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By email: LTEP@Ontario.ca

Re: EBR 012-8840 – Planning Ontario's Energy Future
Ontario's Long Term Energy Plan

Dear Sirs:

Ontario Rivers Alliance (ORA) is a Not-for-Profit grassroots organization acting as a voice for several stewardships, organizations, and private and First Nation citizens who have come together to protect, conserve and restore healthy river ecosystems.

The ORA is very pleased to provide our comments on the formal review of Ontario's Long-term Energy Plan (LTEP), setting a road map for Ontario's energy future for the next 20 years.

ORA strongly agrees with the important principles of cost-effectiveness, reliability, clean energy, meaningful community and Indigenous engagement, and putting conservation and energy efficiency first before building new infrastructure.

ORA Recommendations for a clean, affordable and modern electricity system:

1. No new hydroelectric procurement.
2. Ensure new and existing energy projects do not have negative impacts on our air, land, water or ecosystems.
3. Reduce demand for power through energy efficiency and conservation.
4. Invest in emerging conservation, power storage, and generation technologies.
5. Reduce power losses through transmission lines.
6. Encourage generation of power through harnessing in-pipe water systems, sewers and irrigation systems.
7. Review electricity pricing with the goal of reducing prices paid to power operators.
8. Ensure our electricity supply is environmentally and socially sustainable and affordable.
9. Ensure meaningful consultation with the public and First Nation communities, including the possibility of a no outcome.

Additionally, the ORA is in full support of the recommendations made by the Environmental Commissioner of Ontario on this EBR posting.

Supporting Arguments:

1. No New Hydroelectric Procurement

Outlooks A and B in the Climate Change Action Plan (CCAP) and Ontario Planning Outlook (OPO), indicate that we have sufficient capacity to meet the needs of a flat demand future, right into the year 2035. It is highly unlikely there will be a significant increase in demand with the very high prices currently being paid to generate power in Ontario; therefore, Outlooks A and B seem the most likely.

Additionally, the OPO reported that waterpower has a 30 to 70% capacity rating[1]. This is very misleading, as the document failed to recognize the intermittent side of hydroelectric in their analysis, and badly taints their one-sided and skewed recommendations.

Perhaps 70% efficiency could be achieved at Niagara Falls; however, that is a very unique situation that could not be repeated on many other North American rivers. Run of river hydroelectric facilities may generate as much as 30% efficiency; however, building a true run of river facility is often not cost-effective on smaller rivers because of the high cost of construction, and the small amount of power produced as a result of seasonal low and unreliable flows.

To further highlight this point, in 2014 an analysis was conducted by the Ontario Power Authority to determine the best means of connection of remote First Nation communities, and to enable forecasted growth to the Ring of Fire. It reported "*Northern hydroelectric generation is an energy limited resource known to have significantly reduced output and availability during drought conditions of the river system supplying these generating units.*[2] In fact the recommendation of this report was to not build any new hydroelectric facilities, but primarily to build new transmission lines. A thorough cost/benefit analysis would be necessary to determine whether these types of projects are environmentally and/or economically viable.

The daily, seasonal and annual variations of small hydro operations are intermittent and therefore not reliable for base load power. The electricity produced by small hydro is unreliable because it peaks during the high flows of spring when power is in low demand, and produces at its lowest during the hot summer months when consumption and demand are highest. During the low flow season of summer or during drought conditions many true run of river, and even some peaking facilities, especially on smaller rivers, cannot operate efficiently, and have to be shut down.

The ORO report greenwashes hydroelectric by saying that “waterpower could be a significant source of non-carbon emitting energy and would provide opportunities to partner with First Nation and Metis communities”. **This statement is simply not true.**

Efficient waterpower generation usually utilizes reservoirs and peaking operating strategies and, even so, still may not be able to produce power during the low flow summer and winter months.

There are no lack of studies reporting that flooding landscapes to create reservoirs causes flooded vegetation and soils to decompose, and for sediment to accumulate behind the dam, resulting in net emissions of the GHGs, carbon dioxide (CO_2), and methane into the atmosphere for decades and possibly for its life following flooding.[3,4]

Scientists have known for many years that reservoirs are producing far more greenhouse gases than was previously thought, with most of those emissions taking the form of methane. In fact, a recent Washington State University study, just published in the journal BioScience, compiled and analyzed findings, dating back to 2000, of more than 100 studies of emissions from more than 250 reservoirs around the world. They also took into account a factor some previous studies of reservoir emissions had overlooked: bubbles.

Some greenhouse gases, including carbon dioxide and nitrous oxide, readily dissolve in water and then diffuse into the atmosphere in a fairly uniform way. Methane, in contrast, often surfaces in sporadic bubbles. This has made it challenging to get a clear picture of how much of the warming gas—which is 34 times more powerful than carbon dioxide—is rising off of a reservoir.

Bubble-tracking sonar has shown that reservoirs contribute about 25% more methane than previously thought. The study reports that reservoirs contribute 1.3% of the world's annual human-caused greenhouse gas emissions – as much as the entire nation of Canada. It is time our governments recognize this before continuing down the path of increasing the number of hydroelectric reservoirs.[5]

These results are leading to calls for reservoir emissions to be included in calculations made by countries and organizations such as the Intergovernmental Panel on Climate Change when gauging greenhouse gas emissions. The emissions, including carbon dioxide and nitrous oxide, come from decomposing plant material under the water, and methane is produced by microbes devouring rotting material, such as algae, in sediment that builds up behind dams. The emissions are then boosted by nutrients that come from human activities such as agriculture, wastewater or septic systems. Natural lakes produce less greenhouse gases as there is not so much rotting material beneath the water and because reservoirs have more fluctuations in water levels than natural lakes — something which enhances methane production. Reservoir methane production is comparable to rice paddies or biomass burning, both of which are included in emission estimates of the Intergovernmental Panel on Climate Change, the leading international authority on the subject.

A 2013 study by Edgar G. Hertwich of the Norwegian University of Science and Technology found that carbon dioxide emissions from hydropower, per unit of electricity delivered, were 10 per cent higher than emissions from natural gas-fired plants. The researchers acknowledge that reservoirs provide important services like electrical power, flood control, navigation and water. But reservoirs have also altered the dynamics of river ecosystems, impacting fish and other life forms. Only lately have researchers started to look at reservoirs' impact on greenhouse gases. While reservoirs are often thought of as 'green' or carbon neutral sources of energy, a growing body of work has documented their role as greenhouse gas sources.[6]

In fact, Keywan Riahi, Director of the Energy Program at the International Institute for Applied Systems Analysis says, "*power plants are not only causing climate change, but they might also be affected in major ways by climate*".[7]

The collateral environmental damage caused by dams and waterpower facilities has been well documented for decades[8], including the loss or serious decline in migratory fish species (waterpower facilities are key factors in the listing of some iconic fish species as species at risk in Ontario and elsewhere); declining biodiversity[9,10,11,12,13], impaired water quality (including elevation of mercury concentrations in fish tissue); and are key threats to imperiled aquatic species.[14,15] Significant ecological damage from waterpower has been ongoing for many decades in Ontario[16,17,18] and in other locations throughout the world.[19] In the past, attempts to effectively mitigate many of these impacts have been sporadic to non-existent in Ontario.

Even today, a basic mitigation technique such as the installation of fish ladders at waterpower installations is rarely a requirement. Despite known impacts on several migratory fish species in Ontario, only a few (2-3) fish ladders have been installed on the approximately 200 existing waterpower facilities in the province.

"The accumulated effects of multiple small-scale waterpower operations could amount to similar overall environmental degradation per unit of electricity generated as is caused by larger projects."[20] In fact the cumulative impacts of many small projects can be even larger, depending on the circumstance.[21,22]

In summary, hydroelectric, whether large or small, can have significant negative environmental effects on food security, and instead of mitigating GHG emissions, hydroelectric reservoirs are actually fuelling climate change. Therefore, there should be no additional hydroelectric included in Ontario's Long Term Energy Plan.

2. Ensure new and existing energy projects do not have negative impacts on our air, land, water or ecosystems

The Green Energy Act and Green Economy Act offer peak demand incentives and disincentives, to produce more power during peak demand hours. This encourages harmful daily peaking operating strategies at hydroelectric facilities, using reservoirs and seasonal water level operating bands to peak on a daily basis. The strategy is to hold back water during off-peak hours, in order to produce more power during peak demand hours, which earns a higher price and profit.

The Independent Electricity System Operator (IESO) also offers an Industrial Conservation Initiative incentive for hydroelectric operators to reduce electricity consumption during peak hours. If a corporation can conserve or produce some of its own power, it will offset grid power costs.

On the surface this sounds good; however, there are unintended consequences that can have serious negative impacts on the environment. For instance, a large mining company generates power for their operation at three hydroelectric facilities on a local river in order to offset their consumption of power from the provincial grid. The corporation informed ORA that it saves millions of dollars annually by producing more of their own power on very hot

days when peak demand is greater. In order to achieve these savings, the company can and does use its seasonal water management operating bands to peak its facilities on demand. This allows them, at will, to fluctuate water levels at what was a run of river operation, with reports of fluctuations of up to 3 to 4 feet in a day – all without the benefit of an environmental assessment to determine the impacts.

These extreme and intermittent fluctuations in water levels and flow velocity create havoc on the riverine ecosystem when shoreline residents lose their docks, eggs from nesting loons are washed away, and water quality is degraded. These are only the visible and obvious impacts – no one knows what the long-term impacts will be on the fishery, endangered species, and the riverine ecosystem.

Currently there is no regulatory requirement to undertake an environmental assessment to gauge the impacts and/or trade-offs that these water management changes will have on the riverine ecosystem, or any meaningful attempt to mitigate the impacts. Approval under the Waterpower Class Environmental Assessment is only required when physical changes to a facility would result in an increase in Installed Capacity of 25% or more.

Also in this vein, another generating station in Ontario stands accused of damaging a Provincially Significant Wetland, as a result of using seasonal operating bands on a daily basis to maximize power generation. There are very likely many other facilities that have also changed their operating strategies to take advantage of peak demand incentives.

Undoubtedly there has been untold damage resulting from the GEA - legislation purporting to protect our environment. It is no wonder that the public has lost confidence and there is so much local resistance to these "*renewable energy*" projects.

The system is broken and must be reformed if we are to protect and conserve our freshwater ecosystems.

3. **Reduce demand for power through energy efficiency and conservation.**

The CCAP mentions several programs geared towards conservation of energy consumption. ORA is in agreement with most conservation initiatives, as long as they are carried out in an environmentally and socio-economically sustainable way to protect our air, land, water and ecosystems.

4. **Invest in emerging conservation, power storage, and generation technologies.**

Viable alternatives to new waterpower do exist, and are often more sustainable and less costly environmentally and economically. The most obvious is to improve the efficiency and sustainability of existing power facilities, reduce the demand for power by decreasing energy consumption and increasing conservation, retrofitting power plants with more efficient eco-friendly technologies, and reducing losses through power transmission lines. There are also a number of renewable options that can be considered, such as solar, wind, geothermal and biomass. Of course it is important that individual projects be assessed to ensure they are environmentally and socio-economically sustainable.

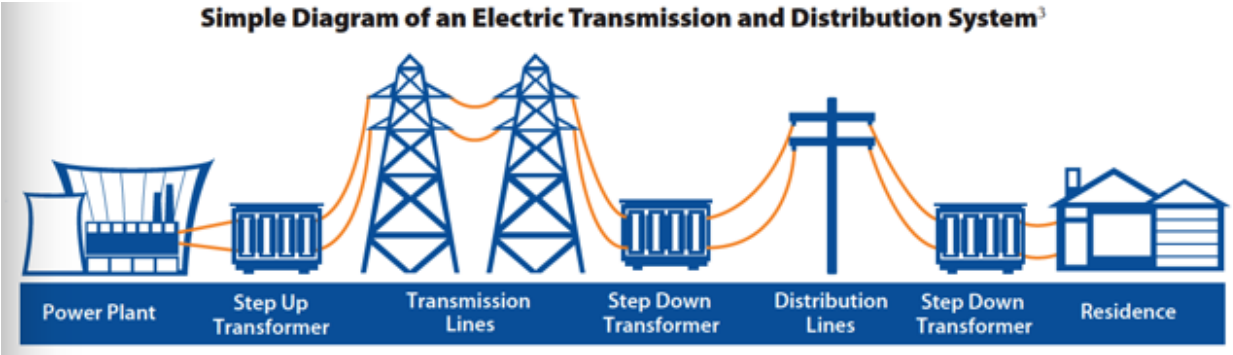
There are also several emerging technologies, such as those related to battery and balloon storage[23], thorium-based nuclear Molten Salt Reactors[24], and the recycling and reprocessing of used nuclear fuel[25], which will need to be evaluated in the future.

5. Reduce power losses through transmission lines

Electricity losses occur at each stage of the power distribution process, beginning with the step-up transformers that connect power plants to the transmission system, and ending with the customer wiring beyond the meter. The figure below shows a diagram of these system components. These electricity losses are often referred to as "line losses", even though the losses associated with the conductor lines themselves represent only one type of electricity loss that occurs during the process of transmitting and distributing electricity. System average line losses are in the range of 6 to 10% on most utility grids, but increase exponentially as power lines become heavily loaded. Avoiding a small amount of electricity demand in the highest peak hours can reduce line losses by as much as 20 percent. At such levels, disproportionately more generation resources need to be operated to deliver the same amount of electricity to end-users.

Each stage identified in the diagram below is subject to losses, and therefore provides opportunity for efficiency improvements. The cumulative benefits can be very significant. This is because a 1 kW load reduction at the customer's end translates into more than a one-kW load reduction – sometimes very much more – moving upstream to the distribution, transmission and generation levels because of losses compounding along the way.

ORA submits that a focus on reducing line losses in the electrical transmission and distribution system could enhance electrical efficiency and make a significant reduction generation-related emissions.[26]



6. Encourage generation of power through harnessing in-pipe water systems, sewers and irrigation systems.

In addition to solar and wind generation, nowadays in-pipe water to wire power systems are becoming particularly interesting for the integration of renewable resources at urban and building scale because of the potential to harness clean energy from excess head pressure in urban and domestic water pipelines. The ability to operate across a wide range of head and flow conditions, these particular micro hydro power systems can be deployed in

municipalities, energy-intensive industries and agricultural irrigation districts providing a consistent amount of clean and continuous energy without the typical intermittency of wind, solar and hydroelectric, and at the same time helping in pipelines management and maintenance.

It would be preferable to offer incentives to industry to produce power from existing pipe infrastructure where there are so many benefits, with very few impacts.

7. Review electricity pricing with the goal of reducing prices paid to power operators.

The prices paid for waterpower are now higher than that paid for the same capacity of solar generation.

The IESO has increased the price paid to waterpower operators under Feed-in-Tariff (FIT) from 14.8 cents/kWh in 2013, to 24.1 cents/kWh in 2017. This has resulted in an increase in waterpower applications under 500 kWh. It is not surprising that there is such a gold rush mentality with the generous increase in prices paid for these intermittent and unreliable hydroelectric facilities.

These tiny projects will receive 40 year FIT Contracts, and in a warming world, these types of projects are ill-advised when extreme weather could impair riverine health and/or result in dam failure. For instance, in 2015, 18 dams were breached in one flood event in South Carolina.[27] During the low flow season of summer or during drought conditions many true run of river, and even some peaking facilities, especially on smaller rivers, cannot operate and have to be shut down due to low flows.

These small waterpower projects would not contribute in any meaningful way to the power grid, but instead represent 40 years of death by a thousand cuts to many Ontario rivers. Even true run of river dams fragment habitat, chop up fish, and impede flow and vital nutrients to the downstream. As stated above, there should be no new waterpower procurement.

For all existing generation, ORA suggests a competitive power procurement mechanism, that would apply to all generators, including Ontario Power Generation and FIT contracted generation. This measure would greatly reduce the cost of power to the ratepayer.

8. Ensure our electricity supply is environmentally and socially sustainable and affordable.

A rapidly changing climate may not support the hydro facilities we already have,[28] let alone support the notion that more hydroelectric dams and reservoirs are a good idea.

According to a new NASA and National Science Foundation funded study of more than half of the world's freshwater supply, climate change is rapidly warming lakes around the world, threatening freshwater supplies and ecosystems. The rate of warming is faster than either the ocean or the atmosphere[29], with even greater warming in northern Canada[30]. As warming rates increase over the next century, algal blooms, which can rob water of oxygen, are projected to increase 20 percent in lakes, and emissions of methane will increase by 4 percent over the next decade.[31] Additionally, new studies are reporting on the increased

evaporation rates from reservoirs[32], and there are increasing reports from around the globe of rivers and lakes drying up.

In fact, the World Economic Forum in its "Global Risks 2015" report lists "water crises" as its number one global risk in terms of impact – beating out the rapid spread of infectious disease, weapons of mass destruction, and failure of climate-change adaptation.[33]

New reservoir flooding also accelerates the bioaccumulation of methylmercury in fish, seals, etc., and can put food security at risk for communities relying on fish and other aquatic life as a main staple in their diet. These effects can persist for 20 to 30 years or more. [34,35]

In addition, hydroelectric projects often overestimate economic benefits, and underestimate their far-reaching effects on biodiversity and critically important fisheries. Current site-specific assessments largely ignore cumulative impacts on hydrology and ecosystem services, in favour of profits, and to the detriment of the environment and citizens.

Hydroelectric isn't the answer to our climate change dilemma – it is the absolute wrong prescription for a warming climate with increasing intensity of droughts and flooding. Protecting our freshwater must be recognized as an issue of national security – it is essential to our own, and our children's survival on this planet.

9. Ensure meaningful consultation with the public and First Nation communities, including the possibility of a no outcome.

Meaningful public consultation must be an essential requirement in the power procurement process. This would provide an opportunity for healthy discussion and input from the public and Indigenous communities before an application goes to Council for endorsement, or a contract offered. As it is now, once an electricity project receives a power procurement contract and progresses through the Environmental Assessment process, there is no possibility of a "no" outcome. This is unacceptable. It is crucial that a community has meaningful say in whether a project goes ahead in their community.

Future growth of waterpower must reflect the need for an evolution of perspectives that respect existing ecosystems, cultures, and human and democratic rights.[36]

It is essential that we secure an environmentally and socially sustainable freshwater future for our children and grandchildren, so let's ensure that any actions taken today to address climate change or power shortages are methodically researched and carefully considered to understand what the trade-offs will be.

Thank you for this opportunity to comment!

Respectfully,

Linda Heron
Chair, Ontario Rivers Alliance

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