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Attn. Stakeholder Engagement
Via Email

Markham District Energy is a leading Canadian district energy company currently providing heating and cooling services to over 10 million sq.ft. of building space in Markham including residential, commercial and institutional customers.

We would like to provide input into your current mid-term review, and some of these comments are equally valid to the broader market renewal initiatives underway at the IESO.

Two areas that are quite common worldwide in large district energy systems and large campus energy systems is chilled water storage and specialized off-peak electricity rates. As further described below, these strategies and technologies could provide benefit to the IESO and the LDC's but there is currently no enabling financial framework in Ontario to make investment possible.

1. Chilled Water Storage

There is currently great interest in electricity storage to augment the intermittent nature of renewable power and to provide operational reserve. There have been significant innovations in storage technologies, a number of pilot projects built in Ontario and some more significant projects in service elsewhere in the world. However, the current group of electricity storage technologies are expensive and have limited track records.

An alternative well-tested mature technology is to indirectly store electricity using chilled water or ice storage. The basic concept is you to consume electricity during low cost / low demand periods to make chilled water and/or ice, and then during high price / high demand periods, use the stored water/ice for cooling instead of electricity. There are very significant utility-sponsored chilled water storage programs in places like Florida.

Chilled water storage was popular back in the 90's in Ontario when demand charges were high and large time of use differences existed from day to night. In Ontario's current electricity rate and market environment, there is little incentive to use chilled water storage for load shifting. Chilled water storage could be utilized for participation in demand response auctions. If you are a class A customer, chilled water storage could be a more attractive option.

To provide a sense of scale, in our current system, it would be possible to shift the electrical equivalent of about 1 MW around anytime year-round, and upwards of 5 MW in the summer. These loads are continuing to grow.

Where Markham District Energy (and others) have struggled is formulating a business case that has certainty. The value of GA is a moving target and for class B customers provides little benefit for load shifting as the costs are levelized across all hours in the month. DR programs are not certain. A capacity auction is perhaps on the long-term horizon. The up-front capital costs are high with no certainty on the avoided costs. The missing piece is some certainty through a rate, a program or a grant that ensures a reasonable payback on the investment. I suspect the issues are very similar to the proponents of battery storage, although I will argue chilled water storage is at a lower cost and more mature technology.

2. Off-peak electricity for heating

One of the things that has been a problem for some time now in the Ontario Electricity market is surplus baseload generation (SBG), and also long periods of extremely low HOEP pricing. As we understand it, the IESO are largely limited to either selling the surplus power at very low prices to other jurisdictions and/or curtail renewable and/or nuclear capacity. This is certainly not an ideal response, both environmentally and politically.

One of the advantages of district energy systems is the ability to vary fuel sources. Currently we use natural gas as the primary fuel source for heating. It would be very easy to install a large industrial heat pump, or even simpler, an electric hot water boiler(s) (say 5 MW size) to displace heat that comes from natural gas (our winter heating peak is now over 35 MW and growing).

Given the flexibility of heat sources in large district energy systems, we can envision an automatic system that uses electricity for heat only when the 5 minute dispatch price is low. The IESO could even directly or indirectly control the load to manage demand short term demand fluctuations in the system.

The idea of electric to heat in district energy systems is not a new concept. There are systems in Germany that currently use this approach when available renewable generation becomes too high.

In order to enable the technology, there needs to be a way to pass-through only the marginal cost, and not layer on the global adjustment and distribution costs. The thinking is an electric heat pump or boiler would only be used at night time and low-load conditions when it is not contributing to the system peaks, and when the electricity is coming from renewable sources, directly displacing the natural gas and GHG emissions.

I would ask that these two strategies / technologies be considered in the list of approaches the IESO is looking at, as we believe they support the broader GHG reduction policy objectives from the Province and provide more direct grid support and utilization at the LDC levels.

Regards,
Markham District Energy Inc.

Peter Ronson, P.Eng.
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