

IESO Engagement

From: Michael Wiggin
Sent: March 9, 2022 1:45 PM
To: IESO Engagement
Cc: John Stephenson; Richard Gilbert; Martin Green; Paul Acchione
Subject: Integration of thermal and electric utility planning

Dear IESO.

As part of the consultation process and further to a submission that I made earlier, I want to register my opinion that an integration of electricity and thermal utility planning is critical to meeting net zero emissions targets and to create more cost effective electricity and thermal utilities.

The dominant pathway to net zero GHG emissions in the building sector by 2050 or earlier, appears to be to undertake major energy demand reduction through retrofits and the electrification of space heating through the installation of heat pumps - mainly air source heat pumps (ASHPs). This will result in an expansion of non-GHG emitting electricity sources and, probably, a less dispatchable electricity supply. For this reason, IESO has gone on record as asserting the continued need for natural gas plants and probably for an expansion of their utilization - and more GHG emissions.

At the same time, there is a growing understanding of the potential for establishing thermal networks to provide thermal energy from multiple sources, with or without heat pump upgrading, and the deployment of thermal energy storage (TES). If we are going for a more electricity based heating system, then to manage loads we can continue to use natural gas turbine generators to manage load, utilize large battery storage or to utilize TES. If the heating is going to be electricity based, then storing electricity or storing thermal energy (heat or cold) will be equally useful. However, the most recent work suggests that batteries for electrical storage will cost about 100 times the cost of large TES - but both will achieve the same load management result. At the same time, the thermal energy networks will provide access to other sources of heat or cold that can be used directly or upgraded with heat pumps but at a higher COP than ASHPs.

It is my understanding that we still live in technical silos. Many people working on SMRs lack an understanding of the potential for operation in a CHP (combined heat and power) mode so that heat can be used instead of waste. Roughly speaking, by operating an SMR so that heat is extracted at about 70C rather than rejected to the lake as cooling water, might result in about 1 unit of electricity output being lost for 12 to 14 units of heat made useful. Therefore, instead of using 1 unit of electricity for about 0.9 units of heat (assuming 10% line losses, 1 unit of electricity could be lost at the SMR to produce 12 to 14 units of heat. Furthermore, as part of an expanded thermal network, TES units can accept surplus electricity and store it as heat for later use, thus avoiding the loss of surplus electricity. In our consultations, we have also noted that many have little understanding of the economies and technical feasibility of long distance transport of heat thus eliminating the possibility of, for example, transporting heat from Pickering to Toronto.

I could go on about the benefits of such integration, but the benefits to the improved use of the electrical system at a lower cost than either continued use of natural gas peaking plants or electrical storage make it imperative that this integration be properly investigated. Recent work by colleagues suggests that in Toronto, for example, thermal networks and thermal energy storage might cost about 1/3 or less that the cost of deep retrofits and air source heat pumps - not to mention the increase in electricity generating capacity and distribution and transmission system upgrades to handle increased loads.

I, and several colleagues, are working on new pathways for net zero GHG emissions that include thermal networks and thermal energy storage. We sincerely hope that you can be part of such investigations and that you raise integration possibilities with your experts. Participation in the GTHA zero emissions pathways investigations that we propose would also be most appreciated and productive. I, and colleagues, would welcome any questions or discussion on these possibilities.

Respectfully,

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