ENERGY STORAGE CANADA

MaRS Cleantech, Suite 420
101 College St. Toronto
Canada, M5G 1L7

Optimization and Flexibility First:

The Clear Case for Energy Storage

Ontario's Long-Term Energy Plan (2017)

Submission of Energy Storage Canada (ESC)

December 16, 2016

Executive Summary

In the last decade, Ontario has phased out coal, invested heavily in renewables, effectively decarbonized its grid, started the privatization of its transmission system, enhanced conservation in its consolidating distribution systems, taken principled positions on pipelines, issued action plans to address climate change, and expanded natural gas services to rural, remote, and Indigenous communities.

This has required considerable investment, and energy customers are now incurring the impacts of increased costs resulting from change. These costs are coming at a time when unprecedented integration of energy and technology developments and concerns about climate change are, in turn, increasing customer choice and mobilization of customers away from all forms of traditional energy production and delivery regimes.

In summary, Ontario is experiencing the "perfect storm" of both positive and negative disruptive change that is particularly challenging for longer-term energy policy and planning. Ontario therefore has pressing demand for solutions that ***optimize its existing energy investments*** and ***facilitate flexibility*** to weather any multitude of technological and policy changes.

Enter, Energy Storage.

Ontario piloted a small procurement of varying types of energy storage in its last Long-Term Energy Plan, with considerable resulting efficiencies, flexibility, and benefits reported by the Independent Electricity System Operator (IESO). Energy Storage Canada (ESC) worked closely with ENERGY, IESO and the Ontario Energy Board (OEB) in attempt to maximize efficiencies and minimize regulatory barriers during the process. The following submissions are provided in the same vein. ESC hopes to assist Ontario in optimizing its existing investments, facilitating flexibility and thereby reducing customer energy costs through the most flexible of tools available to the sector: energy storage.

The following ESC submission sets out how energy storage can assist the government in providing flexibility and versatility, and addressing fluctuating demand, generation intermittency, greenhouse gas missions, and thereby achieve customer cost reductions.

1. Transition meets Flexibility

Energy storage has the ability to realize full and enhanced value from existing energy resources. It also has multiple benefits: it operates to provide flexibility for all of the transmission, distribution and customer sectors and optimizes value at all points in the energy system, including:

- Generation plants
- Transmission grids
- Local distribution networks
- Microgrids, behind-the-meter applications by customers and
- Remote community connections

2. Optimize Existing Investments

Ontario has made significant investments in its renewables, nuclear, and gas resources. Deploying energy storage can derive maximum value from these assets and avoid the current losses of direct value for ratepayers. Energy storage helps mitigate common electron waste and avoids the need to maneuver nuclear units or sell power in an uneconomic manner. Energy storage has the ability to partner with natural gas to shave peaks and optimize system performance, while reducing emissions and saving the costs associated carbon and electron waste. In addition, energy storage works in tandem with renewables to better integrate intermittent, zero-emission electricity for more efficient deployment.

3. Generate Value through Flexibility

Given its versatility and multiple applications, energy storage can also meet the needs as set out in the four demand scenarios in the IESO's Ontario Power Outlook (OPO). When demand is a moving target, the most versatile asset is the most valuable. In a complex environment of uncertainty and variability, increased focus on affordability as well as diminishing social license to build new generation, transmission or distribution facilities, energy storage offers Ontario the flexibility required in managing these fluctuating requirements.

Industry research has demonstrated that energy storage can compete economically in IESO's single-service procurements. But multi-service procurements would offer greater value to the system and ratepayers. Through stacking of benefits, the same asset can provide ancillary services (frequency regulation, voltage control, black start), peak capacity, flexible capacity, transmission and distribution asset deferral, as well as energy arbitrage. Current procurement practices inhibit this unlocking of value by seeking stand-alone services in single procurement streams.

4. Drive solutions for Environment and Climate Change

At the transmission, distribution and customer levels, energy storage offers more avenues for valuable and flexible use of energy storage: optimizing and reducing use of the gas fleet - especially with the closure of Pickering, which will replace nuclear generation with a 50:50 mix of natural gas and renewables. In this scenario, CO2 emissions will more than double and more variable generation will pose system operability issues. Storage can increase the carbon-free capacity of installed renewables and nuclear resources through optimization, improve rural reliability and move remote communities and resource developments off diesel, provide homeowners with residential storage with back-up power, and offer homeowners with residential storage and back-up power with control of time-of-use electricity prices.

5. Create Innovation and Jobs

Ontario is home to innovators, entrepreneurs and established companies working to improve the market for energy storage. Support for the Ontario energy storage industry will not only improve the electric grid and its contribution to greenhouse gas reduction targets but also will create job

opportunities and export potential for Ontario-grown companies. Energy Storage Canada promotes Ontario's leadership on the world stage at conferences and trade shows around the world.

Key Recommendations

1. ESC recommends that that the 2017 LTEP advance the principle of optimization of current resources to generate the greatest value and reliability from existing assets and to reduce costs for ratepayers

2. ESC recommends that IESO use an integrated approach for resource procurement that considers different service needs at the same time and also allows a single facility to provide more than one service. This would provide greater value to ratepayers through increased utilization of future and existing assets. In order maximize the value of this approach, IESO may need to anticipate future near-term requirements and include them in a procurement along with current needs, rather than procuring on a one-off basis as needs arise.

3. Continue ongoing work with the MOE, IESO and OEB to remove regulatory barriers that disadvantage energy storage, especially relative to less flexible, less optimal, single-service resources. It is fundamental that energy storage assets, which provide services into the wholesale electricity market, not be disadvantaged against other wholesale market transactions such as market exports.

4. ESC urges that market renewal processes determine the means to attribute value for performance (including speed of response) and multi-function/service characteristics of energy storage (i.e., appropriately value the stacking of benefits that can be provided).

5. Deploy MOECC's "Green Bank" to expressly fund and facilitate reduced costs for GHG-reducing energy storage facilities at the bulk scale. Savings can be flowed through to the benefit of the ratepayer. Access to low-cost capital will reduce the cost of building these facilities and ultimately provide lower ratepayer costs. Make distribution-level projects eligible for funding from carbon auction revenue for the benefit of the electricity ratepayer where a carbon reduction value can be shown and enable financing from the Green Bank. Provide funding from Carbon Auction revenue and allow financing from the Green Bank to help lower the cost of behind the meter energy storage for home owners – allowing them to reduce costs on their monthly electricity bills.

6. Ensure that the IESO consider the GHG emission impact of the various technologies they are procuring and is an active participant in reducing electricity-system related emissions.

7. Provide the OEB with policy tools and processes to enable energy storage solutions to be eligible for inclusion in the LDC rate base.

8. Introduce effective energy management incentive programs to support installation of energy storage devices so consumers (including First Nations) can cost-effectively implement renewable self-generation and/or manage costs by storing off-peak energy for on-peak use.

Introduction

Energy Storage Canada (ESC) is pleased to contribute to the development of the Ministry of Energy's 2017 Long-term Energy Plan for Ontario. Ontario's energy system is in an important period of transition as demand becomes much more difficult to predict, the supply mix evolves, more intermittent generation increases, reduction of GHG gains importance, and the priority of cost reduction takes centre stage.

ESC understands that ratepayer value must be considered in all future decisions to contain energy costs, leverage the full value of existing asset investments and ensure the reliability and flexibility of our energy system.

By articulating the position of optimization and flexibility first, ESC maintains that greater deployment of energy storage can meet many of the government's energy objectives. Storage can provide flexible capacity, peak capacity, ancillary services, optimization of current generation assets, deferral of additional investments in generation, transmission and distribution, improved reliability of the grid, integration of renewable generation, and empowerment of customers.

With updated procurement processes, storage could also better harness multiple value streams to generate greater cost savings to the ratepayer.

In essence, it means adding technology that enables Ontario to derive more value from current assets, rather than adding more single-purpose assets to the electricity system.

ESC believes that storage has broad capability to contribute to the efforts of the government to optimize Ontario's energy system, reduce projected energy costs for ratepayers, cut GHG emissions, create jobs and build on the success of Ontario's innovative clean-tech companies.
Energy storage has unique characteristics: it is a flexible resource at the transmission, distribution and customer levels and adds value at all points in the energy system:

- Generation plants
- Transmission grids
- Local distribution networks
- Microgrids and behind-the-meter applications by customers

This submission focuses on four areas that will increase system flexibility, maximize ratepayer value and contribute to the environmental health and economic vitality of the province.

1. Optimize Existing Investments
2. Generate Ratepayer Value through Flexibility
3. Drive Solutions for the Environment and Climate Change
4. Create Innovation and Jobs

Energy Storage Canada

Energy Storage Canada (ESC) is the industry association representing the broad range of companies engaged in the energy storage business in Ontario and Canada. We are the only trade association in Canada focused on advancing the dynamic role of energy storage and building the market for the energy storage business.

Our broad membership represents all players along the energy storage value chain -- technology providers, project developers, investors and operators, local electricity distribution companies, and NGOs. We represent the some of the largest energy companies in Canada as well as some of the smallest and most innovative clean-tech organizations. It is this depth and breadth of perspectives that informs our contribution to the important work of energy planning in Ontario.

Businesses focused on research, manufacturing and deploying energy storage technologies and applications already contribute to innovation and jobs in Ontario. With continued domestic growth, there is the potential to achieve much more over the next decade.

Ontario's Leadership

Ontario distinguished itself as a leader in energy storage through the 2013 LTEP. The plan was instrumental in establishing the foundation for building energy storage capabilities, including the 50W energy storage procurement, the grid-level storage study carried out by the IESO in 2016, the ongoing study of storage on the distribution system, and continuing efforts to remove regulatory barriers.

Energy Storage Canada appreciates the ongoing commitment the Ontario government has demonstrated to this growing industry. These initiatives have been vitally important to ensure greater understanding and viability of storage in all its applications.

Ontario is also a leader in articulating the Climate Change Action Plan (CCAP), which has intensified the need to decarbonize electricity and how we use energy beyond the power system. We believe that energy storage can also play a key role in these initiatives.

Optimize Ontario's Energy Investments

Value of Energy Storage

The transformation of Ontario's energy portfolio to include large-scale renewables, the need to reduce carbon pollution, and advancements in energy storage technologies mean that energy storage can enhance Ontario's energy portfolio and meet climate priorities on all fronts. With its potential to play many roles, energy storage ties all these pieces together to bring efficiencies to the system while reducing carbon emissions.

When demand is a moving target, energy storage also provides value with its versatility. Energy storage is unique in its ability to combine many different value streams in one asset. This "stacking" of benefits allows for much better economies than providing just one service. These roles include:

- Generation and uninterrupted power supply
- Flexible and peak capacity
- Regulation service
- Voltage support
- Operating reserve
- Black start
- Fast ramping to mitigate impact of variable generation from renewable power
- Avoided distribution/transmission upgrades
- Carbon reduction by lowering reliance on fossil fuel generation
- Different storage technologies play different roles on the power grid
    - From behind-the-meter(batteries)
    - To distribution/transmission support (batteries, flywheels)
    - To bulk system storage (power to gas, CAES, Pumped Storage Hydro)

Energy storage increases the value of the energy produced by other sources and adds capacity to the system. It acts as a load and generator and provide a range of grid balancing services including regulation services, voltage support and congestion management to allow grid operators to integrate increasing amounts of renewable generation.

Energy storage assets can lower greenhouse gas emissions by permitting more efficient dispatch of gas-fired generators, and lower system costs by deferring costly transmission and distribution system upgrades. The result is a cleaner, more flexible and cost-effective electricity system.

These points are consistent with the storage themes raised in Ontario's LTEP Discussion Guide[1]. Energy storage can optimize all players in Ontario's supply mix to make all components operate more efficiently and cost-effectively. Energy storage partners with natural gas to shave peaks and to ensure that the system is optimized for performance, to reduce emissions and ensure cost-effectiveness through optimal use. In addition, energy storage works in tandem with renewables to integrate intermittent clean electricity for more efficient deployment.

In short, energy storage technologies fundamentally improve the cost effectiveness of how we generate, deliver, and consume electricity. They have the power and versatility to make our power networks more resilient, efficient, and cleaner than ever before, deriving maximum value from fleet assets and avoiding direct lost value for ratepayers.

[1] *Planning Ontario's Energy Future*, pp. 28-29

Optimizing Renewables

- Storage avoids curtailment of solar, wind and hydro by storing excess carbon-free renewable energy and deploying energy only when it is needed.
- It ensures renewable assets can be operated at their designed capacity resulting in ratepayers getting full value out of those clean energy assets.
- Energy storage can provide the flexible capacity needed to meet the IESO's flexibility needs driven by the increase in variable generation and forecast uncertainty

Optimizing Nuclear

- Storage avoids the need to maneuver nuclear units or sell nuclear power at a discount by storing the excess carbon-free energy and using the energy when it is needed. This ensures nuclear assets are operated at their designed capacity. Energy storage has the capacity to take baseload nuclear energy and turn it into a fast-response peaking resource to help optimize renewable resources and the gas fleet. In this manner, the value of dollars invested in nuclear resources is extended via energy storage.

- Excess nuclear power results in operators "spilling" power by diverting steam. Storage can capture this spillage and send it back to the grid in the form of valuable services, such as peak capacity, ramping, etc.

Optimizing Alternatives to Exporting Low-Carbon Resources

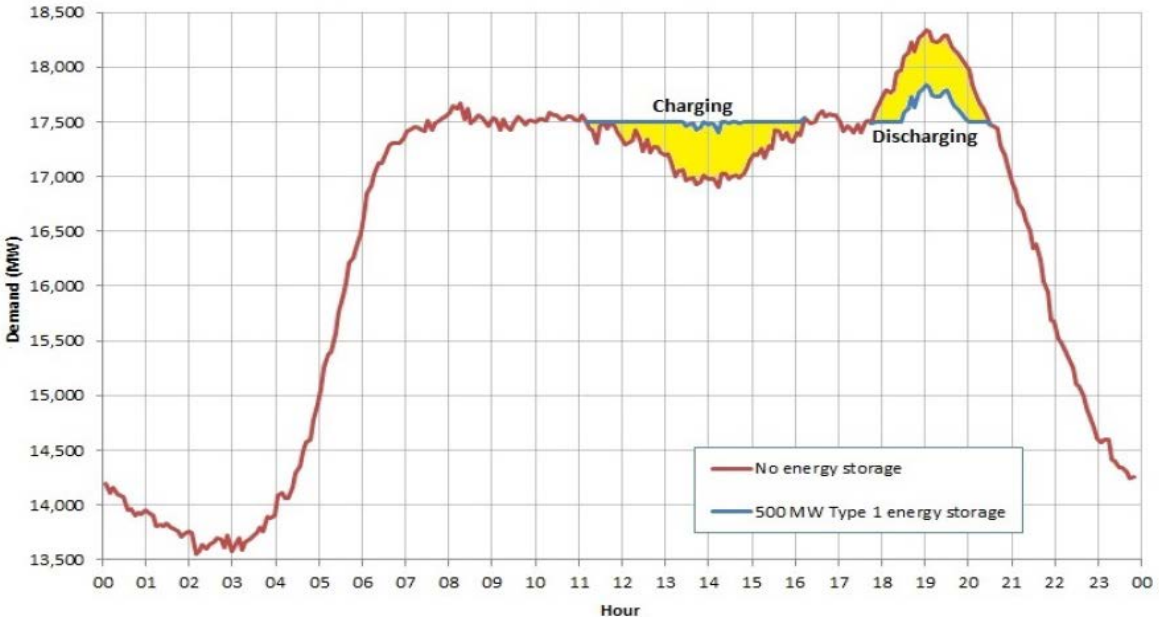
- Wholesale market energy storage resources, connected at both the transmissions and distribution system levels, can offer more flexibility in how Ontario manages its market exports. With growth in energy storage it is expected that Ontario's wholesale electricity market would experience improved market liquidity during off-peak and surplus power periods. This improvement in market liquidity at the wholesale level would occur because more bidders would exist in the market along with more demand during these off-peak and surplus periods. This would tend to provide a more supportive environment for the HOEP market, and this would have a positive impact on the global adjustment that passed on to consumers.

Optimizing Gas Resources

- Ontario's combined cycle gas assets are typically used for intermediate daytime supply. Due to their longer start-up time, these resources have a minimum run time (e.g., six hours).
- This creates a challenge because all the output might not be required during the six-hour period.
- This output may contribute to a surplus situation during their run time. To manage the surplus, the excess power can be sold off to other jurisdictions at a discount or other carbon-free resources might have to be curtailed to match demand.
- Either approach has a negative impact on ratepayer value. In the latter case, gas would be displacing carbon-free generation.

- The best-value approach is to store, rather than curtail, renewable power when there is daytime surplus and use the stored power to offset gas generation in the evening (peaking generation) for example. (See *IESO Report: Energy Storage, p.23*)
- The approach illustrated in the IESO example has the benefit of reducing carbon emissions from less energy-efficient gas peaking facilities and delivering best value from the ratepayer-funded renewable assets.

Figure 7: Example of using Type 1 energy storage to energy time-shift



[2]

Ontario Power Outlook

Given its versatility and multiple applications, energy storage can also meet the needs as set out in the four demand scenarios in the IESO's Ontario Power Outlook (OPO) released in September, 2016. In a complex environment of uncertainty and variability, increased focus on affordability as well as diminishing social license to build new generation, transmission or distribution facilities, energy storage offers Ontario the flexibility required in managing these fluctuating requirements.

Given the fast response, flexible output/input and range of available services, energy storage is a strategic opportunity and a hedge in managing uncertainty while effectively mitigating carbon emissions. In addition, energy storage technologies are scalable, more easily sited than traditional generation or renewables, and adaptable to a wide range of changing needs.

[2] IESO Report: Energy Storage, Figure 7, p. 23

It is important for ESC to highlight a point of clarification in the OPO. While the OPO indicates in Table 2, *Current Technology Characteristics*[3] that energy storage provides the full range of energy storage capabilities, it states that energy storage technology does not provide energy. This may be correct in the context of how energy storage is currently deployed on the IESO system, but, in fact, energy storage can operate in the same manner as a generator by storing and then supplying energy in transmission, distribution or behind-the-meter situations.

While the OPO did not assign any Levelized Unit Energy Cost (LUEC) to storage. A subsequent industry analysis looked at the LUEC for four base case storage scenarios. This analysis demonstrated that within a range energy storage can be competitive and economic. It also showed that the analysis did not capture all the value that energy storage can provide.

All storage technologies can provide added capacity to the system. While bi-directional storage provides added generation on the system, all storage technologies have the flexibility to reduce consumption on demand when storing energy, thereby representing a viable capacity source.

Generate Ratepayer Value through Flexibility

We have emphasized that a key characteristic of energy storage is its ability to be flexible and provide multiple services in one asset by switching operational modes. For that reason, it's called the Swiss Army Knife of energy resources. For example, the same asset can provide ancillary services (frequency regulation, voltage control, black start), peak capacity, flexible capacity, transmission and distribution asset deferral, as well as energy arbitrage.

This ability was identified in the March, 2016 *IESO Report: Energy Storage* (p.7): "As energy storage costs decline, the economic viability of using energy storage for capacity is improving and may improve further if multiple services/benefit streams can be stacked along with the capacity value."

Today, current procurement practices largely inhibit this unlocking of value and economies by using a traditional approach of buying one service at a time in separate procurement processes. As demonstrated through the Navigant analysis, energy storage can compete and be economic in each of these single-service procurements.

However, the traditional procurement structure leaves value on the table.

The IESO could maximize the value of the services by creating procurement mechanisms that seek multiple services from one asset and are evaluated on all the values they can provide. For example,

[3] *Ontario Power Outlook,* Table 2, pg. 12

regulation, flexibility, demand response, capacity or distribution deferral are all procured and contracted for separately as a stand-alone service. This approach disadvantages energy storage in procurements by not utilizing its full range of services.

ESC understands that there are cases where system needs are immediate (i.e., regulation services and flexibility) which may result in expedited single-purpose procurement. However, we also believe that there should be a longer-range approach to procuring where, once short-term needs are covered, the IESO should organize procurements to get better economies by procuring long-life multi-function assets. This will result in capturing the value of versatility (i.e., “more bang for the electricity buck”) from energy storage suppliers.

Further, at the grid level, larger energy storage project sizes can achieve more economies of scale and versatility. This results in greater the savings to the ratepayers (rather than multiple single-purpose procurements). For example, on a per MW basis, building 2MW and 5MW projects is inherently more expensive than building a 200MW or 500MW project.

With commercial projects comes commercial warranties with performance requirements and greater sophistication in contract management. Larger commercial projects are also able to have material impact on the grid in terms of operability and savings.

Contracting for storage under longer term contracts for a capacity payment will allow developers to get lower cost financing, which flows through as lower cost to electricity ratepayers.

Contracts should be designed in such a way that allows the IESO to use the asset for the service that is needed most at the time, for example during the four-hour daily peak it can provide peak capacity, during 10 hours during the day it can provide regulation, and the other 10 hours it can provide flexible capacity for renewable integration. Alternatively, the capacity of an energy resource can be allocated to different services (e.g., 50% for regulation services and 50% for energy or 25% regulation service and 75% energy depending on the priority needs of the system at any given time).

Contractually, storage could be told to bid into certain markets such as capacity markets using its variable cost, payments that would get clawed back under the capacity agreement.
This kind of contracting maximizes the value of the asset and can reduce the overall costs to ratepayers. It also provides the IESO with the flexibility to use it for different services as the grid operability and market evolves over the life of the asset.

Further industry analysis has demonstrated that through stacking of services, the sum of several values can exceed the cost of energy storage.

Drive Solutions for the Environment and Climate Change

At the transmission, distribution and customer levels, energy storage offers opportunities to meet Ontario's climate change priorities:

- Storage can reduce the use of the gas fleet and optimize the efficiency of what still may be necessary to run (by not part loading)
- Ontario plans to replace the nuclear generation from Pickering with a 50:50 mix of natural gas and renewables. CO2 emissions will more than double and more variable generation will pose system operability problems. Energy storage can manage both these issues. Adding 1400 MW of energy storage could eliminate 1-1.5 million tonnes of carbon annually.[4]
- Increasing the carbon-free capacity of installed renewable and nuclear energy resources to reduce/optimize fossil fuel generation would help meet GHG targets, deriving the most out of existing assets.
- Storage can improve rural reliability, moving northern communities and resource developments off diesel-based energy systems; reducing the carbon footprint of these communities and improving conditions in often underserved First Nations and remote communities in the North;
- In the residential sector, storage can provide homeowners with back-up power in the event of grid outages, control over time-of-use electricity prices without altering behaviour and ease integration with rooftop solar system for self-consumption, overall lowering electricity costs, increasing resiliency and reducing carbon emissions right in the home.

Create Innovation and Jobs

Ontario is home to innovators, entrepreneurs and established companies working to improve the market for energy storage. Support for the Ontario energy storage industry will not only improve the electric grid and its contribution to carbon reduction targets but also will create job opportunities and export potential for home-grown companies.

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[4] *In 2015, 91% of available Gas Fired Generation Capacity ran on average for just under three hours each day, accounting for 8.3 TWh of Ontario's electricity generation and emitting approximately 4.5 million tonnes of CO2. Approximately 1-1.5 million tonnes of CO2, out of this 4.5 million Tonnes, could be eliminated with 1,000 MW of energy storage by negating 2-3 TWh of thermal gas power generation. This assumes that natural gas generation operates at peak loads and at a capacity factor of 32% (as referenced in the IESO Power System Planning August 13, 2015 document) ESC Submission on Bill 172, April 2016.*

ESC's membership boasts innovative companies founded in Ontario and seeking opportunities in new markets. We highlight here just three examples of Ontario-based companies who have been helped by contracts with the IESO and are pioneers in energy storage – as creators and manufacturers of innovative technologies, as well as a developer that seeks deployment opportunities that harness the value of these technologies:

- **Temporal Power** makes large steel flywheels respond to two-second signals from the electricity system operator to help regulate and match the power supply and demand;

- **Hydrogenics** has pioneered high power density electrolysers which provide grid services split water to produce hydrogen allowing longer term energy storage as renewable fuel or renewable gas;

- **NRStor** is a developer that has won contracts with the IESO to develop projects with flywheels and compressed air energy storage technology. The company has also partnered with Tesla Energy and Opus One (another Ontario start-up) to bring the Tesla Powerwall home battery to Canada.

Conclusion

In the 2017 LTEP, Ontario should look to optimization and flexibility first as the most effective means to address future evolution of the energy system and value for the ratepayer.

It is our view that the system could benefit from approximately 1000-2000MW of energy storage. For example, we understand that there are immediate needs for 1000MW of flexibility and 300MW of regulation services that may necessitate single-service procurements for the shorter-term. We also understand that these are sustained needs over the longer term. It is our view that there are greater economies to procuring assets that can provide multiple services to address flexibility and regulation, while optimizing existing assets, managing surplus generation, deferring transmission and distribution upgrades, while reducing carbon emissions.

Storage is the most flexible tool to support Ontario's energy transition in multiple ways. If effectively procured, multi-function, flexible resources provide the greatest economic hedge to manage an evolving demand and supply picture over time. It can optimize current investments and help cut GHG emissions while reducing ratepayer costs.

Key Recommendations

1. ESC recommends that that the 2017 LTEP advance the principle of optimization of current resources to generate the greatest value and reliability from existing assets and to reduce costs to ratepayers

2. ESC recommends that IESO use an integrated approach for resource procurement that considers different service needs at the same time and also allows a single facility to provide more than one service. This would provide greater value to ratepayers through increased utilization of future and existing assets. In order maximize the value of this approach, IESO may need to anticipate future near term requirements and include them in a procurement along with current needs, rather than procuring on a one-off basis as needs arise.

3. Continue ongoing work with the MOE, IESO and OEB to remove regulatory barriers that disadvantage energy storage, especially relative to less flexible, less optimal, single-service resources. It is fundamental that energy storage assets, which provide services into the wholesale electricity market, not be disadvantaged against other wholesale market transactions such as market exports.

4. ESC urges that market renewal processes determine the means to attribute value for performance (including speed of response) and multi-function/service characteristics of energy storage (i.e., appropriately value the stacking of benefits that can be provided).

5. Deploy MOECC's Green Bank to expressly fund and facilitate reduced costs for GHG-reducing energy storage facilities at the bulk scale. Access to low-cost capital will reduce the cost of building these facilities and ultimately provide lower ratepayer costs. Make distribution-level projects eligible for funding from Carbon Auction revenue for the benefit of the electricity ratepayer where a carbon reduction value can be shown and enable financing from the Green Bank. Provide funding from Carbon Auction revenue and allow financing from the Green Bank to help lower the cost of behind the meter energy storage for home owners – allowing them to reduce costs on their monthly electricity bills.

6. Ensure that the IESO consider the GHG emission impact of the various technologies they are procuring and is an active participant in reducing electricity-system related emissions.

7. Provide the OEB with policy tools and processes to enable energy storage solutions to be eligible for inclusion in the LDC rate base.

8. Introduce effective energy management incentive programs to support installation of energy storage devices so consumers (including First Nations) can cost-effectively implement renewable self-generation and/or manage costs by storing off-peak energy for on-peak use.

Thank you for the opportunity to contribute to this important planning initiative. We would be happy to respond to any questions or provide more information at your request. I can be reached at pat.phillips@energystoragecanada.org

Yours truly,

Patricia Phillips
Executive Director