December 13th, 2024

Ministry of Energy and Electrification
Government of Ontario
77 Grenville Street
Toronto, ON M7A 2C1

RE: OMISSION OF BIOMASS COMBINED HEAT AND POWER FROM INTEGRATED ENERGY RESOURCE PLAN

Dear Ministry of Energy and Electrification,

TorchLight is a bioenergy advisor and project developer. We work at the interface of the energy, forest products, agriculture, and waste management industries to plan and deliver bioenergy projects and strategies for governments, large industrial energy consumers, and investors. We often work in partnership with institutional investors and municipalities to develop projects that ensure energy expenditures benefit local residents and businesses. Over the past 16 years, TorchLight has completed over 150 projects, including 40 for the Government of Canada. In partnership with Ontario investors, we are currently advancing two large (>100 MW) biomass combined heat and power plants in Ontario. Similar projects are underway in Vancouver and Alberta. We are also leading a $20 M front-end engineering and design (FEED) study on Canada's first bioenergy with carbon capture and storage (BECCS) project in Alberta. This project would permanently remove 1.5 million tonnes of CO_2 per year from the atmosphere while generating a new $250 M/yr export product for Alberta and supporting improved forest management. TorchLight is federally incorporated and registered in Ontario.

We strongly support the ambition of Ontario to significantly increase its domestic energy generation capacity and to make energy more affordable for Ontarians. However, the recently released document, *Ontario's Affordable Energy Future: The Pressing Case for More Power*, completely omits Ontario's largest domestic energy opportunity: forest biomass combined heat and power (CHP). Ontario's timber harvest has dropped by approximately two-thirds since 2004. The unutilized but sustainably available annual forest biomass supply, converted to heat and power, would **supply energy equal to all hydro, wind, and solar generation in Ontario combined**. Doing so would also ensure energy affordability for Ontarians that energy expenditures remain in the province and support Ontario jobs.

Since 2000, 13 of Ontario's 16 pulp and paper mills have closed. It was, in fact, the closure of Ontario's pulp and paper mills that was responsible for 70% of the decline in industrial electricity consumption in Ontario between 2005 and 2014. The 14% drop in total electricity consumption in this period, driven by declines in forest products manufacturing, permitted the closure of coal-fired power plants, which represented 19% of the grid mix in 2005. **Ontario could not have closed its coal-fired power plants were it not for the closure of pulp and paper mills**. We now desperately need a market for the wood fibre that was previously used to produce newspaper and other paper products.

For an Integrated Energy Resource Plan, the critical word is ***Integration*** – including both electricity and heat. For biomass to be economically competitive, it cannot be developed as a power-only resource. It must be developed to provide both electricity AND heat, with heat either provided to industry for process heat or to buildings via district heating systems. Being a thermal generating resource, it must also be developed at scale, with 20 MW_e the absolute economical minimum. In reality, 50-200 MW_e is the economical scale, with co-generated heat ranging from 100-400 MW_{th}. The problem with Ontario's existing bioenergy facilities is that most are power-only and, outside of Atikokan GS, lack scale (Atikokan should not be used as a proxy, given it lacks heat load, must use high-cost pellet fuel, and is operated as an odd peaker). Biomass is a form of steam-based thermal generation. It has much more in common with other thermal generating resources than other renewables. No one would build a 15 MW_e coal, gas, or nuclear plant, but the IESO has prioritized this small scale for biomass, putting it into the same category as solar and wind, despite the $/MWh economics for small-scale thermal generation being very poor. This constraint, combined with a singular focus on electricity and neglecting heat ("not in scope") then reinforces the IESO's position that biomass is high cost. A 15 MW_e nuclear power plant is also very high cost. Artificial constraints are leading Ontario's energy regulators to false conclusions.

We absolutely agree with the Government of Ontario that large-scale electrification of Ontario's heat demands is not feasible. However, it is also not desirable. Heat constitutes approximately 55% of the province's energy consumption. In comparison, electricity is only 17% of Ontario's energy consumption. Even with high efficiency heat pumps, the numbers do not add up. Heat is generally the lowest value product that can be produced from electricity. Electricity is a high-value form of energy and should be used for applications that maximize the economic performance of Ontario. Building space heat is a very difficult load for the electricity grid, given it is highly seasonal and significant capacity must be available to meet extreme peaks. Developing and operating this rarely-used capacity drives up the price of electricity for all other consumers throughout the year. As for industrial process heat, electrifying this demand in Ontario is completely uneconomical, particularly for any industry that requires steam. A steam demand means that the efficiencies gained from heat pumps are generally not available. Electrifying heating also compromises the ability of Ontario to supply affordable electricity for higher priority new loads, such as electric vehicles, manufacturing, and data centres. **It is simply not in Ontario's best interests to electrify heat**.

Ontario is a large importer of fossil (natural) gas from the United States. In 2023, **the net cost of natural gas imports from the United States was $1.7 B**. This is $1.7 B unnecessarily leaving Ontario's economy each year instead of being spent on made-in-Ontario biomass fuel. As trade with the United States is likely to face challenges over the coming four years, it is imperative that the Government of Ontario prioritize Ontario fuels. Given the lack of fossil fuel resources in Ontario, this means biomass. It must also be recognized that it is the Government of Ontario itself that owns most forest resources in the province. It is time Government of Ontario recognized the value of its own asset.

Large-scale biomass CHP is the proven approach for economical decarbonization of northern countries. In Sweden and Finland, which share Ontario's cold climate and significant forest resources, 40% of energy consumption is supplied by bioenergy. Approximately 90% of this is supplied by the forest and these countries have a higher GDP per capita than Ontario. Cities such as Stockholm, Helsinki, and Copenhagen are heated with wood chips, with biomass CHP plants reaching up to 550 MW. They are located downtown in

these cities and have lower air pollutant emissions per unit energy than natural gas furnaces. These Nordic countries use bioenergy to increase the amount of carbon stored in their forests. This is counterintuitive for many, but the reality is trees need space and light to grow. Thinning out forests by removing dead, diseased, dying, and low vigour trees means the remaining trees can be healthier and store more carbon. A few, large, healthy trees store more carbon than many very small, unhealthy trees.

Use of biomass for large CHP plants in urban centres uses commercial conversion technology but relies upon two types of essential infrastructure: 1) rail and marine for fuel delivery; and 2) district heating networks. While it is undoubtedly more effort to bring solid biomass fuels into urban areas than pipelined natural gas, it is entirely doable. A 300 MW biomass CHP requires one train per day. It is also undoubtedly more effort to install new district heating systems to replace existing natural gas distribution systems than to stick with the current fossil fuel, imported fuel infrastructure. However, installing district heating networks and abandoning natural gas distribution systems if the province to use made-in-Ontario fuel. The alternative is to have Ontarians pay for expansion of more and more infrastructure to increase reliance on imported fossil gas. This only supports Enbridge's shareholders and enriches US natural gas producers. This is not a good legacy.

Disconnections from natural gas are occurring around the world, with Denmark, a country where over 70% of the population are already connection to district heating, making over 50,000 new district heating connections per year. The key here is planning for the future; district heating is future proof infrastructure that allows communities to use a large variety of local energy resources for heating buildings. Since water is the heat carrier, anything that can generate hot or warm water can be used to heat buildings. In contrast, natural gas lines can only carry methane. In other northern countries, 55-95% of the population is connected to district heating. In Canada, the primary northern country exception, it is approximately 1.5%. Canada, including Ontario, is the outlier. If Ontario wants to invest in its energy future, district energy infrastructure must be the priority.

Use of biomass for industrial process heat is also widely deployed in other regions around the world. Companies that use biomass for process heat include Coca Cola, Pepsico, Kellogg's, Danone, Unilever, P&G, Dow, Nestle, McCain, Michelin, Pirelli, Volkswagen, Volvo, NorthVolt, Heineken, Bacardi, Bridgestone, and many others. Novo Nordisk, the most valuable company in Europe, is investing C$8 B to expand its manufacturing operation in Kalundborg, Denmark. The process heat supply for the current plant and expansion is biomass CHP.

If Ontario is to capture its forest biomass CHP opportunity, four critical things must happen:

1. **Recognition by the Ministry of Energy and Electrification that biomass is a priority for the province**
   The *Ontario's Affordable Energy Future* document contains sixty mentions of nuclear but only one of biomass and not even in the context of future plans. The Government of Ontario has allocated $80 M for an Ontario Biomass Program but the primary opportunity for biomass is CHP – which is only possible with support of the Ministry of Energy and Electrification. There is a serious policy connect here.

2. **Electricity grid access and power purchase agreements for large-scale biomass CHP plants**
   Biomass must be given just as much priority as nuclear and must not be treated like an intermittent renewable. Biomass is baseload, dispatchable supply that, in CHP design, can modify the output of electricity and heat depending upon variable demand. Plants greater than 50 MW_e must have a pathway to grid connection so private investors have confidence to make investments in project development.

3. **Valuation of the macroeconomic benefits of made-in-Ontario heat**
   Currently, Ontario does not value the macroeconomic or energy security benefits of made-in-Ontario heat supply. Most of the expenditures on biomass fuel are on labour, with most of that labour in rural communities with limited economic opportunities. To reduce imported natural gas consumption, which is a cash drain on Ontario's economy, the primary two options are electricity and biomass heat. Avoided electricity load, which is what biomass heat provides, is not valued under IESO or Government of Ontario policies.

4. **Establish district heating networks as priority infrastructure in Ontario**
   District heating is the proven approach for delivering affordable, local energy in jurisdictions that lack domestic natural gas. There is absolutely zero reason Ontario should be permitting more natural distribution infrastructure when the macroeconomic and technical performance of district heating + biomass is far superior. Natural gas may have a role to play in some district heating systems as a peaking and backup fuel, but it is the fuel flexible, future proof, water distribution-based district heating infrastructure that Ontario should be prioritizing. This infrastructure is also highly favoured for investment by institutional capital. The largest district heating developers and owners in Canada are owned by pension funds. If Ontario wants to attract infrastructure investment to the province, prioritization of district heating is the way to do it.

We strongly urge staff at the Ministry of Energy and Electrification to engage with colleagues in the Ministry of Natural Resources to better understand the need for a market for low-grade wood. With the closure of 13 of 16 pulp and paper mills in Ontario, continued operation of sawmills to produce the lumber required for housing necessitates development of biomass CHP plants. The Government of Ontario has jurisdiction over both energy and forests. It also has jurisdiction over housing and has stated goals to address the severe lack of housing in the province. Closure of sawmills will not help. It is essential that public servants in the Government of Ontario look beyond their own ministries and do not limit the potential of bioenergy to contribute to economic success of the province.

Kind regards,

Jamie Stephen, PhD
Managing Director