

Water Review

A Perspective on Western Water Issues Prepared by the Family Farm Alliance and Its Members

NEW MEXICO

Alternative, Renewable, Clean Energy Innovative District Generates Power Within Canals

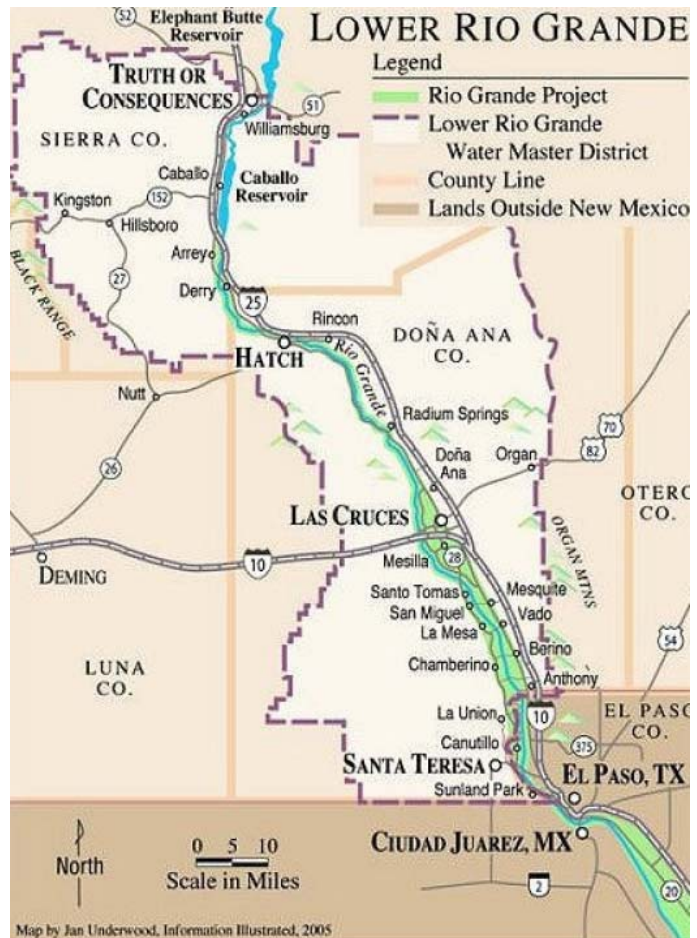
THE RIO GRANDE PROJECT

The Rio Grande Project (“Project”) was authorized as a federal Reclamation project under the Reclamation Acts of June 17, 1902 and February 25, 1905. The United States owns and controls Elephant Butte Dam and Reservoir, Caballo Dam and Reservoir, the bed and banks of the Rio Grande River within the Project, and six Project diversion dams on the river. The Elephant Butte Irrigation District (EBID) manages and maintains a gravity-flow irrigation surface water distribution system comprised of almost 600 miles of canals, laterals, drains, and wasteways located in Southern New Mexico and West Texas.

Ninety-five percent of EBID surface water is derived from Southern Colorado and Northern New Mexico snowmelt and rainfall runoffs and is stored in the Elephant Butte and Caballo reservoirs located north of EBID boundaries. Based on demand of the agricultural crops grown in the area, water is released at the reservoirs and diverted from the Rio Grande into EBID canals for delivery to the irrigators. EBID drains allow for return flow to the river for reuse downstream.

SIGNIFICANCE

EBID delivers surface water to 90,640 acres of farmland for irrigation below Caballo Reservoir through the 110 mile river reach of the Rio Grande, often referred to as the “Ribbon of Life” that runs through this historic, agricultural and culture-rich valley in Southern New Mexico. A typical irrigation season will last about 240 growing days. Unlike many other areas of the West, which primarily rely upon stored snowmelt originating from upstream forested highlands as a source of summertime irrigation supplies, EBID also receives significant water supplies from monsoon floods.



“Our watershed is more of desert, than a forest,” said EBID general manager Gary Esslinger. “What runs off our watershed is pretty wild water during a monsoon season that is getting more intense in recent years.”

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Innovative Rio Grande District Tackles Clean Water and Energy Challenges

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INNOVATIVE APPROACH TO CHALLENGES

EBID has taken an innovative and aggressive approach to tackle clean water and energy challenges and take advantage of the unique characteristics of the local watershed and irrigation project. On the water management end, the district is developing enhanced measures to capture stormwater using drains and canal structures. EBID is also contemplating building five offstream reservoirs to capture stormwater, slow down runoff, reuse water, and return water back into the river at the appropriate time. Installation of mobile water treatment plants allows stormwater to be treated for use in drip irrigation and other uses.

“That water can later be used to recharge aquifers,” said Esslinger. “In-line storage provided by our drains is now turning traditional drainages into habitat, places of recreation, and a source of water re-use.”

EBID has also implemented streamflow gage improvements by expanding the extent of the existing telemetry network and weather stations to upstream ranches, which improves the ability of district managers to predict flooding and alert local communities.

The district is also getting creative in the energy realm. The unique hydraulics of the EBID irrigation water distribution system offer optimal hydropower-generating opportunities. This can be achieved by simply harnessing and utilizing the energy contained within the steady flow of irrigation water throughout the system. This potential was previously considered when the system was engineered and developed in the 1910s and 1920s by the U.S. Bureau of Reclamation. Now, for the first time, EBID is taking action in designing and constructing, along its own acquired rights-of-way, an innovative method for renewable energy that can help address the nation’s energy challenges.

“Canal water can produce clean energy and create revenue streams or energy credits that benefit our farmers,” says Esslinger.

LOW-HEAD HYDROPOWER DEVELOPMENT

Hydropower is the largest renewable resource in the U.S., currently providing about eight-percent of the nation’s electricity. New technologies are creating ways to generate electricity in all kinds of waterways. EBID is taking the lead by fabricating low-cost, efficient turbines to support low-head energy production, utilizing generic brand generators and products that can be purchased “off the shelf.”

The New Mexico Energy, Minerals and Natural Resources Department (NM EMNRD) has partnered with the EBID in funding a hydropower pilot project to construct a small turbine drywell modular unit. EBID is collaborating with El Paso Electric Power Company to output energy onto the regional power grid and receive “green” energy credits for the hydropower produced. Revenues to EBID for providing power to the grid will go into the District’s general fund, thereby reducing the assessments paid by constituents. The savings can then be reinvested by the farmers for irrigation improvements such as sprinkler or drip systems, which can be offset by the energy produced. The hydropower production will indirectly encourage irrigation modernization and water resource conservation within EBID.

PROJECT DESCRIPTION

EBID is providing engineering design, construction, and development and has identified potential sites for as many as 100 small hydropower units that could be built along control structures in the District’s canals. A total of 5 low-head hydropower units will be installed at the pilot project site to fulfill the commitments with the NM EMNRD.

EBID has already begun the process of locating other potential hydropower sites.



Figure 1: Hydropower pilot project location. Source: EBID

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District Generates Clean, Renewable Power Within Existing Canal System

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DESIGN AND CONSTRUCTION

Approximately twelve manufacturers were contacted regarding EBID specifications for power production (low head and high flow turbines). Those that could meet the requested specifications responded with costs that far exceeded the grant budget of \$265,000. The creative talents of EBID's own engineer, consultants, welder and construction crews were engaged to custom-fabricate turbines and a modular turbine dry well structure. The EBID-fabricated units are considerably more economical to build than directly purchasing turbines from manufacturers. Figure 2 shows one of EBID's fabricated 36-inch diameter turbines, which is anticipated to produce 10 kW of renewable energy.



Figure 2: Assembled turbine fabricated by EBID.
Source: EBID.

ENGINEERING AND HYDRAULICS

The pilot project is sited on the Westside Canal, south of Las Cruces, where an existing drop structure was redesigned to house two (2) turbines which would each generate 10 kW of energy. The canal carries 500 cubic feet per second (cfs), and has a drop in water surface elevation of about four feet. The hydropower modular unit is offset from the canal and the canal water flow is diverted into the turbine dry well structure. The two turbines will generate electricity from the irrigation water that flows by gravity through the Westside Canal system.

“The hydropower production will not interfere with irrigation operations at all,” says District Engineer Henry Magalanz. “Instead of dropping the water to dissipate energy from the old canal structure, the new energy source of water will be diverted and will be converted to electricity in the fabricated modular turbine dry well unit that is offset from the canal.”

The two identical turbines in the dry well unit are connected by a manifold that drops the water into a 5-foot metal pipe that discharges back into the canal below the structure, so no water is lost. Electrical energy is harnessed by a positive drive AC 10 kW generator connected to the turbine. The two electrical generators will be connected mechanically to the turbines using a simple pulley and belt drive system.

This hydropower generation site requires no water consumption since all water used during power generation is returned back to the Westside Canal for delivery to downstream irrigators. EBID will test the performance of the hydropower unit during the 2009 irrigation season and will be analyzing a rate structure based on the power production. While there is no magic solution for the nation's energy-water challenges, low-head hydropower promises to be an important resource in a diversified renewable energy portfolio. EBID will continue to be on the cutting edge of developing this energy resource in the future for its constituents.

The hydropower modular unit will utilize irrigation water gravity flow to generate totally clean, renewable, “green” energy. The electrical output for this pilot project is to produce a minimum 50 kW (50,000 watts) which is enough energy to power approximately 50 to 60 homes during the 240 day irrigation season of EBID.

PROJECT BENEFITS

In-canal, low-head hydroelectric projects like the one developed by EBID have tremendous benefits and virtually no negative impacts. Historic structures can be retained while the system is updated with modern technologies. Increased revenues will result in lower irrigation costs to farmers. And, importantly, irrigation water delivery services can continue while utilizing water flow for clean, emissions-free “green” energy production.

“From renewable portfolio standards to comprehensive energy and climate strategies, hydropower offers a proven resource for clean, renewable power production,” says Esslinger.

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District Will Seek Legislative Fix to Streamline Permitting Process

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SOLICITING SUPPORT

EBID advocates and supports the development of low-cost hydropower, which is historically acknowledged as a clean, renewable, non-emitting energy source.

“We are demonstrating this initiative with our hydropower pilot project as an attempt to respond to the energy-water nexus discussion,” said Esslinger.

Toward this effort, Esslinger and Board President James Salopek met with officials in Washington, DC during a trip in April 2009 to elicit support for this small hydropower pilot project. Later in the year, New Mexico Congressman Teague visited EBID for a first-hand look of the hydropower unit, where he came away impressed with EBID’s innovative approach (see Figure 3).

CHALLENGES

Water providers like EBID who seek to implement multiple low head hydro-power generation sites throughout their

service area must undergo costly and time-consuming licensing processes, which impede their ability to contribute completely renewable, green energy. EBID and groups like the Family Farm Alliance and National Water Resources Association are working with Congress and the Federal Energy Regulatory Commission (FERC) to establish a policy that allows a special exemption from Federal Power Act licensing for these types of projects.

“We need a legislative rather than a regulatory fix to make micro hydro power an economic reality,” said Steve Hernandez, counsel to EBID. “Legislation could help address the current lengthy and cumbersome process associated with getting a FERC exemption. Other alternative energy sources – like solar and wind – do not have this requirement. We would like to see if some sort of streamlined FERC exemption could be provided for these types of projects.”

Esslinger – who grew up on a family farm - wants the public and policy makers to see farmers as innovators, where they can employ their proven ingenuity. “Farmers have been on the lands for generations,” says Esslinger. “They will come up with creative solutions that are intrinsically green.”



To learn more about Elephant Butte Irrigation District or its efforts to address challenges and opportunities associated with the water-energy nexus, please visit www.ebid-nm.org, or call Gary Esslinger, EBID Treasurer-Manager; 575-526-6671, Ext. 401 or Henry Magallanez, District Engineer, Project Manager; 575-526-6671, Ext. 420.

Fig. 3: NM Congressman Teague (R) visited EBID for a first-hand observation of the hydropower unit and was impressed with EBID’s innovative approach. Source: EBID

DONOR SUPPORT

Your contributions matter. Whether you support the Alliance’s advocacy, outreach or education efforts, you can rest assured that your investment will promote the protection of Western irrigated agriculture and the strong rural communities that it supports. Make your tax-deductible gift to the Alliance today! Grassroots membership is vital to our organization. Thank you in advance for your loyal support. If you would like further info, please contact Dan Keppen at his NEW e-mail address: dankeppen@charter.net, or visit our website: www.familyfarmalliance.org.



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