiency of their production processes
- Farmers for installing energy- and water-saving irrigation systems
- Landlords for weatherizing their apartment buildings
- Department stores for putting in efficient lights
- Recyclers for transforming waste products into materials for manufacturing new products
- Employers for buying bus passes for their employees
- Restaurant owners for installing waste heat recovery systems

**Total tax credits: 5,577**

### **Recipients**

Commercial firms	4,426
Manufacturers	691
Farms and ranches	460

### **Types of investment**

Conservation	4,099
incl. 1,444 rental weatherization projects (45,735 units)	
Recycling	978
Renewable resources	500

### **Energy savings in 2000**

Electricity:	1.1 billion kWh
Natural gas:	64 million therms
Oil:	6 million gallons
Wood and other:	1.3 trillion Btu

### **Electricity generated in**

**2000:** 689 million kWh

### 3. RESIDENTIAL ENERGY TAX CREDIT

**Total tax credits:      64,789**

**Renewable resource systems**

Solar water heating	16,745
Geothermal	1,747
Solar space heating	1,623
Photovoltaic	146
Wind	28
Hydro	19
	20,308

**Appliances**

Clothes washers	20,459
Refrigerators	13,313
Dishwashers	10,025
Water heaters	472
Energy-efficient ducts	191
	44,460

**Alternative-fuel vehicles      21**

**Energy savings in 2000**

Electricity:	53.4 million kWh
Natural gas:	889,000 therms
Oil:	11,000 gallons

The Residential Energy Tax Credit was created in 1977 to encourage the use of renewable resources to meet home energy needs. More than 20,000 Oregon households have received tax credits for installing renewable resource systems for heating their homes, providing hot water and making electricity.

Over time, as new energy-saving technologies have come on the market, the Legislature has expanded the tax credit to encourage their adoption. In 1997, it added highly efficient home appliances. The program expanded in 1999 to include fuel cells.

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

- Up to \$1,500 for solar, wind and geothermal systems
- A tax credit based on energy savings and the cost of the appliance for highly energy-efficient refrigerators, clothes washers, dishwashers and water heating systems
- Up to \$750 for alternative-fuel vehicles and \$750 for charging/fueling systems
- Up to \$250 for highly efficient heating ducts
- Up to \$1,500 for fuel cells

## 4. ENERGY LOAN PROGRAM

The Office of Energy offers low-interest, long-term loans for energy conservation and renewable resources through the Energy Loan Program.

Besides loans for proven energy-saving and renewable resource technologies, the program showcases the innovative. One recent loan funded the construction of a small office building in Portland that features recycled and environmentally friendly materials and is 25 percent more energy efficient than code requires.

The program has financed a broad range of conservation and renewable resource investments. Here is a sampling of loans made in 2000:

- \$500,000 for energy-saving measures in Newport's new recreation center
- \$117,000 to weatherize a 120-unit apartment complex in Tualatin
- \$64,000 for wind machines that provide freeze protection for a pear and apple orchard in Parkdale, replacing oil smudge pots
- \$1.8 million to upgrade heating and cooling systems at Southern Oregon University
- \$65,000 for energy-efficient lighting for Mill City schools

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

The program was created by the 1979 Legislature and approved by Oregon voters in 1980.

**Total loans: 528**

**Loan amount: \$290 million**

### Conservation loan recipients

Businesses	99
School districts	75
Local governments	59
Colleges and universities	28
State government	27
Other	<u>45</u>
	333

### Types of renewable resource loans

Geothermal	77
Solar	56
Hydro	27
Biomass	19
Waste heat	15
Wind	<u>1</u>
	195

### Energy savings in 2000

Electricity:	434 million kWh
Natural gas:	16 million therms
Oil:	990,000 gallons
Wood and other:	12 billion Btu

### Electricity generated in

**2000: 577 million kWh**

**5.**  
**STATE HOME OIL WEATHERIZATION  
PROGRAM**

**Energy audits: 40,511**

**Loans: 4,417**

**Loan amount: \$11.5 million**

**Rebates: 9,372**

**Rebate amount: \$5.8 million**

**Energy savings in 2000**

Oil: 1.8 million gallons

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 what measures their home needs to make it energy efficient and financial incentives to help pay for those measures.

For households that heat with oil, propane or wood, the State Home Oil Weatherization Program run by the Office of Energy offers free home energy audits and rebates for weatherization and heating measures. Homeowners can qualify for low-interest loans to pay for recommended measures.

Oil companies doing business in Oregon fund the program.

About 100,000 Oregon homes are heated with oil or propane. Most of them were built before energy standards were part of the building code and are likely in need of weatherization and heating measures.



## 6. ENERGY-EFFICIENT MANUFACTURED HOMES

Unlike homes and apartments built on site, manufactured homes are not subject to Oregon's building code. Instead, energy efficiency and other aspects of manufactured homes are governed by federal law.

Federal energy standards are minimal. The Office of Energy has worked with the manufactured home industry in the Northwest since 1988 to build energy-efficient homes. In the early years, Bonneville Power Administration and electric utilities paid manufacturers up to \$2,500 per home to add energy efficiency measures. The program has been market-based since 1996.

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

Under the agreement, the Office of Energy:

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

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

**Number of new energy-efficient homes manufactured and sited in Oregon since 1996: 14,862**

**Energy savings in 2000**

Electricity:	83 million kWh
Natural gas:	149,000 therms

**Estimated number of  
telecommuters: 160,000**

## 7.

### OREGON TELECOMMUTING PROGRAM

Oregon grew by more than half a million people in the past decade, and the number of miles residents drive each year continues to increase. Oregonians drive more than 27 billion miles and burn some 1.6 billion gallons of gasoline a year.

Telecommuting is a small piece of easing congestion and reducing gasoline use. But it's the one strategy where success is likely — and at minimal cost to taxpayers. Employers are offering telecommuting because of the benefits it provides them and their employees. Reducing the need to travel is an added benefit.

In 1991, the Office of Energy began a comprehensive telecommuting program to provide information to employers on how to set up successful — and long-lasting — telecommuting programs. As of year-end 2000, staff had provided information to more than 12,000 Oregon employers and worked one-on-one with more than 2,400.

In 1997, the Legislature passed a bill to promote telecommuting for state employees. The bill requires state agencies to have telecommuting policies. The Office of Energy has worked with Oregon's 100 state agencies to tailor policies appropriate for each agency. The policies define criteria for who can telecommute, how to set work objectives, who's responsible for buying and maintaining equipment, and other issues. As of year-end 2000, 88 agencies had policies in place and more than 1,000 state employees were telecommuting.

During the 2001-03 biennium, the Office of Energy will work with 200 businesses to implement programs for their employees and help establish technology centers in Grant, Klamath and Clackamas counties that will promote telecommuting.

## 8. 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 in the nation to implement a statewide building code that included energy standards. The standards required minimum insulation levels in ceilings, walls and floors. Before that time, most Oregon homes were built with little, if any, insulation.

The energy standards in code have been updated five times since 1974, the most recent update in 1992. The best evidence of progress in energy-efficient housing can be seen in the savings: A home built today requires about half the energy to heat as an equivalent home built in 1974.

As of year-end 2000, about one-quarter of Oregon's 1.45 million homes and apartments had been built to energy standards.

### **Number of homes built to energy standards**

Single-family	218,000
Multi-family	<u>144,000</u>
	362,000

### **Current energy standards**

Windows	U=0.40
Exterior doors	U=0.20
Wall insulation	R-21
Underfloor insulation	R-25
Flat ceilings	R-38
Vaulted ceilings	R-30
Skylights	U=0.50
Basement walls	R-15
Air ducts	R-8

### **2000 energy savings**

Electricity:	857 million kWh
Natural gas:	40 million therms

## 9. COMMERCIAL BUILDING CODES

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

The last major change in the standards was made in 1996.

In addition to the energy savings, the revisions make it easier to comply with the code because they give architects and builders more flexibility in designing and building innovative buildings that meet the energy standards.

Beginning in 1983, when the Office of Energy started estimating savings from the commercial code, it has saved at least 700 million kilowatt-hours of electricity and 6.5 million therms of natural gas.

## 10. ENERGY-EFFICIENT NEW STATE BUILDINGS

Energy standards in the state building code provide a solid baseline for efficiency, but standards alone cannot capture the savings from the unique features of individual buildings. For that reason, a state law was enacted in 1990 that requires new and renovated state buildings be as energy efficient as possible — within cost-effectiveness guidelines.

Office of Energy staff works with state agencies that are constructing or renovating buildings and recommends energy-saving measures to include in designs. Typical measures adopted include energy efficiency improvements in windows, lighting, controls, and heating, ventilation and air conditioning equipment.

By the end of 2000, 50 state buildings had been built or renovated with energy efficiency measures that go beyond code requirements. Overall, the buildings use at least 10 percent less energy than if just built to code. Some buildings, particularly those that are energy-intensive, save more. Among those projects are the women's prison in Wilsonville and the Two Rivers Correctional Institution in Umatilla. Savings at those two facilities are estimated at 35 percent over code.

Plans were underway for 23 more buildings in 2000. The new construction projects include the Eastern Oregon University Science Center in LaGrande and the North Mall Office Building in Salem. Savings for those buildings are estimated at 30 percent better than code.

**Number of energy-efficient new or renovated state buildings: 50**

**2000 energy savings**

Electricity:	19 million kWh
Natural gas:	0.4 million therms
Other:	531 million Btu

## 11. ALTERNATIVE FUELS

**Business tax credits**

Vans/trucks (propane or natural gas)	276
Buses (propane or natural gas)	217
Forklifts (natural gas)	54
Cars (natural gas or electric)	38
Fueling stations (natural gas)	12

**Residential tax credits**

New gasoline-electric cars	10
New electric vehicles	2
New natural gas vehicles	1
Electric conversions	6
Propane conversions	1
Charging system	1

Cars and light trucks 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. One of Oregon’s strategies to improve air quality is promoting the use of alternative fuels.

In 1991, the Legislature added alternative-fuel vehicles and fueling stations as projects eligible for the Business Energy Tax Credit. In 1997, the Legislature expanded the Residential Energy Tax Credit to include alternative-fuel vehicles and fueling systems.

Oregon has formed two coalitions to facilitate the building of alternative-fuel stations and the purchase of alternative-fuel vehicles. One is a group of 150 fleet owners and operators from Hood River to Astoria and from Eugene to Vancouver, Wash. The other is a 40-member group in Southern Oregon. The Office of Energy helped both groups get federal funds for their work.

The Office of Energy also secured federal funds to help the Port of Portland convert all of the gas and diesel buses in its long-term parking fleet to run on natural gas.

Both state and federal law require governments to begin converting their fleets to alternative fuels. As of year-end 2000, the state had purchased more than 220 alternative-fuel cars for its fleet. Most use compressed natural gas, and about 15 of them can use ethanol.

The state included in its fleet a Honda Insight (61 mpg city/68 mpg hwy.) and Toyota Prius (52 mpg city/45 mpg hwy.) to demonstrate how they work and advance their adoption. The cars run on both gasoline and electricity and never need to be plugged in. That experience prompted the departments of Administrative Services, Transportation and Forestry to buy eight hybrid cars in 2000.

## 12.

## NATIONAL INDUSTRIAL COMPETITIVENESS THROUGH ENERGY, ENVIRONMENT AND ECONOMICS

The U.S. Department of Energy annually awards matching grants to businesses for innovations that advance the use of energy-efficient and environmentally clean technologies.

The Office of Energy applies for the grants on behalf of Oregon companies. Since the program began in 1991, four grants totaling more than \$1 million have been awarded to Oregon companies:

- Alpine Technology Inc. of Eugene won a \$205,299 grant for an optical sorting system that significantly increases the amount of glass that can be recycled.
- Beta Control Systems of Beaverton won a \$91,696 grant for a method that allows the re-use of hydrochloric acids in metal finishing processes.
- Osmotek of Corvallis won a \$395,000 grant for a highly energy-efficient process for making food concentrates.
- Hudnut Industries, Inc. of Portland won a \$400,000 grant for its “ReCyclotron,” a line of industrial equipment that converts plastic foam and film into a usable raw material.

## 13. OTHER PROGRAMS

**Building Commissioning** - Office of Energy leads a project to make commissioning standard practice for public buildings in the Northwest. The project includes demonstrations in 36 buildings, including 10 in Oregon. Case studies will document costs and benefits.

**Demand Controlled Ventilation** - With the aim of encouraging their widespread adoption, the Office of Energy is testing sensors that gauge occupancy by measuring carbon dioxide levels. The sensors turn off energy-consuming systems when spaces are unoccupied. Potential savings are considerable for auditoriums, gymnasiums, theaters and other large facilities.

**Energy Awareness Campaign** - Office of Energy directs an annual multimedia campaign promoting the efficient use of energy in Oregon. Partners include Portland General Electric, NW Natural, Pacific Power, Fred Meyer, Northwest Energy Efficiency Alliance and Portland Office of Sustainable Development. Local utilities participate in Salem and Eugene. The campaign achieves more than 8 million media impressions during the heating season.

**Energy-Efficient School Buildings** - Office of Energy offers energy audits, technical assistance, and operations and maintenance training for Oregon schools. The focus is on schools with high energy bills. Staff recommends changes to energy systems and advises how to maintain and operate them properly. Staff has assisted some 60 school districts in recent years. Energy-saving measures put in place cut energy costs typically by about 10 percent. If the schools carried out all recommended measures, savings would be closer to 25 percent. Several districts are using construction bid specifications that the Office of Energy wrote to ensure that new systems operate correctly from the start.



**Energy Services Performance Contracting** - Office of Energy is demonstrating the use of guaranteed energy savings to qualify efficiency projects for additional financing. Staff developed model contract documents for use by state and local governments and is exploring how to get performance contracting adopted by other agencies.

**High Performance Schools** - Office of Energy sponsors training for school staff and construction vendors on building highly efficient, productive and environmentally sound schools. Office of Energy also provides financial assistance to schools seeking the Leadership in Energy and Environmental Design (LEED) rating, which verifies that construction achieves specifications. Workshops were held at Eagle Point, Beaverton, Redmond and Willamette educational service districts as well as Oregon State University. Four schools under construction are designed to LEED standards, in The Dalles, Eagle Point, Salem and Sisters. Seven other schools are being built as high-performance buildings. Others are using the Office of Energy's bid specifications for direct digital controls or are using staff's template for an energy services performance contract.

**National Appliance Standards** - Office of Energy represents states on the committee that develops national standards for clothes washers, dishwashers, refrigerators, ballasts, air conditioners, heat pumps, water heaters and other appliances. The committee recently adopted new standards for refrigerators that boost efficiency requirements by about 30 percent. New standards also were developed for clothes washers and water heaters that will begin in 2004. New standards for residential air conditioners are set to start 2006. Staff is now helping upgrade air conditioner standards for nonresidential buildings and redesigning testing procedures for dishwasher efficiency.

**Oregon Solutions** - Office of Energy is working with Portland General Electric to develop the next generation of sustainable homes and promote them through the company's Earth Advantage program. Fannie Mae will provide incentives for mortgage qualification. Staff is helping develop an Earth Advantage program for remodeling, as well. Office of Energy also is helping set up a program to give citizens and

businesses an opportunity to invest in transportation projects that offset their travel-related greenhouse gas emissions. In addition, staff is working with Joseph Timber Company and 13 state, regional and federal organizations to advance the use of small-diameter wood products.

**Portable Classrooms** - Many Oregon schools need portable classrooms to accommodate increasing numbers of students. The Office of Energy developed specifications for energy-efficient and productive modules. Office of Energy is monitoring energy use, temperature and carbon dioxide levels of high-efficiency modules at two Portland schools and will evaluate cost-effectiveness. Beaverton School District also purchased four portable buildings that meet the specifications.

**Public Purpose Funds for Industrial Energy Projects** - Oregon's electric industry restructuring bill takes effect March 1, 2002. It includes a public purpose charge for conservation and renewable resources. Large electricity users can use part of the charge for conservation and renewable resource investments in their facilities. Office of Energy will review and certify sites and projects, track expenditures and report on results.

**Public Purpose Funds for Schools** - Ten percent of public purpose funds will go to schools for energy conservation investments. Audits are required before measures are funded. Office of Energy will help coordinate the program, provide technical help and quality control, and report on results.

**Rebuild America** - Office of Energy uses this federally funded program to provide technical help for resource-saving projects for schools, state and local governments, and others. Work includes design assistance, training, demonstration projects and technical analysis. For example, staff is demonstrating waterless urinals in 40 state parks and is helping five parks install solar electric and water heating systems.

**Residential Heating and Air Conditioning Systems** - Office of Energy certifies contractors and utility staff to safely and effectively test and seal heating and cooling ducts and test and service heat pumps and air conditioning systems for best performance.

**Save Water and Energy Education Program (SWEEP)/ Resource-Efficient Developments and Irrigation** - Office of Energy promotes high-performance equipment and practices that save water and energy in housing, nonresidential buildings and landscaping. U.S. Department of Energy funds the programs. SWEEP is an educational and technical assistance pilot program in Wilsonville, Lafayette, Bend, Redmond and Salem. A new, smaller program starting in Bend and Redmond focuses on resource-efficient landscaping and energy and water efficiency in housing and commercial developments.



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