



# REPOWERED HYDRO SYSTEM BOOSTS CLEAN ENERGY GENERATION

## FARMERS IRRIGATION DISTRICT GENERATES 12 PERCENT MORE POWER AND SAVES \$150,000 WITH NEW TURBINE

Farmers Irrigation District, located in Hood River, Ore., is no stranger to small-scale hydroelectric power. Since 1986, two hydropower systems have generated revenue and defrayed the cost of delivering water to approximately 5,800 acres and about 1,900 residential and agricultural users, including the high-value pear, apple, wine grape and cherry crops for which the region is known.

In 2005, Farmers Irrigation District began working with Energy Trust of Oregon on projects that save energy and water, and that have allowed the district to steadily increase hydropower generation. The district worked with Energy Trust to construct an energy-efficient pumping station to replace individual user pumps, convert miles of open ditches into piped canals, and pressurize and filter the delivery of irrigation water.

Now the district is boosting hydropower production even further by replacing two older Francis hydroelectric turbines with a single, higher-efficiency 3-megawatt Turgo turbine and generator. By repowering the hydro plant, Farmers Irrigation District expects to increase generation by an estimated 1,953 megawatt hours annually—a 12.4 percent increase.

“That increase in generation translates to an average net gain of approximately \$130,000 per year in revenue over the next 10 years of guaranteed power sales rates. Further, we expect to save around \$100,000 to \$150,000 per year in maintenance costs,” said Jer Camarata, general manager, Farmers Irrigation District.

The district is financing the \$4.96 million project through a 2.45 percent Oregon Department of Environmental Quality State Revolving Fund loan. In addition, Farmers Irrigation District is receiving a \$900,000 cash incentive from Energy Trust. “There’s no way this project would have penciled out without the cash incentive from Energy Trust,” Camarata said. “The loan period and return-on-investment term would have been unacceptable.”

### PROJECT AT A GLANCE

- 3-MW Turgo turbine
- 1,953 MWh additional annual generation
- Installed in 2015

### Estimated annual savings

- Increased renewable energy production, generating enough energy to power 173 homes
- Additional revenue helps pay down loan debt
- Lower operations and maintenance costs
- Greatly improved system controls
- Reduction of an additional 928 tons of carbon dioxide

### Financial analysis

- \$4.96 million project cost
- \$900,000 cash incentive from Energy Trust
- 2.45 percent Oregon Department of Environmental Quality State Revolving Fund loan
- \$130,000 estimated increased annual revenue from energy production
- \$100,000 to \$150,000 estimated annual operations and maintenance savings

*In total, Energy Trust has provided more than \$1.7 million in cash incentives to help Farmers Irrigation District modernize its system, trimming annual energy use by 1,534 MWh and generating an additional 3,831 MWh of hydropower.*

## THE VIRTUOUS CYCLE OF IRRIGATION MODERNIZATION

Farmers Irrigation District's investments illustrate how such improvements can layer on benefits for any district. The first major step is to get water out of open canals and into pressurized pipes.

- This change eliminates canal seepage and evaporation, resulting in more water that can be delivered to crops as well as left in streams for fish and other aquatic species.
- Pressurized water delivered through pipes allows irrigators to remove pumps, saving energy and related costs.
- If there is excess water pressure in the delivery system, an irrigation district or individual irrigator may consider adding hydropower generation technology. Revenue from power sales can be used to finance additional infrastructure upgrades and conservation projects, and stabilize water rates for irrigation district patrons.
- Pressurized pipes also reduce time and money needed to maintain and operate aging infrastructure and reduce the risk of canal bank blowouts and other liabilities associated with open ditches.

Together these changes create agricultural security, build drought resilience and strengthen rural economies.

### Improved technology, lower maintenance

Much of the efficiency gain from the replacement turbine and generator stems from the Turgo system's ability to operate efficiently over a wide range of flows. Being able to operate a single unit regardless of flow and stay online year-round greatly simplifies operations.

In addition, the old Francis units were prone to damage from suspended sediment, typical of runoff from Mount Hood's glaciers. "The Francis turbines were continuously being sandblasted, requiring costly annual rebuilds. The design of the Turgo runner handles such aggression and abrasiveness gracefully and uniformly over time," said Camarata. "As a result, we're expecting to see our mechanical maintenance bill shrink substantially."

### Opening the door to new opportunities

Repowering the turbine and generator, coupled with other energy- and water-saving projects, has freed up as much as

40 cubic feet per second of the district's water rights, depending on seasonal variations. That is enough water to fill 39 Olympic-sized swimming pools per day. The savings present a potential new opportunity for Farmers Irrigation District: pursuing mutually beneficial in-stream flow agreements with Native American tribes and natural resource agencies engaged in fish protection.

The ongoing improvements have also put Farmers Irrigation District on the map as a model for other irrigation districts seeking to improve energy and water management. "We've given tours to other districts from throughout the Northwest and we've drawn international interest as well," said Camarata. "We're proud to share our work. We couldn't have built these great projects without the help of Energy Trust or the Oregon Department of Environmental Quality. Oregon irrigation districts, farmers and orchardists are fortunate to have such vital programs."



**Energy Trust has been with us every step of the way through several energy-efficiency and hydropower projects. The cash incentives are fantastic and make a significant difference on project economics.**

Jer Camarata, general manager  
Farmers Irrigation District



To learn more about Energy Trust assistance for small hydropower projects and irrigation modernization efforts, visit [www.energytrust.org](http://www.energytrust.org) or call **503.459.4071**.