The Energy Storage Roadmap

The Energy Storage Roadmap sets out a clear plan to reduce barriers and deliver greater ratepayer value for Ontario consumers and businesses at the transmission level, distribution level, and behind-the-meter in commercial, industrial, and residential settings.

With multiple regulatory, market and policy engagements underway in Ontario (See Appendix A), energy storage needs a cohesive approach, with single accountability across government and agencies, to capture its full value and benefits for electricity consumers in Ontario.
ESC’s Role in Advancing Energy Storage

Advance the Energy Storage Industry

- Energy Storage Canada (ESC) is the national trade association and voice of the energy storage industry
- Advocate for sustainable market in Canada
- Contribute to economic development and job creation
- More than 60 members across supply chain

Drive Advocacy & Strategic Initiatives

- Catalyst to create fair markets for energy storage with current focus on high-potential Ontario & Alberta
- Engage with federal government to ensure participation of energy storage in climate change and clean tech programs
- Ensure energy storage awareness at policy levels

Build Stakeholder Engagement & Membership

- Host 2019 Energy Storage in Canada Conference, October 1 & 2, Toronto
- Forge key partnerships with complementary organizations
- Export and industry development through range of engagement
The Case for Action on Energy Storage

Energy storage can enhance the **efficiency**, **cost-effectiveness**, and **reliability** of the Ontario’s electricity grid. It can provide multiple services in one asset and can quickly and economically adapt to changing system needs.
The Case for Action on Energy Storage

STORAGE IS A SYSTEM RESOURCE THAT ENSURES BETTER VALUE FROM EXISTING ASSETS AND DELIVERS RATEPAYER VALUE

- Ontario has invested billions of ratepayer dollars to build electricity supply capabilities including nuclear, hydropower, renewable energy (wind, solar and biomass), and natural gas fleet. But these assets are often curtailed and underutilized. Energy storage reduces costs for customers by increasing utilization of existing assets allowing for deferment of future investment in transmission, distribution and generation. Distribution and transmission asset owners can use energy storage to adapt their networks to meet a customer needs and manage outages, both planned and unplanned.

STORAGE AVOIDS ELECTRICITY WASTE, ADDITIONAL COST, AND HELPS CONSUMERS MANAGE ELECTRICITY USAGE

- Ontario’s commercial and industrial electricity consumers are actively looking at ways to better manage their electricity usage to reduce cost as a means of remaining competitive and creating and keeping jobs here in the province.
The Case for Action for Energy Storage

Ontario has the expertise and technology

To get more value from existing generation assets, improve grid resiliency, hedge against uncertain demand forecasts and empower end consumers to reduce their direct electricity costs. Ontario is home to many energy storage innovators and the industry has potential to create more jobs and contribute to economic development.

Divided accountability is preventing Ontario from getting full value from storage

Energy Storage Canada has worked with government for more than 6 years to unlock the full value of storage. While some progress has been made, the main issue is the absence of a single point of accountability to address obstacles.

Storage requires a level playing field

Energy storage was never part of the FIT program in Ontario nor has received any government subsidies.

Removing barriers and creating the right environment for energy storage integration will provide significant value to Ontario’s electricity consumers and power system at the transmission level, distribution level and behind the meter in commercial, industrial and residential settings.
The Case for Action

Storage requires adequate compensation to reflect its full value and benefits.

Other jurisdictions, especially in the U.S., understand the value of energy storage and have developed processes and rules to incorporate storage technologies and services into their regulatory and market frameworks. This value can be unlocked through fair and reasonable compensation that achieves grid-level and customer savings.

The IESO, Ministry of Energy, Northern Development & Mines, and OEB recognize that the barriers to energy storage need to be addressed.

There remains a lot of work to do and to address the barriers in a timely way. Greater and more effective coordination is required between agencies since no one agency alone can address all of the barriers and unlock value and affordability for the electricity system and customers.
A Coherent Plan
and timely action are needed to reduce barriers and increase opportunity for storage to deliver value to Ontario consumers and businesses.

The Roadmap
for energy storage in Ontario is intended to focus efforts of multiple agencies in a coordinated simplified process by focusing on a primary goal along with immediate/near-term priorities.

Near-term Priorities
identified in roadmap are achievable milestones to be completed within a reasonable timeframe and that are seen as essential foundational elements to achieve the overall goal.

Improve Coordination
in the efforts to adapt Ontario’s regulatory framework, market rules and system planning in a way that effectively enables energy storage integration.
In 2018, the IESO identified 35 obstacles to the fair competition of energy storage in Ontario’s electricity system ranging from specific issues within market rules and operation to broader themes.

The number of changes required to remove barriers is impeding the ability of decision makers, agencies and stakeholders to devise consistent and comprehensive solutions that would unlock the full value of storage.

The biggest challenge remains that no single agency has jurisdiction over the complete list of obstacles. Accountability for the various obstacles is spread over agencies and government each of whom have different priorities/mandates with respect to energy storage.

There are approximately 20 engagements involving storage (See Appendix A.) A lack of overarching coordination and engagement integration across the agencies is creating further difficulties for both energy storage providers and the well intended agencies trying to enable storage participation in the Ontario electricity sector.
Six Roadmap Actions to Maximize the Value of Energy Storage

1. **Establish a Coordinating Committee**
   Establish a Coordinating Committee to oversee Ontario regulatory framework update for energy storage resources.

2. **Set Out Clear Guidance**
   Establish clear guidance on Global Adjustment (GA) cost allocation options for all customer types including energy storage resources when operating as a load for the benefit of the grid.

3. **Summarize and Inform on Market Tools**
   IESO to summarize and inform stakeholders of the capabilities and restrictions of the Market tools for energy storage.

4. **Identify Scope for Storage in MRP**
   IESO to identify scope for energy storage inclusion in Market Renewal Program.

5. **Clarify Regulatory Treatment**
   Clarify treatment of energy storage resources in Ontario’s regulatory framework.

6. **Establish Expedited Connection Process**
   Establish an expedited connection process for load displacement resources.
To fully realize the benefits of storage, government agencies and stakeholders must work together to complete near-term priorities. Without coordination between various agencies, inefficiencies and negative impacts can limit the potential for progress on unlocking energy storage resource benefits.

A coordinating committee can reduce the potential for actions and changes that conflict with the common end goal for energy storage resources.

MENDM should name a committee composed of decision makers from key government agencies and stakeholders including OEB, IESO, MENDM, LDCs and energy storage resource representatives.

Objective would be to monitor the progress of near-term priorities and ensure appropriate coordination of actions is undertaken when determining how to address the issues facing energy storage resources.

Committee should also be a limited forum for discussing potential options that do not conflict with various existing processes (e.g., distribution system code amendments, IESO market rules changes, etc.). The coordination committee should report to the Minister’s Office on a regular basis on the progress of each committee members activities and issues.

Establish the Coordinating Committee and host the first meeting end of Q2 2019.
Establish clear guidance on Global Adjustment (GA) cost allocation options for all customer types including energy storage resources when operating as a load for the benefit of the grid.

ISSUE

- The Ontario Government is currently undertaking a review of industrial electricity prices. Of course, industrial customers are economically important to Ontario by providing employment and taxes in both large urban centers and small rural municipalities. Large load customers have unique needs with varying levels of electricity consumption sophistication; therefore, a single rate design cannot work for all customers.

ACTION

- Any changes to GA cost allocation should include consumer choice so that each customer can determine which rate design works best for their needs. Energy storage resources can help customers manage their unique electricity needs under a wide variety of rate designs.

TIMELINE

Q2-Q3 2019
Electricity market design across the US is preparing to change due to Federal Energy Regulatory Commission (FERC) Order 841. Order 841 requires independent system operators (ISOs) and regional transmission organizations (RTOs) to revise their tariffs (i.e., rules) to accommodate the fair and equal participation of energy storage resources.

Order pushes ISOs/RTOs to consider and adopt market design and rule changes to support participation models for energy storage sources that allow their full capabilities to be offered to the market. ISOs and RTOs have been able to develop market design changes they believe can meet the Order 841 requirements. The IESO has pledged to align with the U.S. but needs to provide the energy storage industry with detailed commentary on the Order 841 proposals.

IESO should summarize the ISOs/RTOs proposed market design changes, describing how applicable those changes are to the IAM, and identify what restrictions exist with the current system tools (e.g., dispatch scheduling and optimization (DSO), automatic generation control (AGC)).

IESO is the most knowledgeable on the IAM capabilities and should inform stakeholders about the opportunities/constraints as they relate to other markets. Information on existing system tools capabilities will help stakeholders understand where best to focus efforts in the near-term before larger IAM system overhauls occur with MRP.
IESO to identify scope for energy storage inclusion in Market Renewal Program.

ISSUE

- IESO is undertaking a comprehensive market redesign through market renewal. IESO recommendation report fails to identify specific recommendations for inclusion in the MRP on behalf of the ESAG findings. Related, the MRP has not included an engagement stream for energy storage resources in their stakeholder outreach.

- Unclear how market design changes for energy storage resources are to be included in the MRP design decisions. In the report the IESO does not clearly state whether they have considered if the recommendations are within or outside the MRP scope.

ACTION

- As high-level design documents for different MRP projects (i.e., single-schedule market, enhanced real-time unit commitment, and day-ahead markets) transition to detailed design throughout 2019, now is the time to consider market design elements that support fair competition for energy storage in the IAM.

- IESO should describe how an alternative market design change mechanism would operate in parallel to the MRP process.

- IESO as the organization responsible for MRP and ESAG should be leading this charge on behalf of energy storage resources, Ontario’s power system and ultimately Ontario’s ratepayers.

TIMELINE

IESO should identify what recommendations are within MRP scope and what are outside by start of Q3 2019, along with an action plan to clearly identify steps to implement those recommendations.
Clarify treatment of energy storage resources in Ontario’s regulatory framework.

ISSUE

- Throughout Ontario’s regulatory framework, the treatment or participation model for energy storage resources are missing. Ex: There is no energy storage resource defined in the IESO’s market rules. Further, within the OEB’s Distribution System Code (DSC), there is no consistent treatment of storage resources for connection in the same manner that load customer and generation resources are outlined in the DSC.

- 60 LDCs - interpretation of the DSC responsibilities is not consistent = confusion and delays, raising cost of ESS for the power system and customers: Grid connected resources that withdraw energy during periods of excess and inject when the system needs it most are unfairly charged GA on their consumption with no appropriate offset during injection.

ACTION

- Treatment of energy storage resources be updated and expanded within the Ontario regulatory framework. Ex: LDC responsibility and treatment of energy storage resources should be created in the DSC.

- Responsibility for connection of energy storage resources should reflect energy storage’s unique physical operating characteristics and attributes. IESO should define energy storage resources and clarify the ability to offer different services (e.g., Operating Reserve) into the IESO-administered market based on the market participation type and connection arrangement (e.g., grid-connected versus behind-the-meter).

TIMELINE

OEB should launch a consultation with an objective of issuing DSC amendments by the end of Q2 2019. The IESO should draft market rule amendments for circulation to stakeholders in Q3 2019.
Establish an expedited connection process for load displacement resources.

ISSUE
- The impact on the distribution system differs for BTM resources that export and BTM resources that do not export (i.e., load displacement). Effectively, load displacement resources are similar to investing in energy efficiency to reduce consumption; therefore, the impact on the distribution system should be less than a BTM resource that may export to the distribution system.

ACTION
- Given the lower impact of load displacement, it is recommended that the OEB establish an expedited connection process for load displacement resources.
- Modernize connection requirements to take into account anti-islanding capabilities of new inverter-based technologies.

TIMELINE
OEB should launch a consultation on expedited and modernized connection process at the beginning of Q4 2019 with objective of concluding by end of 2019.
1. Establish coordination committee, MEDNM
2. Guidance on GA cost allocation options, MEDNM
3. Identify FERC Order 841 Compliance plans that are applicable to Ontario and where constraints exist, IESO
4. ESAG Recommendations in Scope for MRP, IESO
5. Clarify treatment of energy storage resources, OEB/IESO/MEDNM
6. Expedited Connection process for load displacement resources, OEB
## Appendix A:

### List of Energy Storage Engagements Underway 2018-2019

<table>
<thead>
<tr>
<th>Organization</th>
<th>Engagement</th>
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<tbody>
<tr>
<td>IESO</td>
<td>Energy Storage Advisory Group (ESAG)</td>
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<td></td>
<td>Innovation and Sector Evolution</td>
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<td></td>
<td>Demand Response Working Group (DRWG)</td>
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<td></td>
<td>Market Renewal Program (MRP): Multiple Engagements</td>
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<td></td>
<td>2019 Ontario Planning Outlook (OPO)</td>
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<td></td>
<td>Bulk System Planning</td>
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<td>Grid/LDC Interoperability Committee</td>
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<td>Regional Planning</td>
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<td>Market Development Advisory Group (MDAG)</td>
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<tr>
<td>OEB</td>
<td>OEB Committee on Innovation</td>
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<td></td>
<td>Innovation Sandbox</td>
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<td>Rate Design for Commercial and Industrial Customers</td>
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<td>Net Metering Consultation</td>
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<td>Responding to Distributed Energy Resources</td>
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<td>Utility Remuneration</td>
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<tr>
<td>MENDM</td>
<td>Industrial Rate Review</td>
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<tr>
<td>LDC</td>
<td>Local Distribution System Plan (DSPs)</td>
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Appendix B:

35 Obstacles to Energy Storage identified by IESO Energy Storage Advisory Group (ESAG)

No. 1 - Lack of clarity in IESO market rules
No. 2 - Minimum size threshold for market participation
No. 3 - Storage participation in OR
No. 4 - Optimize regulation service for energy storage
No. 5 - IESO DSO
No. 6 - Application of global adjustment
No. 7 - Application of IESO uplifts
No. 8 - Application of IESO admin fee
No. 9 - Application of IESO capacity-based demand response charge
No. 10 - Application of transmission charges
No. 11 - Application of distribution charges
No. 12 - Application of gross revenue charges
No. 13 - Application of other regulatory charges
No. 14 - No clear role for energy storage in Ontario legislation and regulations
No. 15 - Energy storage definition in OEB act
No. 16 - Energy storage ineligible for IAP
No. 17 - Price signals for residential and small business customers
No. 18 - Lack of awareness of energy storage capabilities
No. 19 - Lack of clarity in OEB codes
No. 20 - Lock-down of bids/offers prior to real-time dispatch
No. 21 - No aggregation model for energy storage
No. 22 - Revenues from multiple services
No. 23 - Monetizing indirect benefits
No. 24 - Clearer framework for rate basing
No. 25 - Perceived inequity between charges applicable to rate-based assets vs. privately owned
No. 26 - Lack of clarity for energy storage interconnections
No. 27 - SCADA requirements for smaller scale energy storage
No. 28 - Lack of siting information available to third parties
No. 29 - Lack of clarity in safety and interconnection standards
No. 30 - LDCs ability to monitor signals from storage
No. 31 - Metering to become market participant is expensive
No. 32 - No clear procurement process for large scale storage resources
No. 33 - Policy certainty on ICI program
No. 34 - Better stakeholder engagement for policy changes
No. 35 - Lack of nodal / congestion pricing
Appendix C: Examples of Energy Storage Installed in Ontario

Pumped Hydro Storage
- Sir Adam Beck Pumped Generating Station, 174 MW

New Grid-Connected (IESO)
- Approximately 120 MW contracted by IESO since 2012
- 56 MW for ancillary services, demo projects since 2012
- 55 MW procured in 2017 for Regulation Service, Grid Balancing

Behind the Meter – Commercial and Industrial
- Approx 400MW
Appendix D:

Types of Energy Storage Technologies
The Voice of Leadership in Energy Storage

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Chair, Ontario Advocacy Council