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March 9, 2021

Toronto City Council
c/o Marilyn Toft
12th Floor, West Tower, City Hall
100 Queen St. W.
Toronto, ON M5H 2N2

Re: MM28.21- Calling on the Province to Phase-Out Gas-Fired Electricity Generation: further comments.

Dear Councillors:

Further to my letter, dated February 4, 2021, this explains how phasing out gas plants as soon as possible would be one of the best ways for Ontario to meet its emission reduction responsibility.

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Provincial Responsibility

1. Ontario committed to work with the federal government, other provinces and in consultation with Indigenous peoples to meet Canada's emission reduction targets.

2. In the Made-in-Ontario-Environment Plan ("the Plan"), the Ministry of Environment said it would "ensure that Ontario achieves emission reductions in line with Canada's 2030 greenhouse gas reduction targets under the Paris Agreement." It acknowledged this was required under the Cap-and-Trade Cancellation Act, 2018.

3. Critics of the Plan judged it inadequate to meet the current 2030 target. Meanwhile, the Independent Electricity System Operator (IESO) projects an increase of almost 10 million tonnes (Mt)/year of greenhouse gas emissions from 2017 to 2030 from gas plants, not taken into account by the Plan. And the federal government announced it would up its ambition for the 2030 target next month.

4. The Province needs to do something new to meet the 2030 goal. Phasing out much of the pollution from gas plants would contribute a significant part. It would cost less than alternatives, as explained in this letter.

5. The IESO uses a cost minimization model for long-term system planning, including carbon pricing according to current regulations. Unfortunately, the Ontario Emissions Performance Standards (EPS) are currently so lenient the price of pollution for most gas plants is effectively zero.

6. Consequently, while average marginal costs of electricity are forecasted to continually increase over the next 20 years, they won't exceed 4 cents/kilowatt-hour (kWh).

7. The expected contract cost of solar and wind energy is now around 4 cents/kWh, slightly above the projected average marginal cost. Therefore, they will never be selected. And the proof of the pudding is they aren't. There is no additional renewable energy projected in the IESO's long-term plan.

8. EPS is intended to protect trade exposed industries. Electricity generation is not trade exposed. It is hiding behind protection it doesn't need, except from renewable energy.

9. If electricity generation were subject to the same carbon pricing as, say transportation and buildings, the forecast average marginal cost of electricity would increase. For example, in 2027, the first year the amended regulation could likely result in new generation in-service, the average marginal cost would be boosted to 7.3 cents/kWh, and reach 9.7 cents/kWh by 2030.

10. Solar and wind would then be selected by the cost minimization model … up to a point (as discussed more fully below). Even if some wind energy is expected to be curtailed during low demand periods, it would still be competitive because of the carbon prices. Once in-service, solar and wind would be dispatched in priority to gas plants, thereby reducing carbon pollution.

11. The Province could easily amend the EPS to exclude electricity generation and thereby make it subject to proper carbon pricing. It could be amended by order in council (a decision by cabinet); one decision, millions of tonnes of pollution abated. There would be no costs, or staffing commitment, as would usually be required for emission reduction programs for, say transportation or buildings, no restrictive regulations increasing the cost to business, passed through to consumers, no subsidies from tax-payers. The gas suppliers would act as unpaid carbon fee collectors for the government as for any other gas customer.

12. In conclusion, phasing out gas plants is a unique opportunity for the Province to meet its emissions reduction responsibility at the lowest cost to itself, municipalities and Ontarians.

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Refutation of arguments advanced in letters opposing the motion

1. As of February 4, 2021, the City had received 10 communications supporting the motion and 4 against. The arguments of those against boil down to a straw-man. For sure, if every last gas plant was instantly decommissioned and Tesla batteries used to keep the lights on, the cost would be high. But that won't happen.

2. In 2017, gas-fired generation was only 4% of the total, yet the lights stayed on as we can all recall. There were no other load following technologies in the mix. Therefore, is it so unreasonable to propose that gas-fired generation at least be cut back to 4% from the 20% currently projected for 2030? That would reduce greenhouse gas emissions by about 10 Mt/year, a significant portion of what the Province must accomplish and take Ontario electricity back to 96% emissions free.

3. If the Province made gas plants pay their fair carbon fee, or imposed a gradually stricter Clean Electricity Standard, there would be no change in the generation mix, or costs to rate-payers until about 2027, because at least 5 years lead time is required. The carbon fee itself is not a net cost because the revenue is returned to citizens.

4. All the energy from gas plants would not be displaced in a single year. It could take 5 to 10 years. That might be "as soon as possible" per the motion. Notice the upper end of that range eclipses the recent US target of 100% emissions free electricity by 2035, which I believe will be achieved, though it will require load following economically, without gas. (The Americans put a man on the moon within a decade.)

5. Most of the ten big, greater than 300 Mega-watt (MW), gas plant contracts expire this decade or shortly after. In any case, the contracts make them whole, whether they run or not, provided they stay ready to run, and offer to run at the contract efficiency. If sufficient non-emitting resources were contracted such that some or all gas plants ran very little, or not at all, there would be no breach of contract by the Province, no stranded assets, no cancellation costs. The IESO seems to assume there is a good chance most of the contracts would be extended (presumably on similar terms).

6. Bringing on more wind or solar would be an incremental cost to the ratepayer (that's why it's not happening) but very little. The expected contract cost of wind or solar is about 1 cent/kWh higher than the running cost of gas (without carbon fees). Those opposing the motion presume a high additional cost for energy storage. But there need be none, so long as gas plants are still under contract, simply running less and less over time, as more non-emitting resources enter service.

7. The next key insight is to realize that the % of total generation switched from gas to clean in any one year will be relatively small. Hence the bump in hydro rates would be minimal.

8. For example, suppose we keep at least 4% gas generation pending clean, low-cost load following technology (which must be coming soon because the whole world has the same problem). Suppose further the balance of 16% of energy from gas plants that would otherwise be generated from 2027 on is replaced over 4 years. That would be 4% in any one year 1 cent/kWh higher than the running cost of gas, a bump of 0.04 cents/kWh, or 0.3% of the current commodity cost of electricity (12.8 cents/kWh). The cumulative bump by 2030 would reach 1.2% of the commodity cost.

9. Even if as much as half of the wind energy must be curtailed, doubling its effective cost, the result would be still be much less than implied in all the opposing letters (and claimed to be 50% of the commodity cost in one).

10. A 2017 study, The Cost of Decarbonizing the Canadian Electricity System by two economists, Brett Dolter and Nic Rivers used a cost minimization model similar to that used by the IESO. It allowed investment in additional transmission between provinces, where economic, and thereby found the cost was minimized without any batteries, because the hydro dams provided sufficient energy storage. It achieved approximately 96% emissions free from coast to coast at an incremental cost of electricity of about 1 cent/kWh.

11. Even if the bump was 1 cent/kWh, or 8% of the commodity cost: (1) the commodity is usually less than half of a typical hydro bill, reducing it to a 4% or less overall increase, and, (2) it would not rise to that before the end of this decade.

12. The Dolter and Rivers study found the last few % of gas-fired generation to be very expensive to eliminate based on current technology. But it's not unreasonable to suppose that by about 2030, or shortly thereafter, various technologies will have advanced that support economic completion of the phase-out. For example, the final load following could be accomplished with a mix of methods and energy storage much cheaper than today's lithium-ion batteries, or by hydrogen fuel cells, or even some of the existing gas plants converted to hydrogen. The gas plant owners have acknowledged this last possibility themselves.

13. It's also worth rebutting false insinuations made in all the letters against the motion that it would be cheaper to reduce emissions in other sectors. I'd be interested to see any substantiation of that.

14. Google tells us the average sticker price on an electric car is $19,000 higher than an average gasoline-powered vehicle. The 10 Mt/year potential reduction from gas plants

discussed above would be the equivalent of over 2 million EV's, or an additional purchase cost of over $38 billion.

15. The Enbridge web site, Heating with Gas, shows the total annual bill for a typical residential customer would be an extra $1,896 to heat with electricity versus gas. Again, the 10 Mt/year potential reduction from gas would be the equivalent of over 2 million homes retrofitted (somehow) to zero emissions (more than three times the number of single-family homes in Toronto).

16. About the same emissions saving could be achieved by replacing the entire steel industry in Ontario with its zero-emission future reincarnation. That won't happen while steel is also protected from full carbon pricing by the EPS.

17. Good luck with the 2 million ZEV's or ZEB's or drastically reconfigured steel industry by 2030. Isn't it easier to envisage a 96% emissions free grid? We had it in 2017.

Sincerely,

John Stephenson

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