River test bolsters Tenn. inventor's turbine idea

ADRIAN SAINZ - Associated Press - Associated Press

The metallic, wheel-shaped object looks like something taken off a spaceship from Stanley Kubrick's "2001: A Space Odyssey," a futuristic creation born from a 15-year labor of science and love.

However, Geoff Greene's invention is anything but science fiction. It's a water turbine, and its unusual approach to creating hydro-power is being seen as an example of how genuine "green" energy can be created in a time when cheap and renewable power sources are in high demand.

Only one working Greene Turbine exists so far, and it's on display at the Agricenter east of Memphis. Greene and a Memphis renewable energy consulting company are working to prove his turbine can help satisfy the nation's power needs in an inexpensive way— and make him some money in the process.

"It's too simple. It has to work," Greene said Wednesday.

The turbine was moored and halfway submerged in the Mississippi River in Memphis in April, in front of interested onlookers including the Tennessee Valley Authority. The 18-foot diameter turbine spun properly and generated small amount of power.

Since then, Greene and Pete Moss, president of consultant Frazier, Barnes and Associates, have developed a business plan and are beginning a search for investors to help raise $5 million to develop and build 34-foot hydrokinetic turbines at $150,000 each.

Using water movement to generate energy is not new. But Greene's innovation is to produce clean energy more cheaply by using water currents and avoiding the costly and time-consuming effort of building a dam or power plant.

Greene and Moss want to start operating 1 megawatt facilities at Cates Landing and Memphis, to see if the turbines will work over an extended time period. Each river turbine would generate 135 kilowatts of power, enough to continually power 100 homes, Greene said.

Greene's long-term vision is to install his turbines in oceans to add juice to the nation's electrical grids. The ocean turbines would be 250 feet in diameter and generate enough power to run electricity in 1,000 homes.

"It's just rough and ready technology," Greene said.

The invention looks a bit like a windmill encircled by a rim. It has a sealed middle structure and angled blades that harness ocean or deep river currents to turn it. The device moves like a Ferris wheel, and large pipes that run the circumference of

the wheel and down through the center begin to fill up with water as it rotates at the speed of the current.

As the wheel turns, water from the pipes run into the center of the wheel.

The rush of water continuously spins the propeller-like turbine inside the enclosed middle, generating power that is transferred through a center cord and into a generator. The tanks are refilled as the wheel turns. So, unlike a dam, no reservoir is needed, because the tanks refill on their own.

The generator sends power to power stations, which inject the electricity into the grid. Greene says the turbines could theoretically help keep rates steady by supplementing power grids as demand grows.

There are other advantages, Greene says. It's pollution free because the turbine uses only water and gravity to create renewable energy. The turbine would have a maintenance program to ensure it doesn't erode or corrode.

Moss notes that water has advantages over solar and wind power: The sun and the wind can go away, the currents in the mighty Mississippi River don't.

The turbine is also relatively cheap to build because it uses materials that are inexpensive and already available. Some of the components are already being used in windmill generators and hydroelectric dams

No coal mines or oil refineries are needed to extract the energy, though a large generator would be required with the bigger turbines.

The lower building expense, coupled with an ability to generate power at a smaller cost, could make the turbine a boon for Greene, who is trying to make the transition from an inventor who didn't attend college to energy entrepreneur.

"You can make money at this at an economically competitive rate with other technologies," said Moss, who calls the turbine "elegant, yet simple."

The turbine's April 14 test was witnessed by Chris Berryman, a senior consultant for economic development at the TVA.

"It's very unique," Berryman said. "We just don't know if it's viable. It would be a great project if it gets off the ground."

He said the TVA is waiting to receive data from another consultant, Overland, Kan.-based engineering consultant Black & Veatch, to help determine whether there are viable commercial applications for the turbine.

The data analysis for water flow, environmental effects and long-term reliability would come after another turbine is built and operated in the Mississippi for an extended time, Greene said.

There are more than 100 marine and hydrokinetic devices under development in the United States and the world, according to 2011 figures from the federal Energy Department. These devices harness the energy of waves, currents, tides or free-flowing rivers, but most are in the early stages of readiness.

In 2010, conventional hydropower — using dams to collect water that spins electrical turbines — accounted for 6 percent of all U.S. electricity generation and 60 percent of power generation from renewable sources, the Energy Department said.

The Energy Department said it was evaluating how to use water resources to produce energy and expects that some challenges, such as designing devices that resist harsh marine environments and are environmentally safe, will be overcome.

A patent for the turbine is in the works.