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A New Spin on the Hydroelectric Generation of Electricity

Many of my past columns have explored new high-tech environmentally friendly emerging technologies that generate electricity. This column will actually look at a new innovative and environmentally friendly approach to generating electricity that is based on off-the-shelf existing technologies and drinking water. Developed by Rentricity Inc., this hydroelectric-generating process might be a game changer because the company's approach to generating electricity doesn't require the construction of new reservoirs and dams.

You learned in elementary school that the basic ingredient of hydroelectric generation is flowing water. The innovators at Rentricity Inc. have developed a plan to generate electricity from the water flowing in city water mains.

With funding from NYSERDA (New York State Energy Research and Development Authority), Rentricity hopes to prove that its Flow-to-Wire electric generation system is efficient and cost effective by installing its generators in the water mains of the New York City (NYC) drinking water system. Rentricity sees potential energy that can be turned into electricity wherever current technology forces water to flow through pipes under pressure. (See Fig. 1.)

All of NYC's drinking water comes from reservoirs located in the Catskills Mountains of upstate New York. The downhill journey that the water travels creates a fantastic hydraulic pressure that actually reaches 600 pounds per square inch in the water tunnels.

A vast network of water tunnels, water mains, and distribution pipes keeps this water flowing at a million gallons per second from the reservoirs to every water tap in the city. As this water branches off into water mains, the pressure is reduced by special valves until water pressure in local neighborhoods is 60 psi.

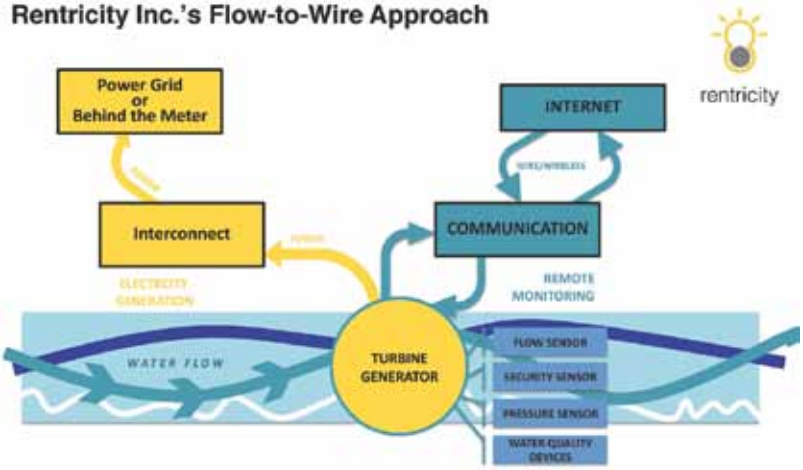

Fig. 1—Schematic diagram provides a graphic look at what each hydrokinetic generator installation will do and monitor.

It is hard to believe that gravity alone is pushing all that water down from the natural elevation of the Catskill's to the lower elevation of the five boroughs of New York City without the use of electric pumps. The change in elevation actually creates enough pressure to naturally push the water to the top floor of every six-story building in the city.

For the water to flow through water mains that are much narrower than water tunnels, the water pressure must be reduced to prevent the pipes from breaking. The water pressure just doesn't drop on its own, special pressure reduction valves (PRVs) are needed to release the extra pressure. Rentricity engineers want to replace current PRVs with a new valve/generator design that would use all that wasted pressure to generate electricity. The electricity that would be generated would then feed into the NYC power grid.

At first glance the idea of generating electricity from NYC's water system sounds like a fantastic idea. However, to initiate such a project you would need all kinds of bureaucratic approvals. On May 1, 2012, NYC's mayor, Michael Bloomberg, signed the needed legislation that launched an 18-month study to determine if Rentricity's system can in fact economically produce electricity without adversely affecting the efficiency of the water system or affecting the cleanliness or taste of the water.

The study will allow Rentricity to replace some of the PRVs with its new hydrokinetic power generators. The Rentricity generators will perform the same job as the PRVs they replace, but they will also use the kinetic energy of the released pressure to generate electricity.

The functionality of Rentricity's hydrokinetic power generators have already been tested in commercial installations in Westmoreland County near Pittsburgh, PA (Photo

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1) and also in Keene, NH (Photo 2). According to Frank Zammataro, president and founder of Rentricity and my contact at the company, "the Keene waste treatment plant that is using the Flow-to-Wire generation system is the first energy neutral water treatment plant in the world." Frank also indicated that Keene, NH, receives a small check back from Public Service of New Hampshire because the city now generates more power then its businesses and citizens use. You will find a link to a Rentricity video online at http://www.technologytoday.us/page13.html.

Photo 1—Westmoreland County pump station installation

Photo 2—Keene, NH, water treatment plant dual turbine installation

Figure and photos courtesy Rentricity Inc.

Recalling the Facts

1. How is the Rentricity method of generating electricity different from the way most hydroelectric power is generated?
2. How is it the same?