



APPRO

ASSOCIATION OF
POWER PRODUCERS
OF ONTARIO

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APPRO Feedback to Draft Clean Electricity Regulations¹

Introductory remarks

We thank the federal government for the opportunity to provide this feedback to the draft proposed clean electricity regulations published August 2023 (“**Draft CERS**”) by the Ministry of Environment and Climate Change Canada (**ECCC**).

The Association of Power Producers of Ontario (**APPRO**) is proud to have established itself as a leader in the industry, representing various power producers across Ontario. Founded in 1986, our member companies build, own, and operate power projects across Canada, and produce most of Ontario's electricity from clean and renewable resources, including nuclear, hydroelectric, natural gas, biomass, wind, and solar energy. APPRO members produce most of Ontario's electricity.

APPRO focuses 100% on the business issues of power producers in Ontario, including:

- electricity planning, market design, operations and power procurement;
- regulation of natural gas transmission and distribution;
- federal and provincial climate change rules and compliance mechanisms;
- transmission operations and development; and
- other energy issues.

APPRO's goal is the achievement of an environmentally sustainable electricity sector in Ontario that supports the business interests of electricity suppliers, ratepayers, and the provincial economy. We play a leadership role in the formation of energy policy and rules to facilitate investment in sustainable supply and efficient pricing of electricity in Ontario.

We believe that ambitious net-zero goals have the potential to transform Ontario's economy, and the way families and businesses use electricity. The costs of meeting targets will be significant, if not historic, and so it is critical that investment and regulation be directed toward productive technologies

¹ Canada Gazette, Part I, Vol.157, Number 33

and outcomes that support the energy transition without unnecessarily constraining economic growth and innovation, or system reliability.

APPPrO has consistently noted that Ontario's power system is already cleaner than jurisdictions like California, Germany, and the United Kingdom, with electricity representing only about 3 per cent² of the province's greenhouse gas (GHG) emissions..

This 'Made-in-Ontario' clean energy advantage is a powerful tool in the fight against climate change and means we have a grid that is net-zero ready to help drive economy-wide decarbonization and maximize the impact of climate-conscious choices Ontarians make every day. We must now leverage existing infrastructure to maintain system reliability, support new energy investment, manage costs and preserve public support for Ontario's net-zero journey.

On behalf of APPPrO members, we offer the following key messages:

1. the 20-year post-commissioning end of prescribed life (**EoPL**) definition does not provide adequate time for the development of grid-scale replacement by other low or zero-emitting technologies in Ontario;
2. the proposed 450 hours and 150 kilotonnes (kt) threshold is insufficient to meet Ontario's electricity system reliability needs;
3. the Draft CERs will result in insufficient flexible generation supply if a 95% carbon capture rate is not achieved in Ontario;
4. the 'emergency circumstances' exemption should be broadened to respect the IESO's statutory authority under the Ontario *Electricity Act* to dispatch resources as it deems appropriate to ensure system reliability and to maintain compliance with governing NERC electricity reliability standards and NPCC criteria; and
5. a periodic review of the CERs should be undertaken to check and adjust the regulation based on effectiveness in light of an evolving electricity sector.

20-year prescribed end-of-life (EoPL) is inadequate

The proposed 20-year EoPL under subsection 6(5) of the Draft CERs purports to support a phased-in approach for the applicability of a 30t/GWh emissions intensity performance standard for, among others, natural gas-fired generation units.

This phased-in approach purports to provide sufficient lead time for natural gas-fired units to make decommissioning decisions or to otherwise retrofit with carbon capture and storage (**CCS**) by January 1, 2035.³

² IESO [Pathways to Decarbonization report](#) dated December 15, 2022 to the Ontario Minister of Energy ("**Pathways Report**"), pages 1, 6 and 34.

³ Added flexibilities include permitting natural-gas units with CCS to emit up to 40t/GWh for up to the first 7 years of operation so long as the 30t/GWh standard can be met under certain prescribed conditions. (Draft CERs at subsection 6(2).)

These provisions are intended to provide a transition period for natural gas-fired generation units to troubleshoot the first generation of CCS, as well as to provide sufficient time for the development and implementation of low or zero-emitting technologies to displace grid-scale natural gas-fired electricity generation.⁴

However, there is no government modelling to date⁵ that demonstrates that this approach is feasible in Ontario. There are no credible studies evidencing that natural-gas fired electricity generation can be satisfactorily displaced by the development of low or zero-emitting technologies in Ontario by 2035. As the IESO's *Pathways to Decarbonization Report* states: "... further assessment is needed to determine the feasibility of ... [Ontario's system becoming zero-carbon in 2045 with the last natural gas plant retiring after 25 years of operation]"⁶ which is effectively what is being proposed by the 20-year EoPL for natural gas-fired units that are commissioned as late as 2024.

And further, "the important characteristics of gas must remain available to Ontario's power system and no like-for-like replacement is yet available"⁷ and is clear that further work is still needed "to determine if [emerging technologies like low-carbon fuels] can replace at scale some of the flexibility that natural gas currently provides the system".⁸

In Ontario, new large scale pumped hydroelectric storage resources (e.g. Meaford and Marmora) and the grid-scale deployment of OPG's first small modular reactor (**SMR**) at its Darlington site are not expected to be in-service before 2029⁹; the refurbishment of the Pickering NGS awaits approval by the government of Ontario and appropriate regulatory agencies with no completion date yet announced; and a possible 4,800 MW expansion of the existing Bruce Nuclear site is still in the exploratory phase. As is well known, all large infrastructure projects face a plethora of regulatory and permitting requirements which make 2035 – at best – an extremely challenging objective.

Even if all of the expected non-emitting supply resources come on-line by 2035, there will still be a reliability need for natural gas-fired generation resources that exceed the operating limit thresholds in the proposed Draft CERs (as described in the following section below).

Most concerning is that the Draft CERs offer no contingency plan if anticipated replacement resources are insufficiently available at grid-scale level by 2035, or even 2050. As the *Pathways Report* states, "[i]f low-carbon fuels do not materialize, replacing natural gas will be an even more complex task, requiring more research and analysis into understanding how generation, demand, transmission and storage can be combined to replace gas."¹⁰ And that:

⁴ Regulatory Impact Analysis Statement (**RIAS**) to the Draft CERs, pages 60-62.

⁵ The *Pathways Report* did not include the performance of an operability assessment, nor were adequacy assessments performed for the years before 2050. (*Pathways Report*, pages 25, 30 and 32.)

⁶ *Pathways Report*, page 37.

⁷ *Pathways Report*, page 24

⁸ *Pathways Report*, page 5.

⁹ See <https://www.ontariopumpedstorage.com/whats-new/news-stories/2023/07-10-2023-tc-energys-pumped-storage-project-moving-to-final-evaluation/>, <https://www.opg.com/stories/marmora-pumped-storage-project-would-turn-inactive-open-pit-mine-into-giant-hydro-battery/>, and <https://www.opg.com/projects-services/projects/nuclear/smr/darlington-smr/>.

¹⁰ *Pathways Report*, pages 4 and 32.

"For a system to be reliable, it must have the flexibility to respond to sudden changes as well as extreme conditions. Future supply mixes will not have some of the traditional resources that currently provide these services, and ensuring reliability without them contains many unknowns. It will require detailed planning studies that incorporate novel approaches, tools and a thorough understanding of the location and technological features of individual resources as they are integrated into the electricity grid."¹¹

Therefore, a periodic review of the development of zero-emitting flexible resources to support reliable grid operations and potential deferral of the 2035 trigger date should also be considered.

450 hours/150 kt is insufficient to meet Ontario's system reliability needs

The proposed exception under subsection 6(3) of the Draft CERs would permit unabated natural gas-fired generation units to continue to operate post-2035 for up to 450 hours and emit up to 150 kt annually, ostensibly to help manage peak demand conditions. This limitation, however, is grossly insufficient to maintain system reliability in Ontario.

The proposed threshold fails to account for the technical characteristics of natural gas-fired generation facilities. Ontario's natural gas-fired generation fleet includes quick-start facilities with combustion turbines (CTs) and with reciprocating engines, combined cycle generation facilities with combustion turbines (CCGT) and steam turbines (STG), and combined heat and power (CHP) facilities. The characteristics of these gas-fired generation facilities are not uniform.

Quick-start facilities with either combustion turbines or reciprocating engines can start quickly and can run for relatively short durations, providing peak electricity. However, the heat rates of these resources are higher than combined cycle or CHP facilities, as the heat generated from combustion has no secondary function. Combined cycle generation facilities and CHP facilities are more efficient, as the heat from combustion is also used to generate steam which is either used for incremental generation through a steam turbine generator in a combined cycle application, or is used for district or industrial energy in a CHP application.

To make use of the thermal energy in these applications, the start-up process from offline to dispatchable (start-up) is not instant. Rather, a minimum operating level (i.e. minimum loading point (**MLP**)) and minimum run duration (i.e. minimum generation block run time (**MGBRT**)) must be maintained to capture and use the thermal energy.

More specifically, the operation of combined cycle natural gas-fired generation facilities and CHP facilities may include a period of start-up and ramping, during which the plant equipment is systematically initiated, thermal energy captured, and generation output raised until the facility meets its MLP. Only when MLP is reached can the facility respond to dispatch. The duration of this start-up period varies with the duration since the last run.

During start-up, gas is consumed and electricity generated at lower efficiency while equipment is brought online and steam is generated. In some circumstances, this start-up sequence can take up to 4

¹¹ *Pathways Report*, page 30.

to 5 hours. Lowering the frequency of operation of these resources is likely to increase the time between operating periods, increasing the number of start-up hours.

Once the full facility is started and operating, Ontario uses the natural gas-fired generation fleet to balance the electricity transmission grid, dispatching resources between their MLP (60%) and their full load (100%) to meet demand changes and to enable access to operating reserves.

The Draft CERs fail to indicate how such flexible operation at less efficient heat rates will be treated for the purpose of the 450-hours allocation, e.g. whether 0.6 hours will be attributed toward the 450-hours where a gas unit is dispatched at only 60% (MLP) for an entire hour. Also absent from the Draft CERs is optionality for natural gas-fired generation fleet averaging, carbon offsets, and/or excess performance credits.

Combined cycle natural gas-fired generation facilities also typically have a minimum run time of 4 to 8 hours, such that a facility must be operating continually for 4 to 8 hours after start-up by equipment design. An 8-hours minimum run time with a 4-hours start will therefore be consuming gas and generating for more than 12 hours.

The Draft CERs are silent on whether these types of operating periods are included in the 450-hours/150 kt operating threshold, or if the threshold pertains only to operation in a facility's dispatchable range, i.e. above its MLP and within its MGBRT. Such clarifications are critical to assessing the practical implications of the proposed 450-hours/150 kt threshold on operation, grid reliability, fuel management and emissions reductions of natural gas-fired generation units.

The 450-hours/150 kt limitation also appears to fail to account for operating run times required to satisfy testing requirements under mandatory North American Electric Reliability Corporation (**NERC**) standards and Northeast Power Coordinating Council (**NPCC**) criteria, as well as for ongoing maintenance requirements which are based on original equipment manufacturer (**OEM**) specifications.

Draft CERs do not reflect a 95% carbon capture rate in Ontario

The proposed 30t/GWh emissions intensity performance standard is intended to reflect a 95% carbon capture rate for natural gas units with CCS.¹² However, CCS success is geology-dependent, and may not be an achievable technology at the proposed scale in Ontario. Most research indicates that CCS will be limited in Ontario given the nature of its particular geology and topography. While Ontario is working through CCS demonstration project enablement through regulation, the regulatory framework is still a work in progress.¹³

CCS is dependent on equipment for the capture of CO₂ from the flue at source, transportation of the CO₂ to injection site, and the injection. A 95% carbon capture rate would require this equipment to cohesively work together at all times and take no planned or unplanned outages with the generating asset perpetually operating in ideal conditions. This is an unrealistic expectation and would create an unachievable standard.

¹² Regulatory Impact Analysis Statement (**RIAS**) to the Draft CERs, page 60.

¹³ See, for example, Ontario's Geologic Carbon Storage Framework, Roadmap Timeline at <https://www.ontario.ca/page/geologic-carbon-storage>.

In addition, the Regulatory Impact Analysis Statement (**RIAS**) for the Draft CERs appears to have underestimated the costs of CCS retrofits. While the commodity (energy) costs may be reduced, the capital costs may increase. Capital costs for natural gas units would include retrofitting costs for CCS (if applicable) without necessarily reducing fixed operating expenses.

For instance, adverse impacts of the Draft CERs on fixed operating expenses could include increased fuel delivery/transport. Ontario natural gas-fired generators generally procure gas delivery in one of two ways: (i) transacting at the Dawn Hub (reserving firm transportation between the Dawn Hub and the generation unit or facility); or (ii) transacting with the local distribution company.

To ensure natural gas-fired generation facilities are available during peak demand periods in Ontario, firm (as opposed to interruptible), gas delivery and management (**GD&M**) services are used. These GD&M services include fixed and variable cost components based on long-term contracts requiring natural gas utilities to manage infrastructure to ensure delivery on a firm basis.

Balancing gas, i.e., delivering sufficient fuel and on time by the gas distributor and/or transmitter to align with generator fuel burn profiles, requires significant investment in pipeline infrastructure. Reducing the operating hours of natural gas-fired generation resources will not reduce GD&M requirements. Requiring a natural gas-fired generation unit under the Draft CERs to either reduce its operating hours (or otherwise decommission) by 2035, could require gas suppliers to reduce contract length terms and in turn give rise to higher GD&M service costs for natural gas-fired generators. It is unclear whether such adverse cost consequences have been included in the cost-analysis sections of the RIAS.

If a 95% carbon capture rate is not reached, the Draft CERs will result in reduced operation of natural gas generation resources and/or a higher number of decommissioned natural gas generators by 2035 than anticipated leading to insufficient flexible generation supply for addressing peak demand periods, emergency circumstances and NERC energy adequacy requirements¹⁴ in Ontario.

Furthermore, APPrO considers that CCS is not an appropriate solution for the Ontario application of flexible, responsive generation to fill the gap between moving demand profiles and underlying supply from other clean energy resources. The *Pathways Report* confirms that CCS is ill-suited for peaking applications¹⁵ for which natural gas-fired generation units are currently relied upon. And that "[r]eplacing [natural gas-fired generation] facilities will be complex and will require detailed assessments and studies ...In addition, it may require the development of new reliability standards".¹⁶

"Emergency circumstances" exemption must be broadened

The IESO's statutory objects as prescribed under subsection 6(1) of the Ontario *Electricity Act, 1998* include to:

- direct the operation and maintain the reliability of the IESO-controlled grid;

¹⁴ *Pathways Report*, page 16.

¹⁵ *Pathways Report*, page 12.

¹⁶ *Pathways Report*, page 33.

- establish and enforce criteria and standards relating to the reliability of the integrated power system;
- engage in activities in support of the goal of ensuring adequate, reliable and secure electricity supply and resources in Ontario; and
- exercise the powers and perform the duties assigned to it under the market rules.

Pursuant to its statutory objects, the IESO has binding interconnection and other operating agreements with neighbouring independent system operators (**ISOs**) and regional transmission operators (**RTOs**) pursuant to interregional NERC reliability standards and NPCC criteria.

Subsection 32(2) of the Ontario *Electricity Act, 1998* grants the IESO the authority to make rules for, among other things (italics added):

- governing the IESO-controlled grid;
- *governing standards and procedures to be observed in system emergencies*; and
- authorizing and governing the giving of directions by the IESO *including action related to a system emergency*.

Chapter 5, section 3.2 of the IESO market rules permits the IESO to direct the operations of the IESO-controlled grid pursuant to the provisions of all applicable operating agreements and requires the IESO to maintain the reliability of the IESO-controlled grid (ICG)¹⁷. This includes issuing orders, directions or instructions to dispatch generation, in accordance with all applicable NERC reliability standards and NPCC criteria.

Chapter 5 of the IESO market rules also prescribes what constitutes an "emergency operating state" (as well as a "high-risk operating state" and a "conservative operating state") consistent with NERC reliability standards and NPCC criteria, and sets out the types of actions the IESO may take to bring the system back to a "normal operating state" including load curtailment and uneconomic dispatch of supply resources.

The definition of "emergency circumstances" under section 19 of the Draft CERs as a circumstance that "arises due to an extraordinary, unforeseen and irresistible event" (underlining added) is unduly onerous and inconsistent with the IESO market rules and with NERC and NPCC electricity reliability standards and criteria. Nor does it comport with the fundamental precept of ICG emergency management, which is to take appropriate actions to avoid or mitigate emergency conditions.

The proposed definition also puts gas-fired generation units at risk for operating periods attributable to being constrained-on by the IESO to address emergency circumstances, which exemption may be denied by the Minister after the fact (ss. 19(3) and (4)). If the Minister does not approve the emergency

¹⁷ See Chapter 5 of the [IESO Market Rules for the Ontario Electricity Market](#). "IESO-controlled grid" is defined in Chapter 11 of the IESO market rules to mean "the *transmission systems* with respect to which, pursuant to *operating agreements*, the *IESO* has authority to direct operations" (italics original).

circumstances exemption request, gas-fired generation units will have already ‘spent’ these hours and emissions as part of their respective 450-hours/150 kt allowance.

Moreover, Ontario is required under its interconnection and other operating agreements with neighbouring jurisdictions to supply electricity during tight system conditions and unexpected shortfalls. Therefore, there must be allowances made under the Draft CERs for operating periods incurred by natural gas-fired generation units to address system reliability challenges including exporting to neighbouring ISOs/RTOs jurisdictions experiencing emergency conditions, pursuant to NERC and NPCC electricity reliability requirements.

To the extent that the proposed CER may adversely affect native Ontario generators vis-à-vis imports from the US, APPrO has previously noted to ECCC¹⁸ the importance of instituting border carbon adjustments: “From a principles point of view, it does not make sense to increase the cost of emitting electricity production in Ontario but allow imported electricity to emit for free.”

Possible solutions

The proposed 20-year EoPL provision under subsection 6(5) of the Draft CERs should be revised to at least a 30-year EoPL for natural gas-fired generation units, which would allow more time for the development of new technologies that can reliably displace gas-fired generation use in Ontario by 2050. The EoPL should also be extended for natural gas-fired generation units contracted by the IESO prior to January 1, 2025 (e.g. under the E-LT1 and LT-1 competitive procurements), so as to commence from the unit's commercial operation date.

The 450-hours/150 kt operating limit under subsection 6(3) should also be removed in favour of being revisited closer to 2035 when there is greater certainty on what Ontario’s supply mix will look like - including the viability of CCS and other anticipated displacement technology development.

Better visibility on the actual supply mix – as well as the achievable carbon capture rate - that will exist in 2035 coupled with shorter demand forecasts to 2050, can help ECCC determine appropriate exclusions for periods attributable to ramping operation and emergency circumstances as well as whether an appropriate operating limit for unabated natural gas-fired generation units should be based on a fleet-wide (rather than individual unit) level to ensure system reliability, particularly during peak demand periods. This would also provide ECCC with more time to coordinate the CERs with other compliance mechanisms such as the use of carbon offsets that could result in reduced emissions at a lower cost with better reliability.

This approach should not undercut Canada's net-zero goals given that electricity represents only about 3 per cent¹⁹ of Ontario's GHG.

We also recommend that the emergency circumstances exemption under section 19 of the Draft CERs be redefined to more closely align with and recognize the statutory authority of the IESO to take steps to mitigate against, and to respond to, emergency conditions consistent with NERC electricity reliability

¹⁸ APPrO Comments on the discussion paper “Exploring Border Carbon Adjustments for Canada”, February 2022

¹⁹ *Pathways Report*, pages 1, 6 and 34.

standards and NPCC criteria, without the ability of such decisions to be subsequently reversed by ECCC for the purposes of exemption eligibility.

In conclusion, APPrO recognizes that Canada is in the throes of an unprecedented energy transition. We applaud the federal government's ambitious decarbonisation goals of reaching 40-45% below 2005 GHG emissions levels by 2030 and becoming net zero by 2050. In order to succeed, however, it is imperative to take into account the specific impacts of the proposed CERs on the downstream energy system in Ontario (and each other province).

As stated in the 2022 report *Net Zero: An International Review of Energy Delivery System Policy And Regulation For Canadian Energy Decision Makers* issued for the Canadian Gas Association and Electricity Canada:

"The unique physical circumstances of any jurisdiction – sources of supply, drivers of demand – will govern what is possible and those circumstances in Canada are often very different across the country ... In short, there is no single Canadian model at present, nor should there be a single model imposed in the future. Approaches to energy system policy, planning and regulatory reform need to be anchored in the principle of respecting difference. What is common is the shared desire to reduce emissions and to identify pathways that speak to the unique strengths, limitations and opportunities within each jurisdiction."²⁰

Similarly, APPrO has previously submitted that:

"Provincial governments and private enterprise should be allowed to take the lead in the implementation of electricity policy in Canada as well as the ultimate delivery of services in accordance with the constitutional division of power. Not only does expertise generally reside with the provinces and private sector actors who have built extensive experience in the complexities of the system, these are also the entities who are ultimately accountable for the success or failure of the electricity system. The federal government should generally refrain from attempting to exercise electricity jurisdiction without accountability in areas that may disrupt the electricity grid homeostasis, which is finely tuned and regulated by each and all of provincial governments, provincial energy regulators, electricity system operators, and North American standards."²¹

²⁰ Cleland, Michael and Monica Gattinger for Gattinger and Associates, April 4 2022, *International Review of Energy Delivery System Policy And Regulation For Canadian Energy Decision Makers* issued to the Canadian Gas Association and Electricity Canada, pages 26 and 28.

²¹ APPrO Submission to the Minister of Environment and Climate Change on the Proposed Frame for the Clean Electricity Regulations (**Proposed CER**) dated August 2022.

Thank you again for the opportunity to provide this feedback on behalf of APPrO members. We look forward to continuing to work with ECCC staff toward the issuance of the final CERs in a form that is truly achievable in Ontario.