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Committee on Environmental Protection
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Regarding
“New York City’s Hydropower Capacity: Present and Future Opportunities”

Good afternoon Chairman Gennaro and Members of the Committee. I would like to commend the Council for tackling such an important issue during such a critical time. The need to increase renewable energy generation is well known throughout the country, but it would be easy for the New York City Council to rest on its laurels given the many programs already in place in the City. Considering alternatives for hydropower signals to the citizens of the City and State that the Council is not content with the status quo and is continually striving to improve policy for the benefit of New Yorkers. This is admirable, and we at Rentricity support you in your efforts.

Expanding New York City's hydropower complements PlaNYC by increasing energy efficiency and increasing the City's clean energy supply. Rentricity has efficient and proven technology solutions that can bring New York City significantly closer to its PlaNYC goals and New York State closer to its 2015 renewable energy targets.



Now to the matter at hand:

Developing New York City's hydropower resources would expand, by one, the types of energy generation that would qualify for the State RPS (Renewable Portfolio Standard). I will begin by providing industry context, then describing Rentricity's approach to hydropower, and then attempt to convey the significance that in-pipe hydrokinetic solutions will have to the environment, local businesses and the citizens of New York City.

Water and wastewater utilities are extremely energy intensive, consuming ~4% of the United States' electricity production. The cost of pumping and treating water represents about one-third of a water or wastewater utilities' operating budget. Compounding the problem, United States water utilities lose approximately 7 billion gallons of water per day through leakage. On average, approximately 20% of all water leaks back into the environment. More water lost means more water pumped and treated, which requires more electricity to be generated.

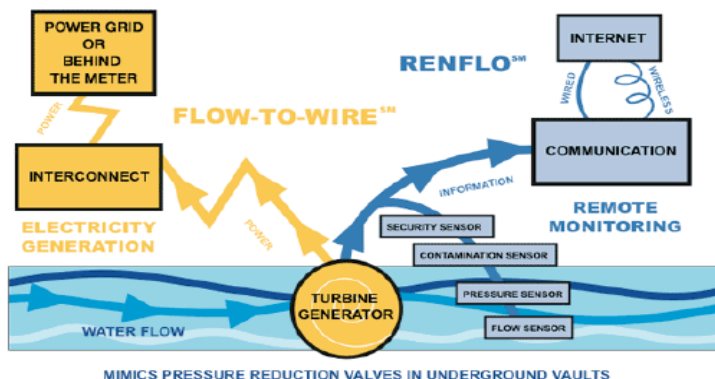
New York's aging water distribution infrastructure is both a problem and an opportunity. Much of it is over 100 years old and in disrepair. Energy recovery and operating efficiencies are often a lower priority to the basic need of moving water. It takes a great deal of pressure to deliver potable drinking water throughout the distribution systems in New York City. However, because that pressure is typically the result of gravity – water flowing downhill from reservoirs in mountainous areas to homes and businesses in lower regions – there is often an



overabundance of it. Therefore, the pressure needs to be reduced before the water reaches its end-users, so that pipes don't explode and users can safely open taps.

Water utilities and municipal water systems accomplish this reduction with valves – Pressure Reduction Valves (PRVs). To be specific, PRVs reduce the pressure to specified levels, but do nothing valuable with the excess pressure – it is simply released as waste heat. Rentricity takes advantage of this waste to create clean, renewable energy.

Rentricity is simply an energy recovery company. Our Flow-to-Wire systems are typically installed in parallel to PRVs and mimic their function, reducing pressure to usable levels. However, Flow-to-Wire systems use the excess pressure to spin water turbines, which then creates electricity. That electricity, the production of which produces no carbon emissions, is then either sold onto the electric grid or used “behind the meter” by water utilities or municipalities at treatment plant facilities and/or pump station buildings. Therefore, Rentricity provides an opportunity to upgrade water industry infrastructure with energy recovery technology and simultaneously powering “smart water grid” leakage monitoring components.



The installation of such systems in no way impedes the regular operations of the



water distribution system. Rentricity uses proven components that water managers see every day in their regular work. Water users enjoy the same services as always, but now the system is more efficient, using a wasted by-product – excess pressure – to create a valuable and much-needed resource: clean, renewable electricity. This type of in-pipe hydrokinetic energy recovery also has additional benefits over other forms of renewable generation. For example, because Rentricity installations deal with treated drinking water within pipes, far from fish and wildlife, they avoid most of the environmental concerns and excessive permitting that come along with more traditional forms of hydropower. Furthermore, because the water flow in pipes is highly predictable and consistent, Rentricity installations are extraordinarily efficient (70-80%), a far cry from solar power (~15%) or wind power (~40%), which rely on the sun shining or the wind blowing – natural events that are difficult to predict and sometimes quite inconsistent. In a head to head comparison, without government incentive, Flow-to-Wire installations have a \$3.50/W capital cost, an 80% capacity utilization, and a 40 year technology life which provides a 25% IRR; versus Solar's at \$4.50/W capital cost, a 15% capacity utilization factor, a 25 year life and 1% IRR; versus wind power's \$2.50/W, 40% capacity factor, 25 year useful life, and a resulting 14% IRR. This simply means that in-pipe hydropower costs less than competing renewable sources.

To sum up, Rentricity utilizes existing technology to take advantage of existing waste in order to create renewable electricity, all while leaving the operation of water systems untouched. Furthermore, it does so efficiently and cost-effectively.

But what kind of impact can this type of generation have?

Each Rentricity system produces between 30 and 300 kilowatts (kW) of power, roughly enough electricity to power 40 to 400 average homes. However, there are many sites for potential installations within each water system, so the overall potential power output is much larger. At this stage, it is difficult to accurately predict just how much electricity of this sort can be created in New York City, but given that over one billion gallons of potable drinking water flow through the City's pipelines daily, it could certainly be in the be 10's of megawatt level or greater, perhaps 1% of the City's total energy demand. It will behoove the City Council and other key city leaders to understand the contribution that hydropower, including in-pipe hydrokinetics, can contribute to the renewable energy goals of New York City. Rentricity stands ready to support NYC in this regard.

The Council should be pleased to learn that Rentricity has already started working towards creating in-pipe hydrokinetic power in a number of cities around the country and recently in Canada.

These slides represent Rentricity's approach and its very first commercial projects within drinking water infrastructure with the largest being a 325kW single site in Palos Verdes, California.

[Show PowerPoint Slides]

Rentricity has also worked with the NYCDEP to determine the potential

energy recovery from wastewater outfalls at the various plants around the City. In order to continue to move forward with the NYCDEP and expand throughout the state it is very important that Rentricity's type of power generation is recognized as a contribution towards New York City and State's energy goals.

That's where the NYC Council comes into play. First, by including in-pipe hydrokinetic power in the City's future PlaNYC 2030 initiative, the Council will expand the city's clean energy as set out in its established goals. This would also contribute to the State's 30% renewable energy goals by 2015. Second, the development of this new form of power will provide economic stimulus to the State and work for its local engineers and construction firms; Rentricity is already working with local New York City contractors, and many more stand to benefit from additional projects. Third, by expanding the City's hydropower goals, the Committee will incentivize Rentricity and other companies like it to choose New York City as a place of business; NYSERDA already provides incentives for this form of generation, and firms will likely follow the programs when deciding where to invest.

It has always been my personal belief that because the renewable energy field is so nascent, and because it is therefore difficult to predict which technologies will provide the best solutions, that lawmakers should strive to:

- 1) provide as broad and fair incentives as possible, and then
- 2) let the market choose the winners.

We at Rentricity believe that the solution we provide can be among the latter; the NYC Council has an opportunity today to provide the former, and we urge you to do so.

To sum up:

The Council should seek to understand the total hydropower (including in-pipe hydrokinetics) energy recovery potential in the NYC water and wastewater systems and its potential contributions to PlaNYC and economic development goals; and

The Council should continue to highlight and explore the predictable cash flows and investment returns from hydropower and related methodologies like Rentricity's that can foster public and private investment vehicles to promote greater adoption and a "shared value" proposition.

Finally, the Council has the opportunity to explore the reduction of permitting by the Federal Energy Regulatory Commission, and like the State of Colorado, may be able to develop a memorandum of understanding to fast-track projects given the low environmental impact.

I appreciate your time spent listening today, and your inclusion of my testimony in the Committee's deliberations. If you require any further information, please do not hesitate to contact me at frankz@rentricity.com or 732.319.4501. Thank you.