



# The New Reality of 'Smart Grid' Participation Brings New Revenues

by Michael Craig

**L**ike all large electricity users, water and wastewater treatment plants are now living in a new era of electricity use, and it's important that plants evolve to function intelligently so they can thrive within the new normal.

That new normal is a situation in which electricity costs are high and continue to increase, and in which generation is becoming increasingly volatile. What this means is that plants are having an increasingly hard time balancing budgets while Independent System Operators (ISO) (the IESO in Ontario) are having an increasingly hard time balancing supply and demand.

What if your load can help provide that balance and you get paid for it?

The electric grid is a large, managed, distribution network for delivering energy in the form of electricity. When generation (supply) and usage (demand) are uncoordinated there is either a surplus or deficit of electricity in the network. Failure to account for surpluses and deficits for an extended period of time results in an unstable grid that can fail, sometimes catastrophically, leading to brownouts and blackouts.

Traditionally, the grid has been kept balanced by generators, which are controlled to match the stability

requirements and goals of the electricity system operator. But, more and more generators, such as wind and solar, are not controllable and often intermittent. Also, more electronic devices are more demanding on the grid because they use electricity in irregular patterns. The result is that the electricity system operators need access to new methods of maintaining balance. To do that, ISOs are exploring new, demand-side solutions, building a Smart Grid that encourages large electricity users to participate. In return, large electricity users, such as water and wastewater plants and factories with large HVAC loads, can earn new revenue to counteract rising costs by becoming active Smart Grid participants while using their existing equipment.

At water treatment plants, the processes of pumping and treating water and wastewater have inherent flexibility. The assets can be leveraged for a secondary use – providing grid balance – without impacting their process operations. Grid Balance is the continuous, real-time balancing of the electricity grid using demand-side assets. It is also energy and capacity neutral. When a pump is slowed down for a period of time, it decreases its flow, which also represents a decrease in electricity consumption. At another time, the pump will be sped up for the same period of time, balancing out the required flow. Within a given day, energy usage is balanced and remains neutral.




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As an example, aeration of wastewater is the largest energy consuming process in a wastewater treatment plant. Fluctuating the workflow means that the average dissolved oxygen concentrations are maintained within the limits set forth by the operators. Similarly, in water treatment plant reservoirs, there is inherent flexibility, and changing the reservoir level within predefined constraints does not negatively affect plant processes.

The amount of Grid Balance required by the electric grid is going to grow rapidly in the coming years, and a single water plant or other industrial facility alone cannot provide enough demand-side flexibility to keep the grid balanced in real-time. Plants need to connect their loads with other industrial, commercial, and municipal electricity users in a network, such as the type coordinated by ENBALA Power Networks™.

The breakthrough innovation is the network effect of coordinating many loads in a robust, reliable, and resilient way. The electricity system requires near real-time balancing, but there are few, if any, resources/processes that can tolerate unpredictable fluctuation every few seconds. An ENBALA Power Network optimizes which loads to change, how much to change them, and when to change them, based on their owner-defined operating constraints.

Participating companies are paid for their everyday electricity usage, which provides Grid Balance to the electricity grid and allows for easy integration of renewable power to the grid while giving plants a way to play an engaged role in the electricity system. Clients are compensated for helping the electricity operators balance the grid and use innovative solutions to increase the grid's reliability and reduce greenhouse gas emissions.


Earlier this year, an independent agency, OCETA, measured the positive impacts of demand-side Grid Balance on the environment.

The OCETA Impact Quantification Study found that by getting water plants and other large electricity users in Ontario connected to the Smart Grid and providing Grid Balance, there will be a significant reduction in greenhouse gases and smog-related emissions in the province. The environmental and societal impacts are the result of ISOs being able to reduce the amount of Grid Balance provided by traditional generators, allowing the ISO to re-deploy that capacity in a more efficient manner. The study found that for every 1 MW of Grid Balance provided through the ENBALA Power Network, greenhouse gases are reduced by 5,500 tonnes, smog-related emissions are decreased by 38 tonnes, and \$30,000 is saved in health impacts through decreased air pollution. If all 100 MW of Ontario's scheduled regulation services were delivered by the ENBALA Power Network, greenhouse gases would be reduced by 550,000 tonnes, smog-related emissions would

decrease by more than 3,800 tonnes, and the Province would save \$3 million in health impacts through decreased air pollution.

Grid Balance is the perfect way to show a water plant's commitment to the triple bottom line, helping the environment by reducing greenhouse gases and facilitating the integration of green energy onto the grid, helping society by making the grid more manageable for ISOs, and increasing income by creating a new revenue stream to counteract rising electricity costs.

The Ontario Clean Water Agency has recognized how water utilities, which use a large percentage of our electricity, can take advantage of new Smart Grid technology, and the Provincial government is also on board. In November 2010, the Province passed the *Water Opportunities and Water Conservation Act*, which aims to make the region a leader in the development of conservation and treatment technologies.

By joining the network and becoming fully engaged Smart Grid participants, water and wastewater plants can showcase their support of innovation and a greener grid while generating a new revenue stream. 

*Michael Craig is a freelance writer based in Toronto.*

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