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Seattle company wants to tap the power of canals with new turbines

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Photo courtesy of Hydrovolts

Water must flow three to four knots for Burt Hamner's turbines to generate energy. The largest turbine generates up to 10 kilowatts of energy.

A small business in South Seattle hopes to revolutionize the way hydropower is generated across the globe. Burt Hamner, CEO of Hydrovolts, said he has an invention that makes microhydro power projects viable for the first time in history.

Hamner invented a small hydrokinetic turbine that can be used in irrigation canals. He says there are millions of miles of canals all over the world, most of which could be used to generate power. For example, he said Pakistan alone has 53,000 kilometers of main canals and 1.2 million kilometers of minor canals.



“Our intention is to put in turbines wherever the water's going fast enough,” he said. “The world is covered with highways of water and we're the first people to provide a car. There's really no limit to how many things can be put out there.”

Irrigation canals are essentially rivers of fish-free, fresh water moving in one direction. Most flow predictably and are owned by utilities, so they aren't subject to the tough permitting required for rivers or oceans.

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Before starting Hydrovolts, Hamner worked on clean energy for the U.S. Agency for International Development. In 2007, he directed the Tacoma Narrows Tidal Study. After determining tidal energy wouldn't work in the narrows, his team looked at where it would work and hit on the idea of irrigation canals. Hamner founded Hydrovolts in 2007.

Until now, Hamner said, every hydropower site in the world has been unique, which is expensive. Hamner said his goal is to mass-produce turbines and drive down the cost, making them affordable around the world.

Hydrovolts has gotten inquiries from 43 countries including Mauritius, Indonesia, France and Peru. The goal is to be shipping turbines by the middle of next year.

Hamner is confident in his business and his future.

“We're doing this to get rich. The objective is to create a \$100 million company within five years. That's the plan and we believe completely that it's do-able.”

Testing turbines

Hydrovolts began by developing a business plan and a turbine prototype. Next, it started competing in contests. The first competition it won was held by the Zino Society, and came with a \$50,000 prize. Up until then the business was supported by Hamner's wife's paycheck.

The money funded construction of the first turbine and allowed Hydrovolts to become the first tenant in McKinstry's Innovation Center. McKinstry workers helped Hydrovolts refine the turbine's design.

Hydrovolts has three turbine sizes. The small one is expected to cost \$2,000, the medium one is \$20,000 and the large one is \$40,000.

In July of 2010, the business successfully tested a turbine in the Roza Irrigation Canal in the town of Sunnyside. Hamner said the project was a first: “No one had ever put a turbine in a canal, ever. No one's ever done it this way.”

DLZ, a Columbus, Ohio-based architecture and engineering consultant that does hydropower work in India, saw a video of the Sunnyside demonstration on YouTube and got interested. DLZ representatives visited, ordered three large turbines and became shareholders. Hamner said DLZ has given his business a letter of intent to order up to 400 turbines.

In November, Hydrovolts starts a three-month test of its large turbine, thanks to a license agreement from the federal Bureau of Reclamation. It will also test a turbine in an artificial waterfall at West Sound Utility District's wastewater plant in Port Orchard, following a request by the utility.

Hydrovolts plans to start commercial sales in California because that state's higher electricity rates will mean a quicker payback. Hamner will pursue other markets as production increases and turbine cost decreases. He is aiming for a five-year payback on the medium turbine at a cost of 11 cents a kilowatt hour, the U.S. national average. Europe, he said, pays between 15 and 30 cents a kilowatt hour.

Hydrovolts will likely keep its headquarters in Seattle and intends to build the first 100 turbines in the Northwest. Hamner said he hopes to learn from each turbine and streamline production before it tries contract manufacturing in other regions. Hydrovolts will continue to manufacture generators for the turbines.

Growth plans

Hydrovolts has grown from two employees to nine. Hamner expects to have 19 employees in a year, half of them engineers and one third in sales. Eventually, he expects a total of 50. Hamner is also a big believer in students. About 25 students have been involved with the firm so far, mostly from the University of Washington.

In August, Hydrovolts secured funding for \$1.3 million, and is starting a second round of funding for \$5 million to \$10 million that should finish by February. Hamner said Hydrovolts almost failed early on because of some poor financial decisions. He said the business was saved through a network of friends who helped fix the problems and make the company more attractive to investors.

Hamner said his success is due in large part to the entrepreneurial opportunities in the Pacific Northwest. He said there are lots of people here who helped found successful businesses and who want to help others. "It's highly concentrated in the Northwest," he said. "This is a unique space to flourish in."

Hamner sees potential for using the turbine in other applications. In September, Hydrovolts demonstrated for the U.S. Navy a "backpack turbine," a small soundless turbine that can be put into a river to recharge military equipment.

There's also potential for oceanographic and survey applications. Hamner said one customer spends \$200,000 a year to get 5 watts of steady power for a sensor package in the Gulf of Mexico. The current there is strong enough to operate a turbine, which could generate 50 watts of energy, he said. He estimates the payback would be about three months.

"There is a big market for every level of power we produce, from micropower home and town-sized power," he said. "The same machine can work everywhere."

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