



STAFF REPORT ACTION REQUIRED

Energy Storage Strategy Development

Date:	October 27, 2016
To:	Parks and Environment Committee
From:	Chief Corporate Officer
Wards:	All
Reference Number:	P:\2016\Internal Services\E&E\Pe16009e&e (AFS 23671)

SUMMARY

This report is provided as an update to the request from City Council to the Director, Environment and Energy to consult with Toronto Hydro-Electric System Limited (Toronto Hydro), and report to the Parks and Environment Committee on:

- a. The use of stored energy as a means of further reducing peak usage and reducing energy costs; and,
- b. The potential for partnerships with Toronto post-secondary institutions and private sector companies to pilot new technologies for energy storage at City facilities.

Energy storage technologies are innovative and versatile with the potential to optimize energy use, provide electrical grid stability and support climate change and resiliency. Currently the City of Toronto is host to several Toronto Hydro pilots including small scale lithium ion battery applications as well as an underwater compressed air energy storage system.

Utility scale lithium ion batteries are currently in the commercialization phase of development and are not yet financially viable. Capital costs are expected to decrease as the technology improves and obtains economies of scale. Similarly, other types of energy storage technologies including compressed air systems are at an equivalent stage of development. The city continues to evaluate the development and will incorporate them into the energy storage strategy when their effectiveness has been validated.

In consultation with Toronto Hydro and a local post-secondary institution the City proposes to develop an Energy Storage Strategy to evaluate technology options and where they might align with new and existing city programs and initiatives.

RECOMMENDATIONS

The Chief Corporate Officer recommends that:

1. The Parks and Environment Committee request the Director, Environment and Energy, in consultation with the General Manager, Economic Development, Toronto Hydro and post-secondary institutions, to report to the Parks and Environment Committee by the third quarter, 2017 on an Energy Storage Strategy for the City that:
 - a. aligns with new and existing City initiatives including resilience, greenhouse gas reduction, energy conservation and demand management, and
 - b. investigates the feasibility for partnerships and pilot projects at City Facilities; and
 - c. incorporates Toronto Hydro's energy storage initiatives.

Implementation Points

In consultation with Economic Development and Culture Division, Toronto Hydro and Ryerson University's Center for Urban Energy, City Staff have identified the need to further evaluate how Energy Storage aligns with City initiatives and develop a strategy which includes but is not limited to:

- 1) Identifying which new and existing City initiatives would align with and benefit from specific types of energy storage including integrated electricity and thermal energy systems;
- 2) Consulting with Toronto Hydro on the progress of their Energy Storage Strategy and identify synergies and/or opportunities for collaboration;
- 3) Consulting with post-secondary institutions on technology advancements and financial models for the development of future business cases;
- 4) Consulting with Economic Development and Culture Division on the feasibility of partnerships with private sector companies through the City's Green Market Acceleration Program (GMAP) to develop demonstration pilots of new energy storage technologies at City facilities.

Financial Impact

There is no financial impact resulting from the approval of this report.

Project approval is contingent upon the development of a business case demonstrating positive results and approval by the CCO or DCM/CFO.

Any future financial impacts identified in the Energy Storage Strategy will form part of a subsequent report to Council and will be included in future budget submissions for Council consideration.

Funding associated with the Energy Storage Strategy initiative will utilize recoverable debt whereby cost avoidance from reducing electricity demand during peak periods and potential revenue streams will be used by participating divisions to repay the recoverable debt.

The Deputy City Manager & Chief Financial Officer has reviewed this report and agrees with the financial impact information.

DECISION HISTORY

At its meeting on March 31, 2016 City Council adopted Staff Report PE 10.2 report entitled "Electricity Demand Response for City Facilities". City Council requested the Director, Environment and Energy, in consultation with Toronto Hydro, to report to the Parks and Environment Committee by the end of the fourth quarter 2016 on:

- a. the use of stored energy as a means of further reducing peak usage and reducing energy costs; and
- b. the potential for partnerships with Toronto post-secondary institutions and private sector companies to pilot new technologies for energy storage at City facilities.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2016.PE10.2>

ISSUE BACKGROUND

The City has committed to meeting greenhouse gas emission reduction targets and resiliency. This commitment aligns with Provincial and Federal organizations including the Ministry of Energy, the Independent Electricity System Operator (IESO), and Natural Resources Canada (NRCan) whom have also expressed their commitment for low-carbon energy solutions and the increasing use of energy storage.

High cost regulatory barriers and the unpredictability of electricity prices continue to be a barrier. Recognizing these issues the Ministry of Energy has committed to addressing the regulatory barriers that limit energy storage to compete in the Ontario energy market. Further the IESO is managing 50 MW of energy storage pilot projects that are focused on identifying the value of a number of different types of energy storage technologies and applications.

While the current costs of energy storage technology and the unpredictability of electricity prices limits the viability for meeting the City's business case criteria, industry experts predict a decline in pricing coincident with escalating electricity costs . The City's Energy Storage Strategy will focus on aligning the cost-benefit to an appropriate timeline for implementing energy storage solutions. Storage solutions to be considered may include batteries, thermal storage and compressed air energy storage.

The current costs of battery storage has declined approximately 40% over the past 5 years and are expected to continue to decline as the technology matures. Data collected through IESO and Toronto Hydro pilots will help identify opportunities to fill the value gap and improve the business case. City staff will continue to monitor progress.

COMMENTS

Energy Storage Benefits

The benefits of Energy Storage can be divided in the following three categories:

1. Customer

- Reduce demand charges for peak consumption including global adjustment costs
- Facilitate the integration of battery and thermal energy storage with district energy systems and renewable energy resources such as photovoltaic solar panels
- May provide resilient backup power in non-critical facilities

2. Distribution Utility (LDC - Local Distribution Company)

- Secure and available distributed and resilient source of electricity
- Avoid costs associated with deferral of transmission and distribution asset replacement or additions
- Improve power quality, voltage control and grid monitoring capabilities for the LDC

3. Transmission (ISO – Independent Service Operator)

- Reduce greenhouse gas emissions by enabling the IESO to reduce the activation of natural gas generators
- Provide regulation services and grid stability by helping to regulate the voltage and frequency on the power system
- Alleviate congestion on the electricity transmission system

Toronto Hydro Pilots

Toronto Hydro has taken a leading role in developing energy storage solutions including lithium ion battery systems located at the City's Roding Court Arena as well as an underwater compressed air energy storage project on Toronto Island. They are also working with Ryerson University's Centre for Urban Energy on the application of saleable battery applications. These pilot projects aim to demonstrate how energy storage can improve power quality, grid stability and allow a LDC (Local Distribution Company) to defer asset renewal.

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SIGNATURE

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