

This Oregon State Summary educates policymakers and the public about EERE investments and their positive impacts in Oregon.

# Oregon


The U.S. Department of Energy (DOE) is pursuing an all-of-the-above approach to developing every source of American energy. The Office of Energy Efficiency and Renewable Energy (EERE) leads DOE efforts to build a strong clean energy economy, a strategy that is aimed at reducing our reliance on foreign oil, saving families and businesses money, creating middle-class jobs, and reducing pollution.

This strategy will position the United States as the global leader in clean energy, increasing our nation's competitiveness. In 2012, \$268 billion was invested globally in clean energy, a 500% increase since 2004.<sup>9</sup> Trillions of dollars will be invested in the coming decades. Clean energy represents one of the most important economic development races of the 21st century. We face a stark choice—the clean energy technologies of tomorrow can be invented and manufactured in Oregon and the rest of the United States for domestic use and export around the world, or we can cede global leadership and import those technologies from China, India, Germany, and elsewhere.



Ocean Power Technologies' PowerBuoy, currently being tested off the Oregon coast, generates power from ocean waves without polluting.

*Photo from Ocean Power Technologies, NREL 22857*



## Oregon's Clean Energy Resources and Economy

- Clean Economy Jobs (2010): 58,700+
- Average Annual Growth Rate of Clean Economy Jobs (2003–2010): 2.2%
- Average Annual Wage of Clean Economy Jobs (\$2009): \$40,072<sup>1</sup>

Oregon's wealth of clean energy resources allows it to generate approximately 80% of its electricity from hydropower and other renewables. While approximately 70% of Oregon's electricity generation comes from hydroelectric dams on Oregon's great rivers, almost 10% comes from other renewable resources.<sup>2</sup> Wind, in particular, plays a large role, contributing 2,513 megawatts of electricity in 2011—ranking Oregon seventh in the nation in wind power production.<sup>3</sup> Oregon also has significant geothermal generation potential, and despite its reputation for cloudiness, Oregon has recently seen growth in solar thermal system installations.<sup>4</sup>

The Oregon state legislature established a renewable portfolio standard, requiring that large utilities obtain at least 25% of their electricity from new renewable generation sources by 2025.<sup>5</sup> In particular, Oregon hopes to encourage the development of distributed generation through small-scale community renewable energy systems. Energy efficiency is prioritized through standards at the state and local levels, such as Portland's requirement that all new public buildings meet the Leadership in Energy and Environmental Design Gold standard.<sup>6</sup> A 3% utility surcharge provides public funding for renewable and energy efficiency projects and supports low-income home and school upgrades. A variety of tax benefits and utility rebate programs provide incentives for individuals and businesses to upgrade buildings and equipment.<sup>7</sup>

Oregon's emphasis on clean energy generation and conservation is yielding sizable economic rewards. Oregon's 58,735 clean economy jobs make up 3.4% of all jobs in the state—the second highest percentage in the nation.<sup>8</sup>

U.S. DEPARTMENT OF  
**ENERGY**

Energy Efficiency &  
Renewable Energy



## EERE and Oregon

EERE helps create Oregon’s clean energy economy today, developing and delivering innovative, market-driven solutions for the following:

- **Sustainable transportation** – making transportation cleaner and more efficient through solutions that put electric drive vehicles on the road and replace oil with clean domestic fuels
- **Renewable electricity generation** – reducing the cost of renewable energy through solutions that squeeze more usable power from sustainable resources and improve the economics of manufacturing and installation
- **Energy-saving homes, buildings, and manufacturing** – developing cost-effective energy-saving solutions that help make our country run better through increased efficiency—promoting better plants, manufacturing processes, and products; more efficient new homes and improved older homes; and other solutions to enhance the buildings in which we work, shop, and lead our everyday lives.

## EERE Investments in Oregon

EERE invests in Oregon through a broad range of clean energy projects, from energy efficiency to solar, geothermal, wind, fuel cells, vehicles, biofuels, and other technologies. Through the research, demonstration, and deployment activities we conduct with Oregon and its businesses, universities, nonprofits, and local governments, EERE supports cities, communities, and families to develop innovative, cost-effective energy solutions.

### Sustainable Transportation



#### Battery Manufacturer Brings Material Production Home



Albany, Oregon  
EERE investment: \$21.3M

**EnerG2**, supported by American Recovery and Reinvestment Act (ARRA) funds from EERE, built a new plant to produce nano-engineered carbon materials for batteries and other energy storage devices that can be used in hybrid, electric, plug-in hybrid, and all-electric vehicles. EnerG2’s proprietary Carbon Technology Platform supports manufacture of this particular form of carbon, which can be used in ultracapacitors, lithium-ion batteries, and advanced lead acid batteries. These batteries enable electric drive vehicles to consume less petroleum and produce less pollution than conventional vehicles. At full capacity, the EnerG2 plant will produce enough advanced carbon material to produce 60,000 electric

drive vehicles each year. In addition to ARRA funds, the company has raised more than \$23 million in venture capital, received a \$1.8 million grant and loan package through the State of Washington’s State Energy Program, and has invested more than \$7.4 million of its own money. Prior to EERE’s engagement with EnerG2, the company was using outsourced facilities to produce these materials; most other producers of similar materials are located in Asia. Now, domestic manufacturers are supplying most of the project’s equipment, and this project is helping to build out a domestic industry that creates jobs for U.S. workers.



ZeaChem’s 250,000-gallon-per-year cellulosic biorefinery in Boardman, Oregon, will deploy its hybrid biochemical and thermochemical technology to produce fuel-grade ethanol from poplar and other feedstocks. *Photo from ZeaChem*

#### ZeaChem Completes a Cellulosic Ethanol Plant



Boardman, Oregon  
EERE investment: \$25M

**ZeaChem**, with support from EERE, is on track to complete a 250,000-gallon-per-year biorefinery in Boardman, Oregon. The facility will convert 10 tons per day of hybrid poplar trees and other biomass resources into cellulosic fuel ethanol and industrial chemicals. The process first produces an industrial sugar stream, which is then fermented into acetic acid; this acid is converted into ethyl acetate, which is then converted into fuel ethanol. ZeaChem began commissioning the plant’s operations in November 2012. ZeaChem anticipates that, once complete, its commercial biorefinery will achieve a 95% reduction in life-cycle greenhouse gas emissions for fuel production compared to conventional gasoline production. This biorefinery has also created jobs, employing approximately 20 full-time workers. Once ZeaChem demonstrates and deploys this process, it has the potential to create many more jobs throughout the United States through the construction of additional biorefineries. ZeaChem contributed \$6.25 million to this project.<sup>10</sup>



## Manufacturer Developing Fuel Efficient Class 8 Truck



Portland, Oregon  
EERE investment: \$39.6M

**Daimler Trucks North America**, matching EERE ARRA funds with \$39.6 million of its own, is working to develop cost-effective measures to improve the efficiency of Class 8 long-haul tractor-trailer combination trucks by 50% by 2015—which would save more than \$15,000 per truck per year in fuel costs. Under the SuperTruck initiative, Daimler and three other industry teams are designing completely new vehicles to demonstrate innovative fuel-saving technologies, including

- Downsizing the engine
- Electrifying auxiliary systems, such as oil and water pumps, reducing vehicle weight with new materials
- Recovering waste heat from the engine
- Improving aerodynamics
- Hybridizing the entire vehicle.

Commercial vehicles are essential to the economy, hauling 70% of goods the United States produces and consumes and consuming almost 23% of the oil used in on-road highway transportation. Because fuel costs can erode already-narrow profit margins, the commercial vehicle market is often an early adopter of fuel-efficient technologies. Increasing the freight-hauling efficiency of these vehicles by 50% would substantially strengthen the country's energy and economic security.



Under the the EERE SuperTruck Initiative, Daimler Trucks North America is working on creating new fuel-efficient vehicles, which will save money and strengthen U.S. energy and economic security.

*Photo from Daimler Trucks*

## Clean Cities Coalitions Help Stakeholders Choose Smart Transportation Solutions



Salem and Medford, Oregon  
EERE investment: \$30K annually to each coalition

EERE coordinates a network of nearly 100 Clean Cities coalitions—self-organized groups of local community, government, and business stakeholders whose efforts to adopt smart transportation solutions have displaced more than 4.5 billion gallons of gasoline and diesel since 1993. Oregon is home to two Clean Cities coalitions: **Columbia-Willamette** and **Rogue Valley**. Clean Cities' efforts to adopt smart transportation solutions have displaced more than 4.5 billion gallons of gasoline and diesel fuel since 1993. EERE provides these groups with information, professional development opportunities, non-financial project support, and other forms of technical assistance. In 2011, the two coalitions reduced fuel consumption by nearly the equivalent of 12.9 million U.S. gallons of gasoline and prevented more than 118,000 tons of greenhouse gas emissions. The coalitions include more than 460 businesses, local governments, and other organizations, and they promote the use of the more than 860 alternative fueling and charging stations in the state.

## Community Readiness Project Helps State Get Ready for Electric Vehicles



Salem, Oregon  
EERE investment: \$485K

In cooperation with Clean Cities, the **Oregon Business Development Department** is developing a comprehensive market analysis and statewide strategy to prepare Oregon for the large-scale use of plug-in hybrid and all-electric vehicles. The strategy will include public outreach and planning for the placement of electric vehicle charging equipment and will serve as a roadmap to reach the state's goal of having 30,000 plug-in vehicles on the road by 2015. In addition, the project is working to bring all of Oregon's existing efforts, stakeholders, and partnerships around plug-in electric vehicles together to maximize their reach and impact. As Oregon is one of the first states investing in the adoption of plug-in electric vehicles, a number of electric vehicle manufacturers are using the state as a launch market. The relative ease of purchasing and using plug-in vehicles in Oregon is likely to influence the nationwide market for these vehicles. This project will help lower market, informational, and permitting barriers, as well as streamline processes to smooth the transition to electrified transportation.





## Renewable Electricity Generation



### Enhanced Geothermal Systems' Newberry Demonstration Project Extracts Energy from Hot, Dry Rock



Bend, Oregon  
EERE investment: \$21.4M

The **AltaRock** Enhanced Geothermal Systems (EGS) demonstration project, at Newberry Volcano near Bend, Oregon, represents a key step in geothermal energy development—demonstrating that an engineered geothermal reservoir can be developed at a greenfield site. The concept behind heat extraction from EGS is similar to that of a radiator, in which cold water is heated by circulating it through a very hot substrate. In this case, water is circulated through cracks in hot rocks more than 6,000 feet below the surface that are created or extended via fluid injection. Unlike conventional geothermal energy extraction, which relies on locating basins of heated water, EGS' technology creates reservoirs to tap the energy found in hot, dry, underground rock. The heated water is brought to the surface, used to power an electric generator, and then re-injected at depth. AltaRock has invested \$22.6 million in the Newberry project, which is currently EERE's largest geothermal investment. In 2012, the project succeeded in creating three reservoirs from a single geothermal well—a critical achievement for lowering the cost of geothermal development.

### Establishing a Testing Center for Wave and Tidal Energy Technologies in the Pacific Northwest



Corvallis and Newport, Oregon  
EERE investment: \$13.1M

Through a partnership with EERE and the University of Washington (UW), **Oregon State University** (OSU) has developed the Northwest National Marine Renewable Energy Center (NNMREC)—a research hub that provides a full range of capabilities to support U.S. wave and tidal energy development and demonstration. NNMREC activities facilitate the commercialization of wave and tidal energy technologies, inform regulatory and policy decisions, evaluate potential environmental impacts, and resolve key knowledge gaps about these technologies. Ongoing Center research involves collaboration on and optimization of marine renewable and other renewable energy technologies. At the successful completion of the project, NNMREC is expected to serve as an integrated, standardized test center for developers of wave and tidal energy in the United States and globally. OSU, UW, and other project participants are contributing \$7.9 million to this project.

### EERE-Funded Project Aims to Stabilize the Energy Grid



Bend, Oregon  
EERE investment: \$3.1M

With EERE support, **AE Solar Energy** is demonstrating and commercializing a set of new technologies that can increase the stability, reliability, and functionality of the electricity grid—improvements that are becoming more essential as more solar energy systems come online. The company's projects include

- Creating a method to reliably detect a loss of connection to the utility without “false trips”—unexpected and unnecessary disconnections from the grid due to fluctuations in output
- Utilizing advanced photovoltaic (PV) control systems to ensure that deploying high amounts of PV does not cause excessive power losses in electric distribution circuits or cause adverse interactions with utility voltage regulation equipment
- Adding energy storage to PV installations to smooth output fluctuations caused by passing clouds, relieving stress on other generation sources that may need to compensate for those fluctuations.

These capabilities are all designed to help utilities view PV as an asset to their electrical grid, to significantly reduce high-penetration PV costs, and to increase the amount of PV power that can be used on the nation's grids.

### Ocean Power Technologies, Inc.: Testing the PowerBuoy



Reedsport, Oregon  
EERE investment: \$2.4M

With funding from EERE, **Ocean Power Technologies** (OPT) is deploying a full-scale, 150-kilowatt PowerBuoy, which essentially consists of an open steel cylinder that extends downward into the ocean from a floating buoy. The U.S. Federal Energy Regulatory Commission granted OPT a license in mid-2012 to deploy up to 10 PowerBuoys off the coast of Reedsport for grid-connected wave energy production. The cylinder contains a piston that moves up and down as waves pass and apply pressure to seawater, which then passes through a turbine to drive a generator to produce power. Over a 2-year period, OPT will test this wave energy device in the Oregon Territorial Sea and collect detailed operating characteristics. The specific performance and reliability data OPT collects will help develop manufacturing processes to maximize production and minimize costs for PowerBuoy deployment in future wave energy installations. Wave power devices generate electricity without emitting greenhouse gases or other pollutants, and their fuel—wave pressure from seawater—is free. OPT and other project participants are contributing \$2.4 million to this project.



## Northwest Energy Innovations: Moving Wave Energy toward Commercialization



Newport, Oregon  
EERE investment: \$1.8M

In collaboration with EERE and the Northwest National Marine Renewable Energy Center (NNMREC), **Northwest Energy Innovations** (NWEI) recently used targeted hydrodynamic testing to verify the functionality of its Wave Energy Technology-NZ (WET-NZ) device. The device, of a type known as a “point absorber,” consists of a float anchored to a heavy, water-filled hull. Passing waves cause the float to move relative to the hull, and the device generates electricity by extracting energy from this motion. The WET-NZ is innovative in that it captures energy from both the “heave” (up-and-down) and “surge” (back-and-forth) motions of waves. Previous point absorber technologies captured energy from only one of these motions. In the summer of 2012, the WET-NZ was deployed off the coast of Oregon, connected to NNMREC’s Ocean Sentinel device testing platform, and tested for six weeks. This project has gathered data that will be used to improve cost-of-energy calculations and better understand the performance of the WET-NZ design. This latest round of testing is expected to bring NWEI’s device to an advanced stage of development and position it for full-scale deployment of a pre-commercial prototype device, and if successful, commercial development in U.S. waters will follow. NWEI and its partners are contributing \$1.2 million to this project.

## Rural Cooperative Develops Geothermal Power Alongside Agriculture



Paisley, Oregon  
EERE investment: \$2M

With an EERE investment, **Surprise Valley Electrification Corporation** is developing geothermal electric power on a cooperative member’s ranch in Paisley. The ranch houses an existing well—which is used to irrigate alfalfa—that produces 1,200 gallons of water per minute at 239°F. A 2008 feasibility assessment concluded that this resource was viable for both electric production and aquaculture operations; production and injection wells have since been successfully drilled. The site is expected to produce 3.1 megawatts of electricity, enough to power approximately 3,000 homes. This successful site may catalyze the development of small, low-temperature resources throughout the region. EERE’s partners contributed \$7.5 million to this project.



Steam rises from a geothermal electric power project on a Paisley, Oregon, ranch. This project is expected to produce 3.1 megawatts of electricity, enough to power approximately 3,000 homes.

*Photo from Oregon energy department*

## Columbia Gorge Community College: Getting Hands-On With Wind Energy



The Dalles, Oregon  
EERE investment: \$238K

With EERE support, **Oregon’s Columbia Gorge Community College** (CGCC) acquired, transported, and installed a new V27 nacelle (the housing and mechanical components of a wind turbine) in its Renewable Energy Technology (RET) laboratory building for its Wind Energy Workforce Training Nacelle Project. With support from the U.S. Department of Labor, the State of Oregon, some wind energy companies, and EERE, the RET program has grown to more than 100 annual participants since its inception in 2007. The project also provided additional opportunities for hands-on training. For example, students transported and erected a 4.5-kilowatt vertical axis wind turbine on campus. As part of the curriculum, students disassemble and reassemble the V27 nacelle each spring term. The vertical turbine and anemometers (wind speed gauges) are used to track wind direction and speeds on campus, and the students conduct annual maintenance on the turbine. CGCC’s project partners contributed \$17,299 to this project.



## Energy-Saving Homes, Buildings, and Manufacturing



### Wireless Infrastructure for Performance Monitoring, Diagnostics, and Control in Small Commercial Buildings



Lake Oswego, Oregon  
EERE investment: \$1.4M

With EERE assistance, **NorthWrite Inc.** developed an innovative wireless technology platform for energy performance monitoring, diagnostics, and controls in small commercial buildings. NorthWrite designed the system to monitor and diagnose packaged rooftop heating, ventilation, and air conditioning units. The system has the capacity to continually diagnose and identify errors, such as when lights and equipment have been left on during non-working hours. By integrating the hardware that is necessary for a building control network, NorthWrite has commercialized a fully integrated family of energy information management software that will enable both small and large business to realize significant energy savings. NorthWrite has successfully installed thousands of its systems nationwide. One notable example involves the headquarters of the American Society of Heating, Refrigerating and Air Conditioning Engineers' headquarters, where the system produced more than 30% in energy savings. NorthWrite contributed \$418,768 to this project.



Oregon's State Energy Efficient Appliance Rebate Program provides low-income homeowners with rebates on energy-efficient equipment, as well as ENERGY STAR™ qualified appliances, including water heaters. *Photo by Warren Gretz, NREL 03062*

### Energy Trust of Oregon Provides Incentives for Highly Insulating Windows



Statewide, headquartered in Portland

The **Energy Trust of Oregon**, one of EERE's Windows Volume Purchase (WVP) program partners, was already providing incentives for ENERGY STAR™ windows and needed a higher performance tier. Currently, WVP allows potential buyers of highly insulating windows and storm windows to obtain bids from a consortium of qualified window vendors, and it brings buyers and industry partners together to overcome the price barrier of highly insulating windows and low-emissivity storm windows. The Energy Trust's new tier aligned with WVP requirements (a U-factor of around 0.2) and enabled incentives to purchase such windows, which accelerated demand and drove increased supply of these products. As a result, electric- and gas-heated homes were eligible for an incentive of \$3.50 per square foot of windows installed with U-Values 0.22 or less. While the incentive is no longer offered, utilities and energy trusts around the country are giving new consideration to high-performance window incentives and rebates. The principal barrier to widespread market commercialization of high-performance windows is cost, which is expected to decrease as production increases. EERE is working with industry and potential buyers to lower costs and make these energy-efficient products more readily available.<sup>11</sup>

### Oregon State Energy Efficiency Appliance Rebate Program Helps Low-Income Families



Statewide  
EERE investment: \$3.6M

The **State Energy Efficient Appliance Rebate Program (SEEARP)** provides low-income Oregon homeowners with rebates on energy-efficient equipment. SEEARP began in January 2010 with a 70% reimbursement (up to \$2,000) on ENERGY STAR® qualified heat pumps and furnaces. It was later expanded to include ENERGY STAR™ qualified water heaters, refrigerators, dishwashers, and clothes washers. Oregon residents received more than 3,200 rebates. Through this statewide program, homeowners are saving every day through their energy-efficient, cost-efficient appliances. Appliances installed under this program will save Oregonians an estimated 884,000 kilowatt hours of electricity per year—equivalent to the annual electricity consumption of more than 70 homes.





## Clean Energy Works Oregon Coordinates Energy Efficiency Efforts



Statewide

EERE investment: \$20M

**Clean Energy Works Oregon (CEWO)** is a non-profit program that reduces energy waste and helps homeowners by simplifying and facilitating the transformation of Oregon's existing houses into comfortable energy-efficient homes. Using EERE funding, CEWO offers home energy assessments (valued at \$500) and advice from independent energy advisors, who are Home Performance with ENERGY STAR® qualified and certified through the Building Performance Institute (BPI), at no cost to consumers. Homes that can achieve energy savings of 15% or more are eligible for low-cost, long-term financing to cover the cost of home upgrades, and loan obligations can be repaid through additions to homeowners' monthly utility bills. Since June 2012, CEWO has completed more than 3,800 residential evaluations and 1,600 residential energy upgrades and provided 1,500 residential loans totaling more than \$19 million. CEWO estimates that for every 100 projects completed, 10 construction jobs are created, \$1.4 million in economic activity is generated, and homeowners save \$28,000 in annual energy costs.<sup>12</sup>

## Oregon State Trains the Next Generation of Energy Professionals



Corvallis, Oregon

EERE investment: \$300K

The Industrial Assessment Center at **Oregon State University (OSU)** provides eligible small- and medium-sized manufacturers with no-cost energy assessments and serves as a training ground for the next generation of energy-savvy engineers. Since its inception in 1987, OSU has performed 592 assessments, helping participants save almost \$45 million in energy costs and more than 3.8 trillion British thermal units annually.

## Deploying Clean Energy Solutions in Oregon Communities

EERE invests in the deployment of energy efficiency and renewable energy projects in communities across Oregon. These investments catalyze economic development, create jobs, generate clean energy, and reduce utility bills. Many of these investments have been American Recovery and Reinvestment Act (ARRA) funds. Of the more than \$125 million in ARRA funds allocated to the State of Oregon from EERE specifically for deployment projects, nearly 98% has been spent as of January 2013 through the Energy Efficiency and Conservation Block Grant Program, State Energy Program, and Weatherization Assistance Program.

## Building Clean Energy Infrastructure

With financial and technical support from EERE, energy officials at the state level, and in 35 communities, have selected and overseen the completion of hundreds of projects that are delivering the benefits of clean energy to citizens throughout Oregon. EERE allocated more than \$80 million in ARRA funds to support activities that

- Contributed to increased energy efficiency and cost savings for more than 4,000 buildings (more than 30 million square feet) through building retrofits
- Installed nearly 80 renewable energy systems with a capacity of over 19,000 kilowatts, including wind, solar, and geothermal energy systems
- Funded more than 300 workshops, teaching approximately 12,000 people to perform energy audits and install renewable energy systems
- Installed approximately 1,500 energy-efficient streetlights and 13,000 energy-efficient traffic signals.

## Weatherizing Homes for Lower Income Families

Oregon has spent most of the nearly \$46 million in ARRA funds it received to weatherize 10,200 homes—just shy of doubling its ARRA goal of weatherizing 5,200 homes. Statewide, this has resulted in annual energy savings of more than 300 billion British thermal units and has averted nearly 30,000 metric tons of carbon pollution to date—the equivalent of taking more than 6,200 passenger vehicles off the road for a year. These projects have enabled income-eligible families to save hundreds of dollars per year on heating and cooling bills by improving their homes' energy efficiency, as well as the health and safety of home environments.<sup>13</sup>

## Deployment Project Examples in Oregon Communities

### NeighborImpact Program Expands, Saves Energy for Oregon Residents



Crook, Deschutes, and Jefferson Counties

EERE investment: \$2.8 million

**NeighborImpact**—a private, nonprofit organization established to serve and speak out for economically disadvantaged people in Central Oregon—expanded its weatherization program, which allowed local agencies to provide increased weatherization services to communities in need. This investment allowed NeighborImpact to weatherize 304 additional homes, install photovoltaic panels on more than 80 low-income housing units, and install ductless heat pumps on another 40 units. These improvements will help low-income Oregonians save on their electric and heating



bills. NeighborImpact worked with eight local contractors to complete the weatherization work, keeping an average of four local contractors employed full time.

### Portland Rolls Out Pilot Clean Energy Fund



Portland, Oregon  
EERE investment: \$1.5M

The **City of Portland** began the initial capitalization of a revolving loan fund (RLF) to be used for residential retrofits. An RLF is a long-term funding mechanism meant to extend the impact of ARRA funds. Its goal is to overcome historical barriers that have prevented homeowners from installing energy efficiency measures in the past. With an investment of \$1.1 million in RLFs and more than \$412,000 in loan loss reserves (LLR), the project enables homeowners to access low-interest, long-term financing for quick, easy, and affordable investments in energy efficiency. The city launched the pilot program in 2009, and the LLR was established in late 2010. This pilot is helping the city and its partners provide simplified financing with no up-front costs. The project also provides “one-stop-shop” supportive services, including pre-approved contractors, lenders, rebates, and quality assurance, as well as the program’s Energy Advisors, which provide homeowners with independent advice throughout the project.

### Energy Efficiency Retrofits in a Dallas School District



Dallas, Oregon  
EERE investment: \$1.1M

The **Dallas School District** completed energy-efficiency retrofits to several school buildings. The district performed upgrades on lighting and heating, ventilation, and air conditioning systems, which included boiler replacements, steam trap repairs, window replacement, and full direct digital control (DDC) systems installations. The district expects to save \$93,000 per year in natural gas costs, with additional electrical savings from the DDC installation.<sup>14</sup>

### K-12 School Rebuilding



Vernonia, Oregon  
EERE investment: \$1M

The **City of Vernonia** incorporated energy efficiency measures throughout, including an efficient integrated heating and cooling system into its rebuilt school. Two “500-year floods” struck Vernonia in an 11-year period, severely damaging area schools. The city used these funds to upgrade the building envelope and lighting, which is expected to reduce the school district’s annual energy usage by more than 40%, saving taxpayers more than \$60,000 per year. Additionally, the

new school will serve as a laboratory for forest technologies and resource education. Leveraging this funding, the city also purchased a biomass boiler, which will provide the school district with additional energy savings. Wood pellets produced from forest restoration efforts will feed the boiler and provide heat and power to the school.

### Biodiesel Production Facility Expands on Umatilla Reservation



Umatilla Indian Reservation  
EERE Investment: \$65K

The **Confederated Tribes of the Umatilla Reservation** (CTUIR) Department of Science and Engineering added capacity to its existing biodiesel production facility. The facility produces biodiesel for use in tribal fleet and farm equipment, using cooking oil from the CTUIR casino and resort restaurants. The biodiesel facility is also available for tribal members and other departments to dispose of used cooking oil and animal fats for supervised processing. The facility is expected to produce at least 40,000 gallons of biodiesel per year. This local, independent, and sustainable fuel source for tribal fleet and farm equipment is expected to provide significant cost savings to the tribe, while reducing its consumption of fossil fuel. Additional benefits include recycling used fats, oil, and grease from tribal operations and households and diverting them from municipal solid waste and water sources, as well as educating students and other tribal members about renewable energy technologies.



Despite Oregon’s cloudy weather reputation, installations of solar thermal systems have been on the rise throughout the state.

*Photo by Dennis Schroeder, NREL 22167*





## Solar PV Installation for Media Center



Confederated Tribes of Warm Springs  
(CTWS) Reservation of Oregon

EERE investment: \$55K

The **CTWS Reservation of Oregon** installed an 11-kilowatt solar array on a newly constructed, award-winning media center that houses KWSO, a non-profit FM radio station, and *Spilyay Tymoo*, a biweekly newspaper. The media center was designed to include several energy-saving elements, including a roof specifically designed to hold solar PV panels and a ground-source heat pump. The solar panels are expected to provide up to 60% of the electricity consumed at the media center and highlight the building's green features, including bamboo floors, recycled carpet, thermal pane windows, and low-maintenance (low water use) native vegetation around the building.

## Lighting Upgrade to Rural Historic School House



Pinehurst, Oregon

EERE investment: \$23K

The **State of Oregon** upgraded the lighting at Pinehurst School, a historic rural two-room schoolhouse. New light fixtures improved lighting throughout the school, increased safety in the gymnasium, and eliminated unwanted sounds from old fixtures that distracted students and staff. The school expects to save approximately \$1,700 per year, which will be used to employ a part-time librarian. The Pinehurst School had a capital improvement budget of just \$1,000 for the 2010–2011 school year and would not have been able to fund a lighting retrofit of this scale without this investment.<sup>15</sup>

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<sup>3</sup>"2011 Wind Technologies Market Report." EERE, August 2012. [http://www1.eere.energy.gov/wind/pdfs/2011\\_wind\\_technologies\\_market\\_report.pdf](http://www1.eere.energy.gov/wind/pdfs/2011_wind_technologies_market_report.pdf).

<sup>4</sup>"Oregon State Profile and Energy Estimates." EERE, July 2012. <http://www.eia.gov/beta/state/analysis.cfm?sid=OR>.

<sup>5</sup>"Database of State Incentives for Renewables & Efficiency." EERE, 2012. [http://www.dsireusa.org/incentives/incentive.cfm?Incentive\\_Code=OR22R&re=0&ee=0](http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OR22R&re=0&ee=0).

<sup>6</sup>"Database of State Incentives for Renewables & Efficiency." EERE, 2012. [http://www.dsireusa.org/incentives/incentive.cfm?Incentive\\_Code=OR16R&re=0&ee=0](http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OR16R&re=0&ee=0).

<sup>7</sup>"Database of State Incentives for Renewables & Efficiency." EERE, 2012. <http://www.dsireusa.org/incentives/index.cfm?re=0&ee=0&spv=0&st=0&srp=1&state=OR>.

<sup>8</sup>"Sizing the Clean Economy." The Brookings Institution and Battelle, 2011. <http://www.brookings.edu/about/programs/metro/clean-economy/metro-profiles>.

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<sup>10</sup>"High Yield Hybrid Cellulosic Ethanol Process Using High-Impact Feedstock for Commercialization." EERE, 2012. [http://www1.eere.energy.gov/biomass/pdfs/libr\\_arra\\_zechem.pdf](http://www1.eere.energy.gov/biomass/pdfs/libr_arra_zechem.pdf).

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# A Proven Track Record

Snapshot of National Outcomes from EERE Investments

## EERE's Return on Investment for Clean Energy Technologies

- EERE's \$931 million investment in vehicles combustion engine R&D from 1986 to 2007 achieved a net benefit of \$69 billion (2008 dollars) in fuel savings for users of heavy-duty diesel trucks.<sup>16</sup>
- EERE's \$3.7 billion investment in solar photovoltaic R&D from 1975 to 2008 resulted in a net economic benefit of \$15 billion (2008 dollars) due to module efficiency and reliability improvements.<sup>17</sup>
- EERE's \$1.7 billion investment in wind energy R&D from 1976 to 2008 resulted in a net economic benefit of \$8.7 billion (2008 dollars) due to wind turbine efficiency, energy capture, and reliability improvements.<sup>18</sup>
- A 2001 National Academy of Sciences analysis found that investments of \$1.6 billion in energy efficiency R&D in the first two decades of DOE's existence from 1978 to 2000 realized a net economic benefit of approximately \$30 billion (1999 dollars).<sup>19</sup>

## Sustainable Transportation

- EERE research has helped reduce production costs of automotive lithium-ion batteries by more than 50% since 2008 and is on track to reach its goal of enabling cost-competitive market entry of plug-in hybrid electric vehicles within the next 10 years.
- EERE's activities to achieve cost-competitiveness for biofuels have resulted in the recent achievement of reaching a modeled cellulosic ethanol production cost of \$2.15 per gallon of ethanol (or \$3.27 per gallon of gasoline equivalent).
- EERE's efforts have reduced the projected costs of automotive fuel cells (assuming high-volume manufacturing) by more than 35% since 2008 and 80% since 2002—doubling the durability of fuel cells from 950 hours of demonstrated operation in 2006 to more than 2,500 hours of operation on the road.<sup>20</sup>

## Renewable Electricity Generation

- Without EERE involvement, the average solar photovoltaic (PV) module production cost per watt would have been \$5.27 in 2008, rather than \$1.92. EERE has accelerated solar industry progress by an estimated 12 years.<sup>21</sup>
- Without EERE involvement, cumulative wind power deployment through 2008 would have been less than a third of actual 2008 levels. EERE has accelerated the overall progress of the wind industry by an estimated 6 years.<sup>22</sup>

## Energy-Saving Homes, Buildings, and Manufacturing

- More than 6,200,000 homes have been weatherized with EERE funding provided to states or leveraged from other sources with EERE support since 1976—creating an average energy savings of \$350 or more per year and avoiding \$1.6 billion in energy costs during winter 2005 alone for all households weatherized.<sup>23</sup>
- Due to EERE appliance standards implemented through 2012, a typical household today already saves about \$180 per year off its utility bills. Households can expect to save more than \$300 per year by 2030, as they replace their existing appliances with newer models that use less energy—a cumulative savings to consumers of more than \$900 billion by 2020, and more than \$1.6 trillion through 2030. The cumulative energy savings of these standards phased in through 2012 will be about 70 quadrillion British thermal units (quads) of energy through 2020, and will amount to 120 quads through 2030. (The United States consumes a total of about 100 quads of energy per year.)<sup>24</sup>
- EERE and its partners in the manufacturing sector have successfully launched 220 new, energy-efficient technologies, received 78 R&D 100 Awards, and delivered technical assistance to more than 33,000 industrial plants.<sup>25</sup>
- Since 2005, EERE has facilitated \$3.1 billion of efficiency investments in federal government facilities from performance-based contracts, which will result in energy cost savings of approximately \$8.5 billion over the life of the energy-saving measures. The savings on utility bills and operation and maintenance created through the facility upgrades will be used to pay for the project over the term of the contract, and the agencies will continue to save money and energy after the contract term has ended.<sup>26</sup>

The Office of Energy Efficiency and Renewable Energy is at the center of creating the clean energy economy today. We lead U.S. Department of Energy efforts to develop and deliver market-driven solutions for renewable electricity generation; sustainable transportation; and energy-saving homes, buildings, and manufacturing. To learn more about the activities of the Office of Energy Efficiency and Renewable Energy, visit [eere.energy.gov](http://eere.energy.gov). If you have questions or comments about the information in this document, please contact us at [EE.Communications@ee.doe.gov](mailto:EE.Communications@ee.doe.gov).