May 12, 2023

Ministry of Energy, Energy Supply Policy Division
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Submitted via email

Re: AMPCO Submission – IESO Pathways to Decarbonization Study (ERO Number 019-6647)

AMPCO is the voice of industrial power users in Ontario. Our mission is industrial electricity rates that are competitive and fair.

Attached are AMPCO's comments on the general questions posed as part of the Ministry of Energy's public consultation on the above referenced topic. AMPCO appreciates the opportunity to provide such feedback.

Best Regards,

Colin Anderson
President

IESO Pathways to Decarbonization Study (ERO Number 019-6647)

Submission of the Association of Major Power Consumers in Ontario (AMPCO)

EXECUTIVE SUMMARY

Pursuant to the Paris Agreement, Canada has made an international pledge to a net zero economy by 2050. While this represents an unprecedented challenge, many AMPCO members have their own similar net-zero targets, and support this ambitious goal. Ontario seems to understand this goal, whereas the Federal Government, with its 2035 deadline for electricity systems in the country, appears less realistic. AMPCO believes that Canada should honour its international commitments, but it should be very wary of arbitrarily increasing the pace of those commitments ahead of other sectors and/or jurisdictions.

Canada/Ontario must take action to confront the climate crisis – AMPCO understands this. But in so doing, it would be unfortunate if our actions gave rise to a massive economic crisis, with societal impacts just as real and undesirable as the forecast impacts of global climate change. The concepts of *balance* and *pacing* must be respected. A balanced approach – one that considers both the environment and the economy and sets an achievable end point, rather than an aspirational one – is absolutely necessary. Similarly, striking the correct pace is essential. This does not just apply to the absolute pace, but also to the pace that is adopted relative to other jurisdictions.

Policy determination always serves multiple objectives and, in this case, it needs to thoughtfully consider the implications of change from multiple perspectives.

INTRODUCTION

AMPCO provides Ontario industries with effective advocacy on critical electricity policies, timely market analysis and expertise on regulatory matters that affect their bottom line. We are the forum of choice for major power consumers who recognize that their business success depends on a reliable and affordable electricity system.

This submission is in response to the Ontario Ministry of Energy's public consultation on the IESO Pathways to Decarbonisation Study. AMPCO's members are major power consumers, responsible for over 15 TWh of annual demand in the province. A reliable and affordable energy supply is critical to the success of their businesses, which is why AMPCO has an interest in this matter. Additionally, many AMPCO members also have their own net-zero targets making them valuable resources in the discussions and allies in understanding the need for decarbonization.

AMPCO will respond to each of the Ministry's nine questions posed in relation to the IESO's "no-regret" recommendations included in its Pathways to Decarbonization Study.

AMPCO appreciates the opportunity to provide feedback.

1. *The IESO's Pathways Study recommends streamlining regulatory, approval and permitting processes, citing that it can take five to 10 years to site new clean generation and transmission infrastructure.*
   - *What are your thoughts on the appropriate regulatory requirements to achieve accelerated infrastructure buildout? Do you have specific ideas on how to streamline these processes?*

While AMPCO is not providing a list of specific ideas on how to streamline regulatory, approval and permitting processes, it does suggest that such processes should be consistent with those that exist in neighbouring jurisdictions. New generation and transmission infrastructure will be needed in Ontario as part of resource adequacy activities as well as electrification resulting from decarbonization. However, Ontario is not the only jurisdiction that will be pursuing such goals. It would be unfortunate if other jurisdictions were viewed as more welcoming of infrastructure investment simply because they refined their processes to be more accommodating. It may be appropriate for the Province to exercise some due diligence in understanding exactly how others approach such procedures, and to learn from (and adopt) their approaches.

Other things like the potential harmonization of local, provincial and federal processes in addition to consideration of some reasonable time constraints should also be considered for Ontario.

2. *The IESO's Pathways Study recommends beginning work on planning and siting for new resources like new long-lived energy storage (e.g., pump storage), nuclear generation and waterpower facilities.*
   - *What are your expectations for early engagement and public or Indigenous consultations regarding the planning and siting of new generation and storage facilities?*

AMPCO expects early and comprehensive public and Indigenous consultations regarding the planning and siting of new generation and storage facilities. Adequate time and opportunities must be provided to allow for meaningful input. However, as highlighted in Question #1 (above), that time cannot be unlimited.

As highlighted by AMPCO in its comments submitted to Government on April 27, 2021 on the Long-Term Energy Planning [LTEP] Framework Consultations, "…One of the key elements of this entire exercise is the achievement of a workable LTEP process that accomplishes the required goals and objectives while not being so onerous as to collapse under its own weight." Further, under Section 25.29 of the current *Electricity Act, 1998*, (the "*Act*") a long-term energy plan may include goals and objectives respecting (among other things), "consultation with Aboriginal Peoples and their participation in the energy sector, and the engagement of interested persons, groups and communities in the energy sector". This legislated object is but one of many set out in the *Act* that obligate the Province to proceed in a certain way. AMPCO strongly recommends that Government review the submissions made in 2021 by all interested parties on the LTEP Framework – it is directly relevant to this question, as well as the overall topic of resource acquisition in service of decarbonization activities. In particular, topic areas such as GOVERNANCE AND ROLES, THE NEED FOR OVERSIGHT and METRICS AND RESULTS should be carefully reviewed and respected as part of this consultation.

3. *The IESO's Pathways Study shows that natural gas-fired generation will need to continue to play an important role in the system for reliability in the short to medium term. The IESO's assessment shows that most of the projected Ontario demand in 2035 can be met with the build out of non-emitting sources, but some natural gas will still be required to address local needs and provide the services necessary to operate the system reliably.*

- *Do you believe additional investment in clean energy resources should be made in the short term to reduce the energy production of natural gas plants, even if this will increase costs to the electricity system and ratepayers? What are your expectations for the total cost of energy to customers (i.e., electricity and other fuels) as a result of electrification and fuel switching?*

Quite simply, no. The subject of cost and affordability must be of paramount importance and priority in this conversation.

AMPCO understands the general need to drive towards Decarbonization. The elimination of gas-fired generation will absolutely increase Ontario's electricity system costs. The degree to which those costs are impacted will be heavily influenced by the pace at which the changes are required to take place. Trying to do too much too soon, or ignoring the issue for too long can both lead to bad outcomes. Striking the correct pace is essential. This does not just apply to the absolute pace, but also to the pace that is adopted relative to other jurisdictions. Being out of step with others will have negative impacts on competitiveness and the ability of Ontario to attract investment capital.

AMPCO does not know exactly what that pace should be. Nor does the IESO. Nor does Government – either Federal of Provincial. And unfortunately, recognizing a seriously incorrect pace may only be obvious in retrospect. All the more reason to proceed with the utmost caution.

Further, AMPCO believes that we cannot simply assume that ALL energy needs currently satisfied by natural gas will ALL somehow, in a relatively short period of time, be met by electricity. In AMPCO's view, one cannot assume that it will be possible to simply transition away from ALL uses of carbon fuels in a short timeframe. For this reason, AMPCO believes that it is essential to maintain viable infrastructures for both gas and electricity until well past 2035. Reliability and affordability depend on this.

Most large industrial facilities require both electricity and natural gas as components of their total energy needs. In many cases, electricity needs are smaller than natural gas requirements. Theoretical industrial electrification is easily understood - simply replace natural gas with additional electricity. In practice, it is considerably more difficult:

- In some cases, the equipment or process technology does not currently exist to simply convert from gas to electricity.
- In some cases, the conversion from gas to electricity may not be economic. Typical industrial equipment lives are measured in decades and replacing them before it is economical would be a major financial obstacle for most entities.

- Where gas is burned purely for heat it may be possible to convert directly to electricity. Where gas is burned as a chemical feedstock, it is not likely possible to convert directly to electricity.
- Conversion from gas to electricity will place a major strain on the Ontario electricity system. Ontario is already entering a period of reduced capacity, even with zero incremental electrification. Many large industrial entities currently satisfy more of their total energy need from natural gas consumption than they do from electricity usage. Full conversion to electricity (from a mathematical perspective, of course – no commentary here on how possible this is) could mean two to three times as much electricity is now required to operate a given facility – with absolutely no increase in industrial output. If each large industrial facility were to double or triple its electrical load as a result of electrification, significant new sources of generation would be required to meet the demand. Within the context of P2D, it is unlikely that gas fired generation (likely one of the quickest incremental sources of significant energy) will qualify. Further, with the uncertainty surrounding gas in Ontario, it is unlikely that any such projects could even secure financing, and if they did, prices charged would have to be exorbitant to account for the incremental risk and the likelihood that the equipment would be decommissioned long before the end of its useful life. This situation clearly extends the difficulty associated with industry's ability to attract capital to others as well, in this case new generation resources due to regulatory uncertainty. This is a difficult situation to be in – a significant increase in demand combined with a significant decrease in the qualified generation technologies available to meet it.

All of this highlights the difficulties associated with major industrial electrification.

AMPCO strongly recommends that P2D be viewed through a realistic lens, as is being generally supported by the Province – in both setting initial assumptions and in recognizing shortcomings in the approach and attempting to integrate potential solutions - rather than an aspirational lens. The appropriate amount of time must be taken to ensure that as much rigour as possible has been brought to bear on this issue. Ontario simply cannot afford to get this one wrong.

Ontario must take action to confront the climate crisis – AMPCO understands this. But in so doing, it would be unfortunate if our actions gave rise to a massive economic crisis, with societal impacts just as real and undesirable as the forecast impacts of global climate change. This potential outcome demands that prudence drive decisions, not emotion. Accordingly, the concept of balance needs to be embraced. Policy always serves multiple objectives and it needs to thoughtfully consider the implications of change from multiple perspectives. In this case, Ontario's actions must reflect a

reasonable balance between the environment and the economy since neglect of either one can have catastrophic consequences.

For this reason, reliability of supply and minimization of costs must be of paramount importance and priority in any resource adequacy exercise, including pathways to decarbonization.

4. *The IESO's Pathways Study highlights emerging investment needs in new electricity infrastructure due to increasing electricity demand over the outlook of the study. The IESO pathway assessment illustrates a system designed to meet projected demand peaks almost three times the size of today by 2050, at an estimated capital cost of $375 billion to $425 billion, in addition to the current system and committed procurements. Please see supporting materials for illustrative charts on capacity factor and cost by resource type.*
   - *Are you concerned with potential cost impacts associated with the investments needed? Do you have any specific ideas on how to reduce costs of new clean electricity infrastructure?*

AMPCO struggles to understand how anyone could <u>not</u> be concerned with the potential cost impacts associated with incremental investments between now and 2050 on the order of $400 billion. It is a staggering number. According to Statcan, Ontario's population as at January 1, 2023 is estimated to be 15.386 million people[1]. For context, $400 billion would translate to just under $26,000 of expense per person – that's every man, woman and child in the province of Ontario. AMPCO finds this very concerning.

Ontario's existing high electricity prices are largely the result of a decade of exclusive focus on sustainability due to the now repealed *Green Energy Act*. That sustainability came at the expense of affordability. Put bluntly, Ontario simply cannot afford to incur another round of price increases in the short term in service of further sustainability goals such as the total elimination of gas-fired generation in the short to medium-term in the province. According to AMPCO's benchmarking[2], Ontario's industrial electricity pricing is already higher than that in most other jurisdictions in Canada and the United States. As such, from both a competitiveness and an investment perspective, it cannot withstand additional upward pressure.

In addition to increased electricity costs, one must also consider what those increased costs will do to Ontario industry and its ability to attract investment capital. Electricity pricing in Ontario struggles to be competitive as compared to other jurisdictions.

[1] https://www150.statcan.gc.ca/n1/en/subjects/population_and_demography/population_estimates
[2] https://ampco.org/benchmarking-2022/

Further price increases will broaden that competitiveness gap, further reducing the amount of investment that Ontario industry will attract. Ultimately, many industrial participants may exit the province which will tend to put downward pressure on Ontario demand. While this may (incorrectly) be heralded by some as a positive step in conservation, it will actually represent a reduction in GDP for the province, in much the same way as occurred during the financial crisis of 2008/9.

Further to this, the demand for the industrial output that used to be produced by industry in Ontario will not have disappeared – only the Ontario industrial facilities themselves will have done that. Instead, that demand will be satisfied by facilities in other jurisdictions – jurisdictions that do not have electricity systems that are as clean as Ontario's currently is and/or jurisdictions whose environmental standards may be lower. So in this situation, while Ontario may not be producing as much GHG emissions as before, these other jurisdictions could be producing more as a result of increased demand for their output.

This phenomenon of "carbon leakage" will result in a net increase in the total amount of global emissions, and such emissions do not respect provincial or international boundaries. So while Ontario may have cut its emissions (at a very high cost), global emissions may, in fact, have increased because production will have shifted to relatively "dirtier" jurisdictions – a catastrophic environmental and economic outcome for the province[3].

To be clear - incurring incremental costs on the order of $400 billion will negatively impact industrial competitiveness and its ability to attract investment capital. We must find another, less expensive, way.

5. *The IESO's Pathways Study recommends that for a zero-emissions grid by 2050, investment and innovation in hydrogen (or other low-carbon fuels) capacity could be required to replace the flexibility that natural gas currently provides the electricity system.*
   - *Do you have any comments or concerns regarding the development and adoption of hydrogen or other low-carbon fuels for use in electricity generation? What are your thoughts on balancing the need for investments in*

[3] This potential outcome adds weight to the need for Carbon Border Adjustments, a subject possibly better pursued at the federal level, but still a critical consideration for the IESO in considering Ontario's electricity supply versus other jurisdictions. To some extent, pursuit of such adjustments can help permit pacing to proceed at Canada's / Ontario's discretion and to blunt the economic and environmental impacts that will arise in the absence of such a construct.

these emerging technologies and potential cost increases for electricity consumers?

In AMPCO's submission, the question of a "hydrogen economy" is much broader than the above question associated with "the development and adoption of hydrogen or other low-carbon fuels for use in electricity generation". The information below relates exclusively to hydrogen as a fuel for generating electricity.

Production of hydrogen (H_2) is currently classified into three colour codes:

- Today, most hydrogen is produced using natural gas through a process called steam methane reformation, which results in a more carbon intensive hydrogen gas. This is often referred to as "grey" hydrogen.
- Lower-carbon hydrogen can be produced from natural gas using steam methane reformation that incorporates Carbon Capture Utilization and Storage (CCUS) to reduce the carbon emissions associated with hydrogen production. This is often referred to as "blue" hydrogen.
- Low-carbon electricity (e.g., nuclear, hydroelectric, wind, solar) can be used for electrolysis to produce low-carbon hydrogen or biomass and renewable natural gas can be converted into hydrogen through processes such as gasification and pyrolysis. This is called "green" hydrogen.

It must be recognized that increased production of both grey and blue hydrogen (the majority of H_2 production currently) will actually *increase* the demand for natural gas, not decrease it. Green hydrogen, on the other hand, will significantly increase the need for electricity, leading to further affordability issues. It seems paradoxical that we eagerly look to hydrogen as the low carbon fuel of the future for generating clean electricity, but the only way to create that hydrogen cleanly is by consuming the very electricity that we are trying to produce.

AMPCO is no expert on hydrogen. With current technology, electrolysis generally produces hydrogen at about 75 per cent efficiency[4]. So to create a kilogram of pure hydrogen fuel, which holds about 33 kWh of energy[5], it takes about 44 kWh. These laws of physics and chemistry suggest that exclusively using electricity to create hydrogen, which will then be converted back to electricity, will actually be a net consumer of electricity, leaving us with less than we started with. This suggests that, if we are to pursue hydrogen as a direct fuel for electricity generation, then natural gas demand

[4] https://www.sciencedirect.com/science/article/pii/S2589299119300035
[5] https://ahdb.org.uk/knowledge-library/hydrogen-electrolysis#:~:text=When%20used%20as%20part%20of,%2C%20or%20burning%2C%20the%20hydrogen.

will be maintained (and, in fact, increased) to accommodate the manufacturing of that clean hydrogen.

Clearly, there are no silver bullets here and no perpetual motion machines.

AMPCO suggests that hydrogen as a clean fuel for generating electricity likely requires significant additional analysis before any heavy investment is seriously contemplated.

6. *The IESO's Pathways Study recommends greater investment in new non-emitting supply, including energy efficiency programs.*
   - *Following the end of the current 2021-2024 energy efficiency framework how could energy efficiency programs be enhanced to help meet electricity system needs and how should this programming be targeted to better address changing system needs as Ontario's demand forecast and electrification levels grow?*

As set out above in Question #3, not all industrial processes using natural gas are currently able to be directly converted to using electricity as a heat source.

However, some processes are clearly capable of being transitioned.

AMPCO suggests that the conversion of these proven processes should be considered as a specific focus of energy efficiency programs, going forward. Subsidization of these equipment modifications for purposes of decarbonization is preferable to spending vast amounts on "greening" an already green electricity sector since it would remove more GHGs for the same level of investment.

Additionally, demand response program rules in Ontario should be reviewed with the objective of increasing program participation, including reconsideration of paying loads for energy reductions.

7. *The IESO's Pathways Study includes a scenario for over 650 MW of new large hydroelectric capacity to meet system needs in 2050.*
   - *A recently released assessment estimates that there may be potential to develop 3,000 to 4,000 megawatts of new hydroelectric generation capacity in northern Ontario and 1,000 megawatts in southern Ontario.*
   - *What are your thoughts on the potential for development of new hydroelectric generation in Ontario by private-, Indigenous- and government-owned developers?*

- *While the capital costs for hydroelectric generation may be higher than nuclear, wind, solar, and natural gas, do you support investing in large scale hydroelectric assets that may operate for over a hundred years?*

AMPCO is typically technology agnostic in regards to provision of electricity, as long as the source is affordable, reliable and sustainable.

New hydro generation should be considered if its all-in costs (including building physical access, transmission, etc.) make it economic to do so. AMPCO expects that 650 MW is a very low estimate, particularly if sources both internal and external to Ontario are considered.

8. *The IESO's Pathways Study suggest that significant transmission capacity will be needed to help balance intermittent sources of electricity (e.g., wind and solar) and to ensure cost-effective supply can be delivered to meet growing demands from electrification and economic growth.*
   - *Transmission will also be required to balance intermittent supply with dispatchable supply (such as natural gas and energy storage) and meet demand in regions with retiring assets.*
   - *What steps should be taken to ensure that transmission corridors can be preserved and lines can be built as quickly and cost effectively as possible?*

In general, see response to Question #1.

However, specifically, the need for transmission to intermittent supply sources needs to be considered slightly differently than transmission to dispatchable generation. It seems appropriate to AMPCO that evaluation of such transmission projects should factor in the nature of the generation being considered. For example, in a situation where two identical lines are being considered – one to connect intermittent generation sources and one to connect dispatchable generation sources – assuming all other aspects of the projects are the same, the line connecting dispatchable sources should be ranked above the line connecting the intermittent, since the dispatchable resource will likely have a higher capacity factor and will be capable of providing other necessary attributes for the operation of the electricity system.

9. *Do you have any additional feedback on the IESO's "no-regret" recommendations?*

"No regrets actions" is a misnomer. Not surprisingly, based on some of the answers set out above, AMPCO remains unconvinced that all such actions identified in the IESO Pathways to Decarbonization Report (December 15, 2022) are truly "no regret".

Further, the Pathways to Decarbonization Report in some ways provides a view of a potential end-state, without a realistic path by which to achieve it.

Central to AMPCO's discomfort is the apparent disregard for appropriate pacing in regards to change, for the necessary balance between environmental and economic considerations and for the fact that Ontario's electricity sector is currently one of the cleanest on the planet. This is particularly evident when one considers the Federal target of 2035 for all Canadian electricity systems. Ontario's view that gas will be necessary well beyond this is much more realistic.

Addressing these concerns thoughtfully does not prohibit moving in the direction of decarbonization. But the need for balance and appropriate pacing counsels prudence and realism as necessary underpinnings to all of the decisions that need to be made, rather than wishful thinking and blind hope. A realistic pace and approach is likely more reasonable than an aspirational (or evangelical) one.