



Mitchell Dam Mitchell, IA



Technical Specifications:

Hydro Turbines

380 kW Uralhydromash

285 kW Uralelectrotyazh mash

Generators

380 kW Uralelectrotyazh mash

Project Cost: \$769,744

AERLP: \$250,000

Loan Term: 10 yrs.

Lender: First Citizens National
Bank, Osage, IA

Lender Share: \$350,000

Annual O & M Cost: \$46,286

Est. Payback: 10 yrs.

Installation Date: November 1998

An abandoned hydroelectric station on the Cedar River near Mitchell came to life in 1998 after three decades of inactivity, thanks to an innovative partnership between the Mitchell County Conservation Board (MCCB) and two California investors.

The MCCB inherited the dam and powerhouse for \$1 in 1962. The deal included a mandate to preserve the adjoining lake for recreational use, but provided no money for maintaining the dam.

When federal incentives for renewable energy production became available in the early 1980's, the MCCB realized that a rejuvenated power plant might be the best option to pay for upkeep and repairs to the dam.

Their activity eventually attracted the interest of brothers Gary and Peter Garratt who were looking to invest in such a facility. In the mid-1990's the Garratts agreed to undertake the project and to give 15% generation royalties to the MCCB. In turn, the Garratts asked the MCCB to undergo the difficult process of obtaining an energy generation permit from the Federal Electric Regulatory Commission (FERC).

Because the MCCB could not afford the estimated \$150,000 to hire an engineering firm, they sought the FERC permit on their own. MCCB Director Milt Owen calls the three-and-a-half year permitting process a "nightmare from the standpoint of time and effort" that probably cost the MCCB more than \$60,000.

But their efforts succeeded by the end of 1996, and the long process gave the Garratts time to mount an international search for affordable, reliable, and proven generation equipment. They eventually

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Project Performance

Year	Production (kWh)	Production Value ¹	O & M ²	Total Value
1998 ³	160,650	\$9,639	\$6,003	3,636
1999	2,668,750	\$160,155	\$58,119	102,036
2000	2,064,300	\$124,039	\$36,354	87,685
2001	2,176,650	\$130,739	\$62,934	67,805
2002	2,301,600	\$138,409	\$40,462	97,947
2003	1,879,150	\$112,703	\$36,751	75,952
2004	2,511,260	\$150,755	\$41,140	109,615
2005	2,977,381	\$178,737	\$54,098	124,639
totals	16,739,741	\$1,005,176	\$335,861	\$669,315
avg. ⁴	2,368,442	\$142,220	\$47,123	\$95,097

¹ Includes Powerhouse energy use; ² Includes 15% production royalty paid to Mitchell County Conservation Board as powerhouse rent; ³ Reflects partial year production; ⁴ Excludes partial year ('98) production.

landed a pair of Kaplan turbine/generator sets in Russia, rated at 380 kW and 285 kW, respectively, from twin hydro-manufacturing companies Uralhydromash and Uralelectrotyazhmash.

The equipment has performed almost flawlessly, achieving nearly 95% of expected output with excellent reliability. All told, the automated facility produced an average of 2360 MWh of electricity per year through 2005, with just three unscheduled repair instances totaling 20 days of downtime. Garratt estimates the generators produced electricity during more than 8000 hours every year.

Available water flow is the key factor in small hydro projects, and Owen believes flows have been fairly average from 1999-2006. Garratt gained confidence in the river during the planning phase by developing a custom spreadsheet based on historic daily-flow data from similar sites, adjusting for his particular watershed and equipment. Their turbines require a flow of at least 50 cubic feet per second (cfs), and are shut down in storm surges above about 1080 cfs to protect the equipment from debris.

The project's most serious repair came, in fact, when high-water debris destroyed a plastic trash rack, became lodged in a wicket gate, and caused one of the turbine's upper bearings to burn up when the water level fell. During a week-long outage, a sturdier metal trash rack was installed to prevent a recurrence of the event.

Both the Garratts and the Owen are thrilled by the consistent overall performance of the powerhouse. Garratt notes that attractive funding and a favorable

energy price played key roles in getting the project off the ground.

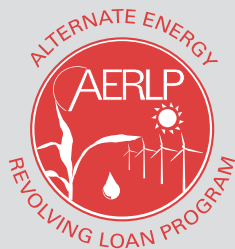
"The benefit of the Revolving Loan Program of the Iowa Energy Center is that Mitchell Mill Hydro became a viable economic project when coupled with the state mandated 6 cent per kilowatt hour energy contract," says Garratt.

The Garratts and Owen also enjoy an amicable partnership where agreements to share costs and responsibilities are generally made with a handshake. The MCCB spent about \$1000 of their royalties per year on dam maintenance through 2005 and are banking the remaining funds for future repair needs.

The MCCB maintains ownership of the powerhouse building, historic limestone-block structure that was fully restored in the startup process. But the Garratts co-funded needed repairs to the tailrace and foundation, and even ordered custom interior fixtures to match those salvaged from the building. The MCCB now offers tours to school and community groups by appointment.

The project even benefited from massive flood damage to the dam in 1993, just as their partnership was beginning. The site qualified for more than \$400,000 from the Federal Emergency Management Agency and the Department of Natural Resources, allowing the MCCB to replace both tainter gates and make needed concrete repairs.

"I look back and think 'how lucky can you have been to have everything fall together in sequence the way that it did?'" says Owen. "It's a facility we felt strongly deserved preservation and protection."



The Iowa Energy Center's Alternate Energy Revolving Loan Program (AERLP) plays a supporting role in stimulating renewable energy development within the state. Since its inception in 1996, the AERLP has supported numerous wind, biomass, solar, hydro, and hybrid projects.

Successful applicants receive a low-interest loan from a combination of Energy Center and lender funds. The Energy Center provides loan funds equal to 50% of the projects financed cost (up to \$250,000) at 0% interest. Matching financing must be obtained from a lender of the applicant's

choice. The maximum loan term for the Energy Center's funds is 20 years.

The lending institutions are responsible for financially qualifying the borrower, while the energy center assists in technically qualifying the borrower. By partnering with expertise from lending institutions the Energy Center is able to cost-effectively process the loans in a timely manner and maximize the impact of the loan program.

Eligibility

The AERLP is open to all individuals and groups who want to build renewable energy production facilities in Iowa. Utilities that are not required to be rate-regulated are not eligible. AERLP loan funds may not be used to refinance an existing loan or be applied to existing alternate energy facilities.

Application Deadlines

January 31
April 30
July 31
October 31

For more information

Contact the Iowa Energy Center,
(515) 294-8819
www.energy.iastate.edu

The Iowa Energy Center is dedicated to improving Iowa's energy efficiency and use of renewable energy through research, demonstration, and education.

