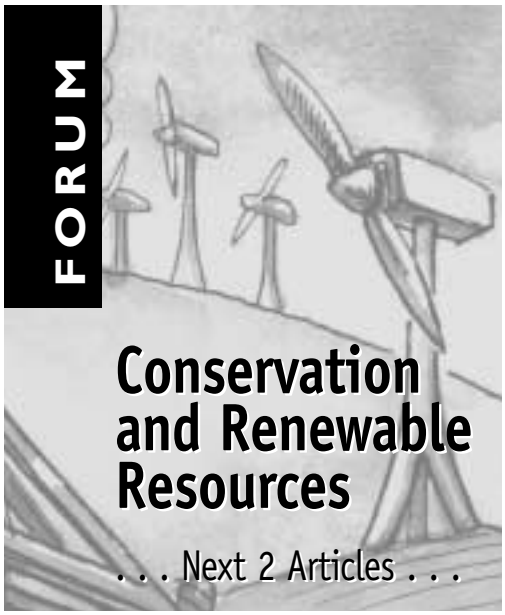


Energy Efficiency

by Margie Gardner

Oregonians can make dramatic reductions in their energy use with inexpensive technology.

Oregon's Norm Thompson company lives by its motto, "Escape from the Ordinary." It's what they strive for in their products and in their corporate culture. It's also what they looked for in 1994 when they were planning to build a new headquarters. The owners of Norm Thompson wanted to build a state-of-the-art, energy efficient headquarters while staying within their tight budget. Using what started as a standard tilt-up concrete box, they built a facility that not only makes extensive use of exterior light, but also uses a computer to sense the availability of natural light and adjust internal electric lighting controls. The computer regulates interior temperatures as well, by capturing the heat generated from people and computers and redistributing it via heat recovery coils. "Our people are our furnace," says Norm Thompson co-owner Jane Emrick.

While these and other energy efficient improvements added $4 per square foot to the cost—numbers that would make most companies cringe—Norm Thompson achieved a four-year payback on the investment and is now saving up to $25,000 a year in energy costs. And these savings will continue year after year, their value changing only as the price of energy rises or falls.

The owners of Norm Thompson are no longer alone in their awareness that energy efficiency can pay off in the long run. Due to recent publicity about the "energy crisis," between 80 and 90 percent of Northwest residents want to know what they can do to help. Short-term behavioral changes driven by recent publicity and the urging of utilities and public officials have already resulted in a drop in energy use of approximately 5 percent in the last year.

This is a big change from several years ago when concern about energy use wasn't really in the public consciousness. In spite of a steadily growing population, five years of higher-than-average rainfall fueled our hydroelectric system and hid the need for more generation. During this period, uncertainties wrought by energy deregulation delayed investments in new generating plants and efficiency. Now the region needs to build new generating plants as well as implement conservation measures. However, installing energy efficient appliances, more efficient industrial equipment, and energy saving building materials may be the most cost-effective way of finding new energy.

"Conservation" is most often defined as short-term changes in behavior, such as turning off lights, that result in less use of power. It typically means doing without. In the energy industry this is called curtailment.

"Energy efficiency" refers to the investment in technology or building changes that result in less use of energy over the long term, such as replacing an incandescent bulb with a compact fluorescent one. You still receive the same amount of light from your bulb, but you use less electricity. Over time, as an energy shortage wanes, it can become more difficult for people to maintain short-term behavioral changes. Once installed, however, energy efficiency measures can save energy for years, even decades.

Today the region uses 1,700 average megawatts (the equivalent of almost three Bonneville dams) less than it would have if the energy efficiency measures had not been implemented. In fact, the power saved from the increased use of energy efficient technology and materials in Oregon could defer the need to build some of the new generating plants currently being considered for construction throughout the state.

In the electric power industry this is called "deferred generation," and it has several key benefits. First, building fewer power plants means less pollution and waste. Second, the installation of energy efficient technology is, in the long run, cheaper than buying electricity from a power plant.

Studies indicate that, over time, the average cost of buying electricity from generating companies will be in the range of 3 to 4 cents per kilowatt-hour (KWh), while the average cost of energy-efficiency measures is about 2 cents per KWh. That means it is cheaper for utilities to "buy" KWh from consumers in the form of energy efficiency than it is to buy new electricity from a generating plant.

Energy efficiency also acts as a hedge against sudden spikes in the price of electricity. Every KWh saved is one that need not be bought on the open electricity market during a price spike.

Rebates, Coupons, Tax Credits, and the Energy Trust

One of the biggest roadblocks to energy efficiency among consumers is the initial capital investment required. Home owners often balk at the money needed to add more insulation inside their walls or attics. Small

business owners may not be able to afford changes to their lighting or their heating, ventilation, and cooling (HVAC) systems. And large industry executives are often leery of dedicating capital to improve the efficiency of manufacturing plants or industrial processes.

One way to help alleviate those costs is with rebates. Utilities can use rebates in the form of discounts, coupons, or payments to buy efficiency from consumers. These incentives pay the initial capital costs of such measures as installing new insulation, sealing ducts, purchasing energy efficient appliances such as water heaters and heat pumps, and replacing windows. Commercial rebates—offered to both small businesses and large industries—help companies tune up energy wasting HVAC systems, install energy efficient office equipment, and improve the energy use of industrial machinery.

Many utilities currently offer these rebates to customers as a way to meet yearly energy saving goals set by public utility governing boards (for public utilities) and by the regulatory authorities for investor owned utilities, or IOUs. IOUs represent over two-thirds of electricity sales in Oregon.

In March, however, this system is expected to change for the IOUs. As a result of deregulation, IOUs will dedicate 3 percent of their revenues to support conservation, energy efficiency, renewable energy, low-income energy assistance, and energy-efficiency upgrades in Oregon schools. The Energy Trust of Oregon will take the biggest share of this 3 percent contribution and spearhead the state's efforts in conservation, renewable energy, and energy efficiency. The Energy Trust's budget may be as much as $50 million a year—enough money to make a real difference in these important areas.

Tax credits are incentives offered by the state against Oregon income taxes; they also apply to a number of qualifying improvements to homes or investments in energy efficient systems and appliances. Buying an energy efficient dishwasher, clothes washer, or water heater can get you a credit of up to $200 per appliance; changing to a geothermal heat-pump system to keep your house warm (three times more efficient than electric heat) can qualify you for a credit of up to $1,500.

Northwest Energy Efficiency Alliance

Sometimes the market doesn't take to a particular technology or innovation despite demonstrated energy savings. That's where organizations like the Northwest Energy Efficiency Alliance can help. The Alliance works in conjunction with investor owned and public utilities as well as state and local governments. It operates on a number of fronts toward its mission to catalyze the Northwest marketplace to embrace energy efficient products and services and to educate consumers about how they can make their environments more energy efficient over the long term.

Funded by utilities in Oregon, Washington, Idaho, and Montana, the Alliance has focused specifically on what's called "market transformation," which brings affordable, energy-efficient technologies to the marketplace. The Alliance helps by providing funding and technical assistance for research and development, fostering the production of energy- efficient products, and pushing for their acceptance into the market. The result: more and better energy efficient products and technologies are available to consumers throughout the four-state region, and they can be installed at lower costs.

One of the Alliance's earliest programs was designed to increase the market for energy efficient clothes washers, which now bear the federal "Energy Star" designation. When the program began in 1997, only about 2 percent of washers sold could be classified as "resource efficient" clothes washers (saving energy and water). Retailers had little or no information about the washers. Most domestic manufacturers, seeing little demand for the product, were not interested in bringing them to market.

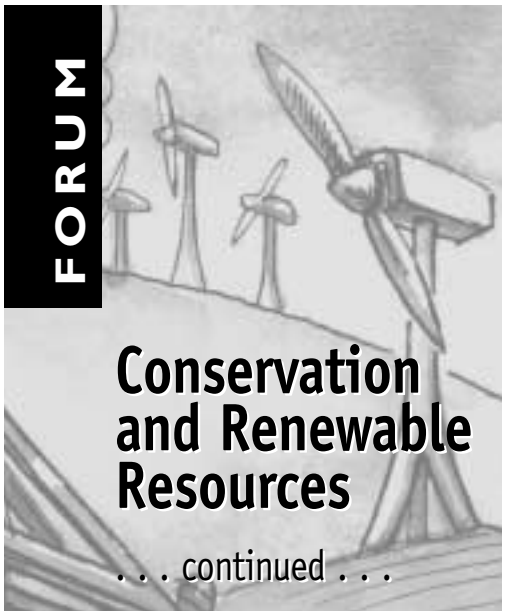
In response, the Alliance designed a multi-layered approach to support demand for resource-efficient clothes washers in the Northwest. The goal was to convince major manufacturers that they were worth producing. This program included large rebates for con-

Net Metering

In 36 U.S. states, it is now possible to watch your meter run backward and have the local utility credit you at retail rates for energy generated by your solar panels or small wind turbine. The subject of tremendous wrangling between renewable energy advocates and utilities, net metering is making progress nationwide. A recent FERC decision overruled an Iowa utility's objections to net metering programs, and California recently raised its system eligibility requirement from 10 kilowatts to 1 megawatt.

Oregon passed a net metering law in 1999, HB 3219. This bill requires utilities to offer net metering for fuel cells and solar, wind and hydro resources of 25 kilowatts or less. The law requires utilities to offer net metering to all customer classes, but total customer-generation capacity is not to exceed 0.5 percent of a utility's historic single-hour peak load. Once the 0.5 percent level is exceeded, further eligibility is limited. In Oregon, excess electricity generation is netted against a current monthly bill or credited to the following month. At the end of the year, unused credits can be donated to a low-income assistance program or dedicated to another use, subject to approval by the Public Utility Commission. The green energy community advocates legislation that will expand the limits of net metering programs. For more information see www.rnp.org/htmls/netmeter.htm.

Elliot Mainzer for Oregon's Future



Conservation and Renewable Resources

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sumers, point-of-purchase materials for retail outlets, retail merchandising support, training for retail salespeople, and some consumer advertising. After a year, sales of resource-efficient washers had grown to more than 12 percent of the market. Retailers indicated they believed they could sell the washers to a third of their customers. Consumers were pleased with the washers' performance and were better educated about how they worked. Most importantly, major manufacturers in the U.S. began to produce resource-efficient washers. Even after the consumer rebate was discontinued, sales continued at the same level.

The U.S. Department of Energy used results from the project when it determined energy efficiency standards for clothes washers. The first phase of these standards will produce washers that are more than 22 percent more efficient by 2004. By 2007, all clothes washers produced in the U.S. will be 35 percent more efficient than current models. Education transformed the market.

Learning from these successes, the Alliance and its partner utilities have redoubled their efforts to help consumers understand how they can save power over the long term. The region's utilities have boosted funding and personnel for many different programs aiding homeowners, businesses, and industries. The Alliance will continue to push for market transformation in the future and will soon receive its funding from the newly established Oregon Energy Trust, rather than directly from the IOUs in the state.

The goal of organizations such as the Alliance is to make energy efficiency as easy for the public as recycling is now. It should not be something you do to go out of your way for the environment, but just another sound household or business decision—something that makes sense for both the environment and the pocketbook.

Just on the horizon are a number of exciting developments, such as light emitting diode (LED) technology for lighting and microscale heat exchangers that may improve the performance of heating and cooling systems by 30 to 40 percent.

Margie Gardner is the executive director of the Northwest Energy Efficiency Alliance, a non-profit group of electric utilities, state governments, public interest groups and efficiency industry representatives.

Refinements in solar technology allow windows and roofs to collect the sun's heat to generate power, and distributed generation systems allow buildings and homes to have their own power sources.

As efficient as these technologies are, however, none will save much energy if people don't use them. Right now, Oregonians are still lighting their homes and businesses across the state with incandescent bulbs, when compact fluorescent bulbs produce the same light using 75 percent less energy. Over the next decade, Oregon could make dramatic reductions in its energy use by installing energy efficiency technology, especially given the unique opportunity provided by the Oregon Energy Trust.

Renewable Resources in the Northwest:

An Awesome Opportunity

by J. Rachel Shimshak

We are lucky in Oregon. We have clean air, we can see the mountains, and our state has a history of supporting environmentally responsible policies and programs. The reason why we enjoy this high quality of life is that hydropower fuels over half of our economy. Hydro is a renewable resource, and harnessing falling water to make electricity does not pollute our air. *(Please see sidebar on Low Impact Hydro Institute which addresses the issue of hydro sustainability -ed.)* However, coal plants provide most of the remaining 40 percent of the electricity used by consumers. As we move into the next decade our need for more power could shift the balance between these fossil fuels and the relatively clean energy of hydropower.

A report completed by the Northwest Power Planning Council in 2000 concluded that the region must acquire a minimum of 3,000 new megawatts (MW) of energy, about enough to serve four cities the size of Portland, to meet future demand. Utilities, owners of our transmission system, and generators of electric power will soon decide who will produce this power and how they will transmit it. The choices they make will impact the quality of our lives and the lives of the next generation of Northwesterners. Certainly we need to build some new, efficient gas plants to meet our needs. However, if we are to proceed rationally, and in a way that protects our treasured quality of life, the Northwest needs to invest in

conservation and renewables.

Policymakers should make energy efficiency and conservation programs a permanent part of Oregon's energy strategy, as Margie Gardner convincingly argues in her article for this edition of *Oregon's Future*. The second element to the solution, and the focus of this article, is the need to add new renewable resources, such as wind power, to the electric power system.

Wind turbines, as well as geothermal and solar energy facilities, do not use fuel and builders can construct them quickly. The capital costs, though higher than a new gas turbine, are fixed and therefore stabilize rates for the long term. Local resources such as wind farms keep well-paying jobs in our region and don't send hard-earned dollars across the border to pay for fuel.

Wind Power Makes the News

The state of Montana alone has enough wind energy potential to serve 15 percent of our nation's electricity needs. In addition to the environmental benefits of such a new, renewable resource, wind farms provide economic benefits to rural areas. Owners of wind projects lease land from farmers and ranchers and pay them royalties. Royal Raymond, a farmer in Helix, Oregon, has ten turbines on his land. He claims that the extra income from the turbines acts as a "second crop" that helps him stay in the farming business. Because Mr. Raymond can farm right up to the base of each turbine, not much of his property is taken out of production. His only complaint is that there are not enough turbines spread around his land.

Engineers mount wind turbines on steel towers that stand 60 meters tall. The Stateline Wind Project, located in Umatilla County, Oregon, and Walla Walla County, Washington, will include about 400 towers. Turbine manufacturers are hiring the region's metal manufacturers to construct the towers. One turbine manufacturer is even contemplating building a facility here in Oregon. The jobs created in the construction and operation of a wind project not only provide employment for rural areas of the state, but also contribute to local property taxes.

Important Regional Players for Renewables

Fortunately, Bonneville and major Oregon utilities (specifically PacifiCorp, Portland General Electric, and the Eugene Water and Electric Board) exercised

The Hydropower Dilemma: Certifying Low Impact Hydropower Dams

Hydropower presents a dilemma for Oregonians interested in environmentally sound, sustainable energy. Hydropower does not burn fossil fuels, but hydropower dams can block habitat access, impede natural river flows, and degrade water quality. The Low Impact Hydropower Institute (LIHI), based in Portland, can help consumers choose "green" hydropower. LIHI certifies as low impact those hydropower dams that meet criteria in eight key resource areas: river flows, water quality, fish passage, watershed, threatened and endangered species, cultural resources, recreation use, and removal potential. The certification criteria are based on recommendations for environmental protection made by state, federal and tribal resource agencies, and the certification process is open to public comment and appeal. (Certification criteria, pending applications and a list of certification projects are all available at www.lowimpacthydro.org).

Lydia Grimm, Low Impact Hydro Institute

Green Power Trading

The environmental community has a love-hate relationship with using market-based mechanisms to improve environmental quality. From emissions trading to electricity deregulation, the market has been a double-edged sword. For example, electricity deregulation has opened markets to cleaner sources of generation, but it has, in some cases, resulted in lower wholesale prices, making renewable power less competitive.

One promising market mechanism is the trading of Renewable Energy Credits (RECs). Modeled after markets for tradable emissions credits, RECs represent the environmental benefits or "greenness" of power generated by renewable resources such as wind and solar. For each megawatt-hour (MWh) that a renewable power project produces, it is awarded a REC that can be sold separately from the underlying physical electricity generated by the plant. A wind project, for example, which needs $42.00/MWh to break even, can sell its physical power to a utility at the prevailing wholesale market price such as $32.00/MWh and can sell a REC for $10.00/MWh to a retail customer or green power marketer. The combined revenue of $42.00 makes the generator whole. The REC purchase allows power suppliers to market their power as "green power" and it allows residential consumers to invest in renewable energy. Green power marketers typically bundle RECs with system energy and market it as "renewable energy."

To some, this approach is a marketing fiction, but REC sales directly support new renewable power projects and lead to improvements in air quality. Several agencies, including the Attorney General's office, closely monitor REC trading to prevent abuses and double-counting. Some players hope to eventually see a national market for Renewable Energy Credits, which could be an important step in growing the renewable power market.

Elliot Mainzer for Oregon's Future

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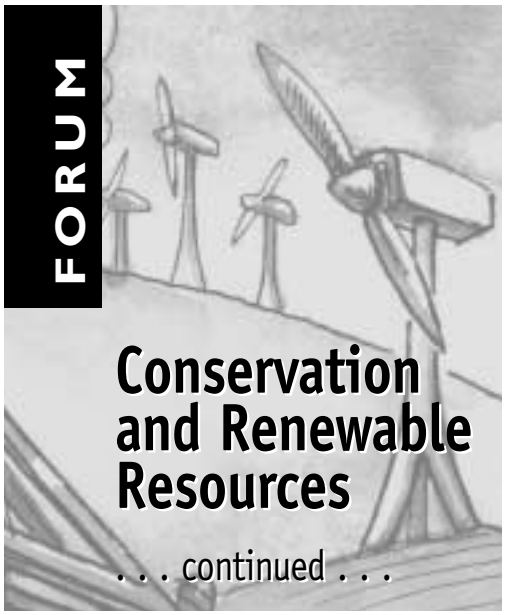

Conservation and Renewable Resources

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early leadership when they developed some small wind, solar, and geothermal projects. These projects, which include the Vansycle Wind Project near Pendleton, demonstrated that renewables can be integrated into our system, sited in our region, and counted on to produce clean energy.

Obligated to provide an additional 3,000 MW to meet the needs of its customer utilities, Bonneville recently requested proposals for 1,000 MW of wind power. The market responded with a vengeance! Bonneville received proposals for over 2,600 MW of wind power and has chosen to move forward with projects that will generate 830 MW of wind power to add to the 400 MW to be generated by projects already underway. The clout of Bonneville brought bid proposals from many new developers. The region's developing competitive market for wind power has reduced its cost by between 4 and 6 cents per kilowatt-hour (KWh). This range is nearly competitive with prices of energy produced from fossil fuels.

In an unexpectedly farsighted move, PacifiCorp Power Marketing (PPM)—a subsidiary of PacifiCorp an investor owned utility that serves customers in six Western states—shocked the region by announcing last fall that it would buy the entire 261 MW output of the Stateline Wind Project (developed by FPL Energy, LLC, a subsidiary of FPL Group). PPM has since indicated its intention to purchase between 1,000-2,000 MW of wind over the next couple of years. PPM recognizes that wind power is cost-effective and that customers want more renewables. Stateline, the anchor tenant for wind power in the region, will be the largest wind project in the West when builders complete it at the end of this year.

An even more diverse group of players is investing in the region's natural renewable power. An affiliate of Golden Northwest Aluminum, Inc., which owns two aluminum plants in the region, is building a wind plant to serve the company's needs. Another, the Blackfeet tribe in Montana, is working with wind developer SeaWest Wind Power, Inc. to develop the first wind project on tribal lands. Even Energy Northwest, the owner of the region's only operating nuclear plant, is developing a wind project for its customer utilities.

Green Power

Over 80 percent of the customers in Oregon can currently choose to purchase a renewable product, also known as "green power," from their local utility. Wind power and community solar projects support the retail green power programs being offered by 15 utilities throughout the region. A growing number of residential and commercial customers, including the Port of Portland, Columbia Steel, and the City of Corvallis, are demonstrating that they care where their power comes from. Northwesterners now purchase over 46 million kilowatt-hours (KWh) of renewable power—they are going green.

The Current Clean Energy Challenge

So if there's all this great renewable activity in the region, why should we worry? Power managers tend to resist the large, upfront costs of building generators fueled by renewable resources, even though the low cost of generation stabilizes prices over the long-term. Altogether, there are about 1,600 MW of wind, solar, and geothermal projects proposed or underway. Compare that to the 16,000 MW of natural gas-powered projects proposed or underway. If developers bring all these gas projects online, their gas turbines will release 53 million tons of carbon dioxide into the atmosphere, the same amount of greenhouse gas released from the gasoline burned by 8 million new cars. To sequester that much carbon and remove the CO_2 from the atmosphere, foresters would have to plant 23 million acres of trees.

House Bill 3283 and Carbon Offsets

In July 1997, the Oregon Legislature passed [SMW1] an innovative measure to confront the problem of global climate change. House Bill 3283, the first of its kind in the United States, requires Oregon's new gas-fired energy facilities to meet a net emissions rate of 0.675 pounds of carbon dioxide per kilowatt-hour. This works out to 17 percent less carbon dioxide than any power plant currently operating in the United States. This is a tall order for power plants, so the law provides them with some flexibility. A plant developer can choose to fulfill Oregon's emissions requirements by providing funds to what the law calls a "qualified nonprofit." This nonprofit uses the funds to undertake projects that offset carbon dioxide emissions that the plant produces.

One such nonprofit is The Climate Trust, originally funded with money from Oregon electric utility operators. The Oregon Energy Facilities Siting Council and energy facilities appoint the Trust's board of directors, and the state audits its operations.

Last year, The Climate Trust funded a landfill gas generation project, a project to stimulate Oregon wind power, an Internet-based car- and vanpool matching project, and two permanent forest sequestration projects. This year, the Trust is working with the Bonneville Environmental Foundation on a project that will retire CO_2 offsets purchased as green tags. The environmental benefits, represented by green tags, will be held in trust and will not be resold to companies for use in meeting emmission caps. The green tags are being purchased from the Bonneville Power Administration (BPA) to assist the development of the new wind project at Condon, Oregon, or another comparable Oregon wind power project. For more information see www.climatetrust.org or send email to info@climatetrust.org.

Kris Nelson for Oregon's Future

The barrier in the market is that the price of renewable resources does not reflect all the environmental and economic benefits they provide. These benefits are directly proportional to what economists call the "external costs" of burning fossil fuels. Air pollution, negative health impacts, and climate changes caused by fossil fuel combustion cost members of society a high price that is not reflected in either fuel prices or electric rates.

Follow-through Is Essential to a Clean Energy Future

Bonneville, PacifiCorp Power Marketing, and many other utilities in the Northwest have already played an important role in developing renewable resources. But it is not enough. In the early and mid 90s, when energy prices were low, Bonneville slashed funding for conservation by 70 percent. To make the Northwest the renewable capital of the country, the region's utilities and marketers will have to remain steadfast in their resolve to follow through with a commitment to conservation and renewables, even if falling prices in the market tempt them to change course.

So if there's all this great renewable activity in the region, why should we worry?

Policy Changes Are Needed

Natural wind cycles set the schedules of wind farms. Wind energy cannot be stored in a barrel and then "burned" when customers call for power. Plant managers of fossil fuel plants, however, can fire them up and transmit power on a schedule that accommodates demand and the transmission system. Owners of the transmission system in the Northwest need to agree on a system of transmission service policies that works with the natural cycles of renewable energy plants.

Both state and federal policies should support the market activities of the region. Congress should extend the wind energy production tax credit and provide the credit to all renewable resources. It should also adopt the renewable portfolio standard sponsored by Sen. Jim Jeffords (I-VT). This standard would ensure that every purchase of energy in the United States contains a minimum amount of new renewable energy. Oregon's electricity restructuring bill, passed by the 2001 Legislature, also provides necessary financial incentives for energy conservation and the development of renewables. Oregonians must support initiatives that help level the playing field and aid Green Power developers in overcoming market barriers.

J. Rachel Shimshak is the director of the Renewable Northwest Project, a regional advocacy organization promoting the implementation of solar, wind, and geothermal resources.