



THE VIRTUOUS CYCLE OF IRRIGATION MODERNIZATION

The work done by Three Sisters Irrigation District illustrates how irrigation modernization efforts 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, canal 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.



To learn about Energy Trust assistance for small hydropower projects and irrigation modernization efforts, visit www.energytrust.org or call **503.459.4071**.



IRRIGATION DISTRICT GROWS THE FLOW

THREE SISTERS IRRIGATION DISTRICT'S NEW HYDROPOWER PROJECT IMPROVES WATER MANAGEMENT AND QUALITY

Flowing water is a natural energy resource that some irrigation districts are capturing to generate renewable hydropower along with other agricultural, environmental and economic benefits. Energy Trust of Oregon provides resources and cash incentives to help districts and property owners throughout Oregon assess, finance and install small-scale hydropower generation systems.

Many irrigation districts in the state operate aging open canal systems. While districts repair and maintain them, and seek out funding to replace what they can, upgrading these systems is complex and expensive. Three Sisters Irrigation District in central Oregon formed collaborative partnerships to help plan, finance and complete many successful projects that have transformed its leaky, open canal systems to efficient pressurized pipes.

More water for farms and fish

For more than a decade, Three Sisters has teamed up with government and conservation organizations to invest in irrigation modernization improvements that increase water delivery to farms and ranches, improve stream flow, help restore fish habitat, save energy and produce hydropower.

Working in several project phases, the district has:

- Piped 50 of its 63 miles of open canals, eliminating seepage and evaporation.
- Delivered pressurized water to 75 farms (served by Central Electric Cooperative), eliminating irrigation pumps and saving about 5 million kilowatt hours of electricity annually.
- Increased water delivery to farms by 25 percent.
- Permanently conserved more than 24 cubic feet per second of in-stream water flow in Whychus Creek, the district's water source.
- Restored stream channels to improve habitat.
- Provided upstream and downstream fish passage and installed a Farmers Screen™ to keep fish out of irrigation water.

With key piping phases complete, the district embarked on the Main Canal Pipeline Project, which included installing a \$2.3 million, 700-kilowatt hydroelectric plant at the end of the main pipeline on the Watson Reservoir property. The plant generates about 3.1 million kilowatt hours of electricity annually, enough to power 275 average Oregon homes a year. Operational since 2014, the hydroelectric plant produces revenue from power sales that helps pay back \$2.3 million in loans from Department of Environmental Quality to finance an earlier piping project.



Marc Thalacker, district manager, stands in front of the new Farmers Screen, a fish screen with no moving parts and no power required. The new screen lowers operations and maintenance costs for the district while enabling upstream and downstream fish passage at their diversion.



Pressurized water is its own economic generator. Farmers can remove their pumps and save on energy costs. And with a more secure water supply, they are expanding the variety of their crops, which is a boon for the whole supply chain in our community.

Marc Thalacker, district manager
Three Sisters Irrigation District



Three Sisters was resourceful and innovative in securing funding and approvals for the hydropower project. The district used the Hydroelectric Permitting and Interconnection Guidebooks produced by Energy Trust to streamline the permitting process. District staff, who honed skills piping earlier projects, completed much of the construction and performed most of the district's own maintenance, saving millions on project and operations costs. "We may be a little Wild West in our approach," said Marc Thalacker, district manager, "but we produce impressive results with our talented crew." Three Sisters has a plan to pipe and pressurize the entire district by 2020.

Partners in project planning and finance

Three Sisters collaborated with government, tribal and nonprofit organizations to navigate the complexities of planning, permitting and securing grants and loans for all of its irrigation infrastructure projects over the last decade. Energy Trust supplied \$40,000 in Project Development Assistance for engineering, design and interconnection services. The Deschutes River Conservancy helped the district secure grants for the hydropower project through the Pelton Fund.

A \$1 million incentive from Energy Trust helped pay for the hydroelectric plant. This had the added benefit of helping secure a \$1 million grant from the U.S. Bureau of Reclamation's WaterSMART program, of which \$719,000 helped fund the hydro facility. "Energy Trust has been a major partner in developing a means to pay for conservation and making renewable energy available in Oregon," said Thalacker. "The incentive was an essential piece in our financing structure."

Water for the win

Overall, the district's piping and restoration work has conserved 28.2 cubic feet per second of water, enough to fill 24 Olympic-size swimming pools each day during the irrigation season, from April to September. This is a win for agriculture, the local economy and wildlife. More flow in the stream reduces water temperature, improving conditions for steelhead, trout and other native species.

"Whychus Creek was once home to about 40 percent of the potential steelhead production in the upper Deschutes Basin," explained Zachary Tillman, conserved water manager for the Deschutes River Conservancy. "Three Sisters Irrigation District has been a fantastic partner, taking action to secure millions in public funding for projects and restoring water into a creek that was dry in 2000. The first reintroduced adult steelhead returned to the creek in 2012."

From an economic perspective, irrigation system improvements have created construction jobs, boosted crop variety and output, and increased opportunities for renewable energy production. These benefits are a result of a new collaborative approach to managing water. By engaging irrigation districts in early planning for irrigation modernization projects, Energy Trust is opening up long-term opportunities for individual districts and many other organizations to invest in energy and water conservation.



Pressurized water delivery means this irrigation district patron no longer needs to pump water out of a canal. In fact, the excess pressure at this site may be able to support a small hydro turbine in the future.

Three Sisters Irrigation District Irrigation System Modernization Funding Partners

Three Sisters has spent more than \$26 million on irrigation modernization projects, leveraging more than \$15 million in grants from the following funders:

- \$4.11 million from Bureau of Reclamation
- \$3 million from Deschutes River Conservancy
- \$2.77 million from Oregon Watershed Enhancement Board
- \$2.48 million from Pelton Fund
- \$1.04 million from Energy Trust of Oregon
- \$979,000 from National Resources Conservation Service
- \$263,000 from National Fish and Wildlife Foundation
- \$85,000 from National Forest Foundation
- \$50,000 from The Nature Conservancy
- \$50,000 from Oregon Conservation Strategy
- \$46,000 from Oregon Governor's Fund

THREE SISTERS IRRIGATION DISTRICT MAIN CANAL PIPELINE HYDROPOWER PROJECT

Overview

- Single 700-kW turbine
- 3.1 million kWh annual generation
- Installed in 2014

Benefits

- Renewable energy production
- Revenue helps pay down loan debt and finance additional projects

Financial Analysis

- \$2.3 million project cost
- \$1.04 million cash incentive from Energy Trust
- \$719,000 grant from the Bureau of Reclamation
- \$600,000 cash from Three Sisters Irrigation District