Introduction

Energy Storage Canada (ESC) is pleased to provide comments on the Natural Resource Canada's Assessing regulatory, policy and market impacts on Canada's electricity grid modernization paper. There is no pathway to mass electrification that does not include energy storage.

Storage has the unique ability to extract more value from existing zero-carbon assets, such as nuclear, solar, wind, tidal, geothermal, and hydro. It is also unique in its capacity to provide multiservice benefits, including flexible capacity, peak capacity, ancillary services, deferral of additional investments in generation, transmission and distribution, improved reliability of the grid, system stability and empowerment of customers.

While energy storage resources have enormous potential to both decarbonize and scale up the grid to meet electrification goals, there are some key regulatory barriers as detailed below,

Energy Storage investments enable electrification by:

1. Increasing deployment of new and existing renewable energy by improving renewable energy output;
2. Reducing reliance on peak thermal resources; and
3. Enabling multi-service capability (e.g., capacity, energy, reliability, regulation service, operability, stability) whereby energy needs can be met using stored energy from zero carbon resources rather than fossil fuels.

While energy storage resources have enormous potential to both decarbonize and scale up the grid to meet electrification goals, there are some key regulatory barriers, as well as potential solutions, as detailed below.

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Sincerely,

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1. **Operating within Canada's current energy regulatory constructs, how might the pace of electrification and grid modernization be accelerated?**
    a. **What specific tools, services, guidance and/or resources are required? Do these apply to particular jurisdictions, or can they be applied more broadly?**

The acceleration of electrification and grid modernization is dependent on the deployment of short- and long-duration energy storage projects.

Electrification demand is expected to increase substantially in the coming years, through both decarbonizing and expanding Canada's existing electricity system to facilitate the switch for sectors such as ground-based transportation and industrial facilities from being fueled by fossil fuels to being fueled by electricity. Decarbonization is critical to ensure that fuel switching from fossil fuels to electricity has maximum carbon reductions. Expansion is critical to ensuring that there is sufficient electrical energy and capacity to take on new load from the expected fuel switching and electrification. In Energy Storage Canada's whitepaper *Energy Storage: A Key Net Zero Pathway in Canada,* which evaluates the possibility of a net-zero system by 2035, it concludes that the system expansion and retirement of high carbon assets in Canada will demand a minimum of 8 to 12 GW of short-to-medium duration energy storage.[1]

Energy storage enables decarbonization and system expansion by:

- Providing balance in the system for variable renewable generation, allowing low cost renewable energy to be utilized when it is needed and providing fast ramping capacity when variable renewable energy comes offline. Energy storage performing energy arbitrage stands to significantly benefit rate payers by bridging between times of high and low prices. A study undertaken jointly by Energy Storage Canada and The Canadian Renewable Energy Association (CanREA) found that 300MW of energy storage would have saved Albertan electricity consumers over $600M in 2022, if allowed to economically pursue energy arbitrage. Energy storage allows the lowest cost electricity, often renewable energy, to find it's way to consumers.
- Supplying ancillary services such as operating reserves and frequency response, which have traditionally been met with fossil fuel powered thermal or legacy hydro assets
- Acting as a non-wires alternative when pursuing system expansion and decongestion, especially to meet electrification based peak load and renewable energy additions. Energy storage can preempt and/or supplement wires-based system expansion and allow faster system expansion. Transmission and distribution constraints will likely be a significant hurdle to decarbonization and electrification. Energy storage resources can ensure a prompt and orderly relief of these constraints complementing traditional transmission and distribution expansion.
- Flexibly responding to system conditions by charging and discharging, when paired with less flexible assets, such as nuclear
- Enabling demand side flexibility at a distributed and behind the meter scale, allowing for a smoother and more manageable load profile while electrification increases

[1] https://www.energystoragecanada.org/es-net-zero

- Providing clean backup power, especially as electrification makes access to electricity even more critical

Energy storage resources can accelerate the pace of electrification in all jurisdictions in Canada but will be especially useful in provinces with the largest change needed to decarbonize and expand their electricity systems through 2035 and 2050. Energy Storage Canada's *Energy Storage: A Key Net Zero Pathway in Canada* whitepaper finds that energy storage is most needed in Alberta, Saskatchewan, Ontario, and the Maritime provinces.

b. Is there a role for the federal government to support through programming, and what are the specific needs?

The interaction between energy storage and system planning, design and operation is not yet well understood by utilities and system operators. A key reason for this is that there is limited direct operational experience of such technologies in Canada. The federal government can play an important role addressing this knowledge/experience gap throughout Canada.

The role of the federal government includes convening sub-national government, industry including utilities and system operators, and other stakeholders to develop and share knowledge about the integration of new technologies such as energy storage.

The federal government could also continue its successful track record of funding smart grid and grid modernization projects, with focus on projects that deliver essential reliability services, and that reliably integrate variable renewable energy resources.

Of note, while electricity is traditionally the domain of the provinces, the federal government is actively supporting more integration between provincial electricity systems through projects such as the Atlantic Loop and initiatives such as the anticipated Pan Canadian Grid Council. When exploring transmission system expansion, the federal government should pay special attention to how energy storage resources can optimize both the performance and reliability of these assets. In Alberta, for example, the loss of interregional transmission is a significant reliability challenge for the Alberta electricity system. Storage can relieve this by discharging at times when the intertie is lost temporarily, preserving the services the intertie typically provides and minimizing load shedding and/or curtailment of inertia-less renewable resources. When expanding interties in other regions, storage deployment may be considered to preempt such scenarios and maximize/minimize the benefits/challenges posed by interties.

2. In consideration of the previous question, if the regulatory constructs require change, what is needed to enable that change?

a. What specific tools, services, and/or resources are required to facilitate this change? Do these pertain to particular jurisdictions, or can they be applied more broadly?

While the goals of decarbonization and expansion to meet electrification can be significantly aided by deployment of energy storage resources, there are still significant regulatory hurdles. Many of these hurdles fall within provincial jurisdiction.

- In many jurisdictions, especially jurisdictions served by vertically integrated utilities, there are minimal means of pursuing energy arbitrage due to a lack of price signals. These jurisdictions should explore how to compensate energy storage for the energy arbitrage service, under either special rate design or contractual arrangements.
- In market-based jurisdictions, such as Alberta and Ontario, while price signals exist, a lack of energy storage specific tariffs can still artificially make energy arbitrage uneconomic.
    - Tariffs that treat energy storage as a consumer of electricity may charge energy storage resources for utilizing the electricity system much more than is actually being done because energy storage resources are generally not consuming electricity but storing it for later use.
    - Time-of-use charges may insufficiently line up with times of excess and constrained supply and provide an insufficient signal for energy arbitrage.
- Many jurisdictions do not have fully implemented means of pursuing storage as a non-wires solution. In Alberta, for example, *The Electricity Statutes (Modernizing Alberta's Electricity Grid) Amendment Act, 2022 (Bill 22)* allows energy storage to be owned by transmission and distribution facility owners but has not been sufficiently implemented to be utilized. Power system planning and regulatory processes must evolve to appropriately consider the value proposition of energy storage as a non-wires solution.
- Sufficient access compensation structures, where they exist for energy storage resources, are not always available when connected through the distribution system.

Finally, relevant to most regulatory hurdles, is the pace of reform. While reforms are not trivial, they must keep pace with technological advancement, decarbonization ambition and accelerating electrification.

b. What can the federal government do to facilitate this change? Is there a role for the federal government to support through programming?

Recognizing the provincial role in electricity regulation, the federal government can play a role in convening regulators and policy makers for the purpose of solving regulatory barriers to electrification, inclusive of the regulatory barriers facing energy storage resources per the above.

3. How could federal funding stimulate those changes? In general, what are the regulatory, market, policy barriers and opportunities for innovations in electric grid modernization, distributed energy resources, and behind-the-meter resources? Do you have examples of barriers and opportunities faced in your jurisdiction?

Federal funding, especially through the SREP and the anticipated Clean Technology Investment Tax Credit (ITC), will greatly accelerate the decarbonization and expansion of Canada's electricity system. The continued funding of the SREP and timely implementation of the Clean Technology ITC, with a clear process, will be crucial. Indirectly, these may help reduce the aforementioned regulatory hurdles by exacerbating the pressures to realize the benefits of energy storage in a transforming electricity system.

System expansion, including storage acting as a non-wires alternative means of expansion, will be critical to enabling electrification. How to fund expansion is a significant point of contention, with the risk of

increased costs on electricity consumers. The federal government may have a role in allowing electricity systems to be expanded without placing the burden on ratepayers.

The federal government can also fund research and collaborative processes (e.g. “regulatory sandboxes”) to stimulate and direct dialogue toward solutions.

4. **To what extent might the existing regulatory, markets, and policy environment result in potential disproportionate impacts to specific customer segments from electrification and grid modernization? What regulatory, market, and policy innovations could be implemented to mitigate these impacts?**

As mentioned above in 2a, there are regulatory hurdles related to the allocation of costs and benefits from energy storage that must be addressed to enable cost-efficient and effective decarbonization and system expansion. This is an area where federal funding for research and collaborative processes (e.g. “regulatory sandboxes”) could stimulate and direct dialogue toward solutions.