

December 3, 2025

Infrastructure and Environment Committee
City of Toronto
100 Queen St W
Toronto, ON

Re: **IE26.14 - Electricity and Toronto's Climate Commitments**

Dear Mayor Chow and Members of the Infrastructure and Environment Committee,

The motion proposed by Councillor Saxe seems to be predicated on the belief that the TransformTO strategy approved by Council in 2021 is viable, and that the IESO and Toronto Hydro should ensure that net-zero electricity is reliably available to allow the TransformTO strategy to succeed. Such belief is perhaps understandable, given the general availability of electricity for non-heating uses. But the enormous challenge of electrifying the heating of whole communities, in our highly variable cold climate, is not so simple.

The Boltzmann Institute (BI), in our comments regarding agenda item IE26.3, has argued that the TransformTO strategy, especially in regard to electrification of building heating, was never viable:

- The target of reducing thermal energy demand for existing buildings by 75 percent by 2040 is unrealistic, and far exceeds the 10 to 20 percent reduction that other jurisdictions have found to be achievable, even with heavy subsidies (as high as 110 percent, in Italy) and well-organized, long-term government programs for building retrofits.
- TransformTO assumed unrealistic high efficiency and high capacity performance of air-source heat pumps (ASHPs) even on the coldest winter days.

The above two items led to the City's projected peak power demand on the Toronto Hydro system, which would occur on very cold winter mornings, being *underestimated by more than a factor of 3*. For details, see BI's Two Pathways report (<https://zenodo.org/communities/twopathways/>) and its annex specifically addressing Toronto Hydro (https://zenodo.org/records/15548051/files/LDC_Annex_Toronto_Hydro-Electric_System_Limited.pdf). (The latter is also appended to our comments regarding IE26.3.)

When developing the Integrated Regional Resource Plan (IRRP) for Toronto, both Toronto Hydro and the IESO appear to have accepted, without question, the projected electricity demand implied by the TransformTO strategy. As indicated in the staff report for IE26.3, the targets of the 2021 TransformTO strategy are not being achieved, particularly in regard to building retrofits and electrification of

heating. It is now manifestly evident that heating electrification with ASHPs would require several times more reliable peak electric power than contemplated in the IRRP.

The plan to electrify heating of most Toronto buildings was never viable and should be abandoned. The only apparent viable alternative is to implement thermal networks / district energy to serve almost all of Toronto's existing and new buildings. Smart implementation of thermal networks would allow the peak power demand to be kept to a manageable level.

Once heating electrification is taken off the table, the IRRP for Toronto seems reasonable. Whether gas-fired generation can be phased out at the Portlands Energy Centre (PEC) by 2035 will depend on what other reliable, on-demand (dispatchable) generation, storage, and transmission capacity can be added to the grid by that time.

The IESO has an *overarching requirement to provide reliable power that meets the Ontario demand*. Wind and solar cannot provide reliable power, especially on cold, still, early winter mornings. To integrate clean, but intermittent, power sources, such as wind and solar, system operators must add equipment to better provide voltage control, frequency stability, fault clearing capability, inertial capability and reduced curtailment of clean generation. This is primarily done by adding expensive electrical storage systems. That additional equipment is paid for by wholesale market uplifts to the retail price. The cost shows up on retail bills, not wholesale market prices. Intermittent sources can easily make the cost escalate rapidly as penetration increases.

Ontario is working to add substantial nuclear generating capacity that should come online between 2030 and 2040. That will reduce the long-term need for reliable gas-fired generation. But four units at Pickering NGS B will be shut down in 2026 for refurbishment and will only fully return to service in the mid 2030s. Until adequate nuclear capacity becomes available, the IESO has no good alternative to increased use of gas-fired generation. As an illustration of the importance of conventional, reliable generation, excessive use of solar power led to a recent major power outage in Spain and Portugal, the recovery from which relied on nuclear power from France.

The PEC serves an important purpose of providing reliable power without overloading transmission facilities from the Ontario grid into Toronto. That's partly why the IESO is proposing a 3rd transmission line into Toronto, but the details and timeline for that line remain uncertain. A possible long-term future for PEC is to convert it to a combined heat and power (CHP) plant fueled by biomass (wood chips) or municipal solid waste. Electricity generation might be 40 percent efficient,

with residual, low-grade heat being supplied to Toronto thermal networks while raising overall plant efficiency to 80 percent or more. For an example of a modern CHP waste-to-energy plant within a city, see https://en.wikipedia.org/wiki/Amager_Bakke.

Implementing distributed energy resources (primarily solar PV since large wind turbines are not allowed) within the City would be about twice the cost of implementing them on the Ontario grid. Since adequate nuclear capacity to provide reliable power for Ontario, including when the sun is not shining, is already needed and planned, installation of solar PV generation would only increase long-term costs.

However, if Toronto and Ontario were to implement large-scale thermal networks and thermal energy storage (TES), and configure retrofitted and new nuclear plants for CHP operation, then Toronto's buildings could be entirely heated with heat from nuclear plants that would otherwise be wasted by discharge into the environment – Lake Ontario, etc. Since the nuclear plants could then vary their electricity output by directing more or less heat to the thermal networks (and TES), it would become feasible and economical to add much more wind and solar generation to the grid.

Energy systems are highly complex and serve many different needs. Creative integration of electrical and thermal systems will enable an efficient, affordable transition to net-zero heating of buildings, more than double the energy efficiency of thermal power stations, and allow increased utilization of wind, solar and other forms of renewable energy.

*In light of the above, we respectfully recommend that the IEC members **not accept** the recommendations put forward by Councillor Saxe.*

What is needed, instead, is development of a much broader integrated, low-carbon energy plan for Ontario, and Toronto, that addresses both electrical and thermal energy in a fully integrated manner. The Boltzmann Institute would be pleased to participate in the process leading to such a plan.

Sincerely,



Martin Green, Ph.D.
Director and Treasurer
The Boltzmann Institute
E: mgreen@bi-ib.ca
T: 416-247-2818
W: bi-ib.ca