



Wastewater Facilities Give Energy Costs the Full Treatment

Energy efficiency and on-site renewable energy help plants curb operating costs and generate power from available resources.

Wastewater treatment is an energy intensive process. Electricity is required for almost every stage of the treatment process, from collection of raw sewage to discharge of treated effluent. With pumps, motors and other equipment operating 24 hours a day, seven days a week, it's no surprise that wastewater recovery facilities are among the largest consumers of energy in a community—and among the largest contributors to greenhouse gas emissions.

The good news is wastewater facilities throughout Oregon are achieving substantial energy and financial savings through operational and maintenance changes and capital improvements. Their investment in energy efficiency has allowed them to stabilize rates, meet local sustainability goals and improve effluent quality.

Energy Trust of Oregon is committed to helping wastewater facilities pursue these goals. Our highly skilled energy experts understand the specific needs of a facility, providing technical assistance and cost analyses that make it easy for you to make the best decision for your plant and community. We offer cash incentives for capital equipment upgrades, operations and maintenance improvements, Strategic Energy Management and generating clean, renewable energy.

Energy Trust offers technical assistance and cash incentives for:

- High-efficiency pumps, motors and blowers
- Advanced aeration
- Variable frequency drives
- Pipeline optimization
- New or optimized sensors and controls
- High-efficiency lighting
- Strategic Energy Management
- Solar electric
- Biopower



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We're already talking to Energy Trust about additional projects that deliver excellent savings.

Gary Breilinski,
superintendent,
Grants Pass Water
Restoration Plant

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GRANTS PASS LIGHTS THE WAY TO ENERGY-EFFICIENT DISINFECTION

Years ago, the Grants Pass Water Restoration Plant was among the first on the West Coast to use ultraviolet (UV) disinfection. Today, the plant is again at the forefront by upgrading to the latest UV technology—an investment that is trimming annual energy costs by an estimated \$35,295.

The original UV system at the activated sludge secondary treatment plant had become cost-prohibitive to repair, prompting the city's engineering design consultant to contact Energy Trust for help. “We'd worked with Energy Trust previously to upgrade efficiency at our water plant and to install energy-efficient lighting, so approaching them seemed like a good place to start,” said Joey Wright, project specialist, Grants Pass Public Works Department. “Energy Trust engineers evaluated the plant's overall process before coming up with solutions. They even held a workshop with us to explain all the options.”

The end result was to replace the existing medium-pressure lamp UV disinfection system with a new low-pressure, high-output lamp UV system that provides just the right amount of disinfection. Coupled with program logic controls, the new system resulted in a 66 percent reduction in energy used for disinfection.

“When Energy Trust calculated the savings for us, it was an eye opener,” Wright said.

Grants Pass received a \$206,995 cash incentive from Energy Trust toward the cost of the project, which came in at \$747,070.

The new system is providing benefits in addition to lower operating costs. “We're getting better disinfection, and our maintenance and demand energy costs are down,” said Gary Breilinski, superintendent, Grants Pass Water Restoration Plant.

PROJECT-AT-A-GLANCE

ESTIMATED SAVINGS

- 662,187 annual kilowatt hours
- 315 annual tons of carbon dioxide

FINANCIAL ANALYSIS

- \$35,295 estimated annual energy cost savings
- \$747,070 project cost
- \$206,995 Energy Trust cash incentive



WINSTON-GREEN'S AERATION BLOWER DELIVERS 35 PERCENT SAVINGS AND MORE PRECISE CONTROL

Aging aeration blowers at the Winston-Green Wastewater Treatment Plant, located in Winston, had become a maintenance dilemma. That problem turned into a plus when the plant replaced two 40-horsepower centrifugal blowers with a single, 75-horsepower hybrid blower controlled by a 100-horsepower variable frequency drive (VFD). The new equipment not only cuts annual energy costs by nearly \$7,200, but gives plant employees better control of dissolved oxygen in the treatment process.

"Before, our blowers were always either on or off; there was no in-between" said Chris Sherlock, plant superintendent. "With the hybrid blower and VFD, we're now able to adjust the blower according to fluctuating demand."

Controls on the new system are more sophisticated, with a range of set points that translate into more precise process control. "The equipment automatically senses and adjusts for dissolved oxygen," Sherlock said.

Energy Trust prepared an engineering study on the new technology prior to installation and later provided a \$40,552 cash incentive on the \$103,600 project cost.

"The information Energy Trust presented to us was detailed and timely. They made it easy to decide to move forward."

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This was our first process-related Energy Trust project and the entire process was easy. We'll turn to them again when it's time to upgrade or replace aging equipment.

Chris Sherlock, plant superintendent,
Winston-Green Wastewater Treatment Plant

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PROJECT-AT-A-GLANCE

ESTIMATED SAVINGS

- 133,543 annual kilowatt hours
- 63 annual tons of carbon dioxide

FINANCIAL ANALYSIS

- \$7,185 estimated annual energy cost savings
- \$103,584 project cost
- \$40,552 Energy Trust cash incentive





PROJECT-AT-A-GLANCE

ESTIMATED SAVINGS

- 977,729 annual kilowatt hours
- 464 annual tons of carbon dioxide

FINANCIAL ANALYSIS

- \$66,272 estimated annual energy cost savings
- \$22,555 Energy Trust cash incentive

ALBANY UNCOVERS 16 PERCENT SAVINGS THROUGH STRATEGIC ENERGY MANAGEMENT

Investing in energy efficiency is nothing new at the City of Albany Water Reclamation Facility. Over the years, capital improvements in equipment and controls have trimmed the plant's annual energy costs by \$128,000. What is new is the city's decision to seek deeper savings by participating in Energy Trust's Strategic Energy Management initiative, uncovering an additional \$66,000 in annual savings through no- and low-cost operations and maintenance improvements.

"We were surprised to find that much additional savings," said Scott LaRoque, plant supervisor. "We knew we could improve on some operations, such as avoiding over-aeration in our sludge basins. But we didn't think it would add up to so much."

As part of Strategic Energy Management, plant employees worked closely with Energy Trust for 11 months, receiving training and tools, and developing long-term skills on how to identify energy-saving opportunities that can deliver significant and long-term savings. They developed an energy management policy. They set an energy savings goal, which they exceeded several-fold by achieving 16 percent savings within a year. They formed an energy team charged with implementing energy-saving strategies and tracking progress.

Albany staff teamed up with Energy Trust experts in a day-long "energy treasure hunt," fanning out across the plant to examine processes and procedures, review operating schedules and look for energy-saving opportunities.

"The treasure hunt pointed to some big wins," said LaRoque. "We learned the importance of optimizing our aeration control valves to minimize blower run times. And our disinfected effluent that we use for hosing was operating continuously at high pressure, which wasn't necessary."

Other operations and maintenance improvements included shutting down several VFDs during the summer and setting up a maintenance schedule to clean dissolved oxygen probes weekly. "Dirty probes give a false low reading, causing blowers to run unnecessarily," explained LaRoque.

Energy Trust provided web-based tools so Albany can track energy use in real-time and normalize energy use for load, weather and other variables.

As LaRoque puts it: "Strategic Energy Management taught us how to optimize our entire process in a way that will persist."

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We now use our SCADA system much more effectively. Pop-up screens remind us when to examine flow and shut off equipment.

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Scott LaRoque, supervisor,
City of Albany Water Reclamation Facility

Participating in Strategic Energy Management can trim energy costs by up to 20 percent through simple behavioral changes and no- or low-cost operations and maintenance improvements.

CLEAN WATER SERVICES TAKES A COMPREHENSIVE APPROACH TO KEEPING ENERGY COSTS FLAT

Despite a growth rate twice the state average, Clean Water Services, which serves more than 570,000 residents in urban Washington County and parts of Multnomah and Clackamas counties, has kept its electricity use flat for several years. The water resource management utility has doggedly pursued energy projects since 2010, slashing its annual energy costs by more than \$1.5 million.

“Energy is one of our largest operating budget items, making the savings from these projects a major way to control costs,” said Nate Cullen, treatment department director. “Energy Trust has been there the entire time, providing more than \$5 million in cash incentives to help us run more efficiently.”

Clean Water Services has left few stones unturned, recognizing that the savings from small, medium and large projects add up. At the utility’s Rock Creek treatment facility in Hillsboro, investing in program logic controllers on the aeration mixers trimmed annual energy costs by \$25,600 and paid for itself in only five weeks. Upgrading the UV disinfection system netted an additional \$38,700 in annual savings. And adding VFDs to aeration blowers at the Durham facility in Tigard cut an additional \$78,700 from the annual energy bill.

With a goal to increase its use of renewable energy by 50 percent, Clean Water Services also invested in a 1.7-megawatt cogeneration system that captures energy from wastewater, converting it to heat and power used onsite. Located at the Durham facility, the system is fueled by biogas from anaerobic digestion, plus an input that contributes significantly to economic and energy benefits: fats, oil and grease (FOG) collected from Washington County restaurants that was previously sent to a landfill.

The renewable electricity and heat produced by the cogeneration system reduces energy costs by an estimated \$800,000 annually. In addition, Clean Water Services earns up to \$340,000 a year in tipping fees from FOG haulers. The \$16.8 million project received \$3 million in cash incentives from Energy Trust and \$2.8 million in tax credits from the Oregon Department of Energy.

Coupled with an existing 403-kW solar electric system, the cogeneration plant allows Clean Water Services to generate 60 percent of the electricity needed to run the Durham plant. The system also keeps FOG out of local landfills and drain pipes.



PROJECT-AT-A-GLANCE

ESTIMATED SAVINGS

- 22,017,237 annual kilowatt hours
- 21,400 annual therms
- 10,583 annual tons of carbon dioxide

FINANCIAL ANALYSIS

- \$1,509,507 estimated annual energy cost savings
- \$24,314,470 in project costs
- \$5,053,843 in Energy Trust cash incentives



Using less power from the grid reduces our reliance on coal and other fossil fuels, resulting in a smaller environmental footprint and reduced greenhouse gas emissions.



Bruce Cordon,
business opportunities
manager, Clean Water Services



Photo Courtesy of Enterprise Electric

CITY OF WALLOWA HARNESSSES THE SUN FOR ZERO ENERGY COSTS

The City of Wallowa boasts the first 100 percent solar powered wastewater treatment plant in Oregon. The 60-kilowatt system, which includes 270 ground-mounted photovoltaic panels, generates 71,000 kilowatt hours annually—enough to meet all the plant's electricity needs.

Although the project cost \$382,200, the city didn't pay a dime upfront. "Our Energy Trust solar electric contractor, who installed the system, put together a third-party financing package that required no upfront costs," said Travis Goebel, public works director.

Third-party financing is a common way to pay for solar systems and can work several ways. In the case of the Wallowa Wastewater Treatment Plant, several investors paid for the system. In return, investors received tax credits and depreciation benefits and an Energy Trust cash incentive of \$54,708. Investors also received the value of the system's solar energy output, about \$5,000 annually, for the first six years. In the seventh year, ownership of the system and its savings transferred to the City of Wallowa, which will enjoy free energy from the sun for another 20 years.

"The project was low risk for the city, and it didn't take city council long to decide solar was a good investment," Goebel said. "Since installation, electricity costs have gone up, which means the energy generated will be even more valuable over time. I would do this again without hesitation."

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We expect to enjoy free power and zero energy costs for 20 years or more.

Travis Goebel, public works director,
City of Wallowa

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PROJECT-AT-A-GLANCE

ESTIMATED SAVINGS

- 71,056 annual kilowatt hours
- 34 annual tons of carbon dioxide

FINANCIAL ANALYSIS

- \$5,000 estimated annual energy cost savings
- \$382,200 project cost
- \$54,708 Energy Trust cash incentive

A solar electric system is an excellent way to lower your plant's energy costs and is a viable technology option throughout Oregon. We can work with you on financing strategies to make solar more affordable.



PORTLAND FACTORS ENERGY EFFICIENCY INTO ALL PROJECT DECISIONS

For decades, the City of Portland has been on a quest to improve efficiency at its Columbia Boulevard Wastewater Treatment Plant. The city has used gravity instead of pumping—the oldest and most reliable efficiency for water systems—and designed or remodeled with energy efficiency in mind. In 2009, the city invested in a cogeneration system that uses the plant's biogas to generate 12.1 million kilowatt hours annually. Although that project is considered the plant's crown jewel, Portland has never stopped looking for more ways to cut energy costs, embarking on several projects that are delivering another \$181,800 in savings per year.

"Looking for energy savings has become second nature for us," said Paul Suto, supervising engineer, Portland Bureau of Environmental Services. "Anything we can do to offset ratepayer funding is a plus."

The project with the biggest impact was a process-driven improvement that revamped zone control in the plant's eight aeration basins. Previously, each basin had one dissolved oxygen sensor, resulting in over aeration. The upgrade replaced the single sensor with five sensors spread across zones in each basin. The project also called for installing automatic control valves and reprogramming controls, slashed energy costs by more than \$61,500 annually. Thanks to a \$284,810 cash incentive from Energy Trust, the \$474,683 project paid for itself through energy savings in only three years.

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For every project we consider, it's now part of our internal guidelines to explore the potential for an energy component.

Paul Suto, supervising engineer,
Portland Bureau of Environmental Services

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Plant personnel took advantage of Energy Trust's 90 by 90 industrial operations and maintenance offer to tune up the plant's two compressed air systems. They shaved another \$3,100 from the plant's annual energy costs by repairing leaks, reducing the compressed air dryer purge, and adjusting load and unload set points. Because they completed the improvements within 90 days, they received a cash incentive from Energy Trust for 90 percent of the \$6,840 project cost.

Portland also has steadily upgraded lighting at the plant, resulting in another \$18,700 in annual savings. The city replaced metal halide lighting in the parking lot with LEDs and swapped fluorescent lighting in the plant's tunnels with tubular LEDs. "Our tunnel lighting is on 24/7," said Jeff Hanks, electrical maintenance supervisor. "Because the LEDs are rated to last about 20,000 hours, we expect to save on maintenance costs as well."

Finally, Portland found significant savings by paying attention to heating, ventilating and air conditioning. "We tend to think of treatment plants as being about pumps and blowers," said Hanks. "We were surprised to find more than \$12,300 in annual savings from insulating our building and improving our HVAC system."

PROJECT-AT-A-GLANCE

ESTIMATED SAVINGS

- 14,713,851 annual kilowatt hours
- 15,766 annual therms
- 7,081 annual tons of carbon dioxide

FINANCIAL ANALYSIS

- \$1,009,627 estimated annual energy cost savings
- \$5,736,018 in project costs
- \$765,428 in Energy Trust cash incentives



ENERGY TRUST OFFERS SOLUTIONS THAT CAN HELP

- Reduce operating costs and stabilize rates
- Generate clean, renewable energy
- Earn cash incentives
- Help with load management
- Contribute to community sustainability goals and reduce your carbon footprint
- Move your wastewater facility closer to energy independence



Get more from your energy. For more information, visit www.energytrust.org/wastewatertreatment.

Energy Trust of Oregon

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Energy Trust of Oregon is an independent nonprofit organization dedicated to helping utility customers benefit from saving energy and generating renewable power. Our services, cash incentives and energy solutions have helped participating customers of Portland General Electric, Pacific Power, NW Natural, Cascade Natural Gas and Avista save on energy costs. Our work helps keep energy costs as low as possible, creates jobs and builds a sustainable energy future. **Printed on paper that contains post-consumer waste. 6/17**