ENERGY STORAGE CANADA

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Written Submission for the Pre-Budget Consultations in Advance of the 2019 Budget by Energy Storage Canada

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Recommendation

- That the Government establish an extension of the Emerging Renewable Power Program (ERPP) focused on large- scale, long-duration transmission-connected energy storage.

Rationale

Energy Storage Canada (ESC) is the trade organization that represents the broad range of companies engaged in the energy storage industry across Canada. We represent over 60 member organizations that range in size from large multinationals to smaller, innovative technology companies. Our goal is to build a sustainable market and demonstrate the value that energy storage contributes to our energy systems, our environment and our economy. Canada has the opportunity to become a global leader in the energy storage industry by reinforcing innovation, creating expertise and jobs, and ensuring the establishment of a strong supply chain.

In Budget 2017, the Government announced a $200-million Emerging Renewable Power Program (ERPP), to support deployment of emerging renewable power by de-risking the upfront capital investments. However, as the program rolled out, it became clear that it would focus on a narrower range of technologies: offshore wind, geothermal, concentrated photovoltaic, and tidal power.

A major emerging renewable power source left out of the program was energy storage. This is an omission that has become common across the Government's new set of programs focused on energy and climate change. It is especially puzzling when one considers the unique set of benefits provided by storage that are unparalleled in the energy system:

- increasing deployment of new renewable energy by improving energy output certainty;
- improving capacity (value) of existing intermittent wind and solar generation by capturing surplus energy for use when wind and solar energy is unavailable;
- eliminating power loss from tidal generation during slack tides;
- enabling more electricity system services (e.g., capacity, energy, regulation service, fast ramping, voltage support, black start) by using stored energy from zero carbon resources (additional value from wind, solar, hydro, tidal, geothermal); and
- increasing GHG reduction by using stored zero carbon to replace coal and optimize natural gas generation.

Storage presents a remarkable emerging area of growth in clean technology and can help ensure Canada's competitiveness. Bloomberg, for example, estimates "The global energy storage market will double six times between 2016 and 2030, rising to a total of 125 gigawatts/305 gigawatt-hours."[1]

Canada has helped develop a number of important energy storage technologies, through initiatives such as the 50 MW procurement target set out in Ontario's 2013 Long Term Energy Plan. Yet we are missing key export opportunities, and we are at risk of falling behind the United States and other jurisdictions that are deploying energy storage to optimize their energy grids, reducing both ratepayer costs and GHG emissions.

[1] *Bloomberg New Energy Finance*, Nov. 2017

Several U.S. states have stipulated targets for energy storage to help integrate renewables, reduce GHG emissions, stimulate clean-tech jobs and ensure grid resilience:

- New York State set a 2018 target of 1,500 MW of energy storage deployment by 2025, in part to help integrate renewables more efficiently.
- Massachusetts 2017 State of Charge study shows that 1800MW of storage in the state would benefit grid by $2.3B for $1B investment. Storage would reduce carbon emissions by 1Mt over 10 years.
- In 2018, California in the process of passing a bill to procure 1,000-2,000 MW of pumped storage hydro
- In 2013, California mandated 1,350MW of Energy Storage and including energy storage as part of its Renewable Portfolio Standards. In 2016, the state carried out “emergency” procurement to meet capacity needs due to a gas supply shortage, recognizing that it was the only technology reliable enough (vs. demand response) and could get procured in large quantities fast enough (vs. gas plants).

Although storage is quite cost competitive with other conventional electricity sources, procurement processes in Canada generally discount the value of storage, failing to take into account the many stacked benefits that storage provides, including services such as optimizing existing generation sources (wind, solar, natural gas, etc.), reducing peak load, ensuring reliability, and many others (See Figure 1 below.) Single-service procurements fail to recognize and capture the breadth of value that storage can provide, and this is especially true when it comes to the GHG reduction value of storage.

Figure 1: LUEC Comparisons for Energy Storage from Figure 2 of Navigant Report[2]

Figure 2. Updated OPO Table 2 – Current Technology Characteristics[2]

Technology	Capacity	Energy	Operating Reserve	Load Following	Frequency Regulation	Capacity Factor	Contribution to Winter Peak	Contribution to Summer Peak	LUEC ($/MWh)
Conservation	Yes	Yes	No	No	No	Depends on Measure	Depends on Measure	Depends on Measure	$30-50
Demand Response	Yes	No	Yes	Yes	Limited	N/A	60-70%	80-85%	N/A
Solar PV	Limited	Yes	No	Limited	No	15%	3-5%	20-35%	$140-290
Wind	Limited	Yes	No	Limited	No	30-40%	20-30%	11%	$65-210
Bioenergy	Yes	Yes	Yes	Limited	No	40-80%	85-90%	85-90%	$160-260
Storage – 4 hour daily cycle	Yes	Yes	Yes	Yes	Yes	10-50%	60-90%	60-90%	$160-185
Storage – 10 hour daily cycle									$75-80
Storage – 4 hour high cycle									$225-230
Storage – 15 minute high cycle							6%	6%	$80-85
Waterpower	Yes	Yes	Yes	Yes	Yes	30-70%	67-75%	63-71%	$120-240
Nuclear	Yes	Yes	No	Limited	No	70-95%	90-95%	95-99%	$120-290
Natural Gas	Yes	Yes	Yes	Yes	Yes	up to 65%	95%	89%	$80-310

[2] Note: The "Capacity Factor" is better described as a "Production Factor" representing the annual energy production of storage resources built upon the assumptions described in the report.

Results of Proposed Program

An ERPP-like program for energy storage would promote the development of Canadian emerging technologies – such as offshore (underwater) storage, flywheels, and batteries – as well as technologies available in other countries but not yet in Canada – such as grid-scale variable-speed pumped storage and compressed air.

Canada has a number of emerging and innovative storage technologies ready for export and domestic markets. The United States is currently reaping such benefits, with energy storage jobs increasing 235% from 2015 to 2016, for a total of 90,800 direct jobs. By 2025, this number is estimated to grow to nearly 200,000.

For an investment of $200 million, a new program in Canada would result in

- Creation of 4,000-6,000 new jobs. These include construction jobs and also subsequent supply chain capacity and expertise;
- Investment of over $2,4 Billion; and
- Cost savings to the grid of $34M annually; and
- Reduction in GHGs of 500,000 tonnes, equivalent to taking nearly 100,000 cars off the road.[3]

A summary of outcomes of this program, compared to the original ERPP, is outlined in Fig. 3 below.

[2] "From "Levelized Unit Energy Cost of Storage Resources: Approach and Assumptions", Navigant Consulting, November 2016

[3] Figures derived from 35 x 25: A Vision for Energy Storage (Nov. 2017), Energy Storage Association.

Fig. 3: Summary of Outcomes

ERPP 1 Target Results	Extended ERPP 2 Results
Increase in deployment of emerging renewable power projects in Canada;	Increase deployment of commercially viable energy storage not yet operating at utility scale in Canada Increased energy storage will support increased penetration of renewable energy in Canada
Reduced barriers to deployment of emerging renewable power projects in Canada	Program support will showcase viability of many applications/technologies of energy storage and the value of adapting regulations to enable storage.
Increase in renewable energy capacity from emerging sources in Canada	Reduced curtailment of renewable resources (energy waste) & broaden the electricity system services available from increased capacity of renewables via stored energy Enable renewable resources to become “dispatchable” (for use on demand)
Create environmental benefits, including greenhouse gas (GHG) reductions	Reduce GHG by increasing zero-carbon capacity of renewable energy
Increase in renewable technology supply chains in Canada	Promote development of Canadian technologies and innovation Increase design expertise, manufacturing jobs; construction and installation jobs; (i.e., export opportunities for emerging Canadian technologies in U.S., Australia, Europe, Asia)

By establishing an extension of Emerging Renewal Power Program that focuses on large-scale, grid-connected storage, the government would be able demonstrate important leadership in economic development, job creation, and GHG reductions.