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SUMMARY REPORT OF PROCEEDINGS

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Table of Contents

1 INTRODUCTION

Purpose and Intent behind the DES conference in November of 2012:

- Once again, raise the level of awareness about both the problems and the potential solutions around the need for storage. There are new people and new organizations that can benefit.
- Review the spectrum of available 'off the shelf' technologies both local and global. The prospect of economic deployment here of what works elsewhere.
- Convergence around the most promising emerging storage technologies – most especially micro-storage – because distributed storage would be easier to develop and deploy (reduced capital investments combined with local need).
- Case studies from various developers as to how they achieved early successes in commercializing their technologies, barriers that arose, and lessons learned.
- Examination of the potential for export to other jurisdictions of technologies developed and demonstrated in Ontario.

2 CONTEXT

A scan of technology demonstration projects across Canada shows that distributed energy storage technology development is a rapidly increasing area of activity for Canada. There has been much recent attention given to the development of cost-effective energy storage technologies in Ontario. The need for successful deployment of such technologies has been highlighted by several factors that, while not individually unique to Ontario, are creating a uniquely local challenge by virtue of their combined occurrence at this point in time. While this combination of factors is creating problems for the Ontario electricity system, it may also create the opportunity for 'made in Ontario' technology solutions that could have export potential. Some of these factors are:

- The FIT program and the subsequent increase in the percentage of the generation mix that is intermittent, cannot be dispatched, and is often generated when demand is low. Energy storage could enable renewable sources to become more balanced with system demand, and could make the grid integration of distributed generation (DG) much easier.

- The push for 'smart grid' solutions in Ontario is increasing, which is increasing the appetite for a provincial smart grid strategy. A smarter grid would make more efficient use of the system including the leveling of peaks and valleys in the daily power demand curve thereby maximizing system utilization and lowering commodity cost.

- There is presently a surplus of generation capacity at night, which often leads to negative pricing during off-peak periods. This creates added costs to all ratepayers via the 'global adjustment ' and is not an efficient use of resources

- Off-peak generation is virtually emission free. Storing this energy for dispatch during times of peak demand would reduce greenhouse gases and improve urban air quality.

- LDCs in Ontario do not have a clear business incentive to adopt energy storage systems and integrate them into their distribution systems, as benefits are shared by others in the supply chain who did not contribute. Further, LDCs do not have a mandate to participate in the development of storage technologies or systems.

For these reasons, Natural Resources Canada, Ontario Centres of Excellence, the Ontario Ministry of Energy and Science Concepts International came together to sponsor an event that could build on a previous workshop held in the spring of 2008. That workshop raised awareness and began to explore potential collaborative projects that could be sponsored by the various participating agencies and companies. This current conference aimed to:

- Bring together the new people and new organizations that had entered the sector and stakeholder group since the 2008 workshop.
- Raise the level of awareness about both the problems and the potential solutions around the need for storage.
- Consider the stage of technology development of both local and global storage technologies, and the associated economic deployment opportunities domestically and locally.

- Highlight the most promising emerging storage technologies that would be easier to develop and deploy based on a combination of lower capital investments combined with local need.
- Share case studies from various developers and associations as to how they achieved early successes in commercialization, what their experiences where with barriers that arose, and what lessons were learned.
- Outline elements of strategy for export of technologies developed and demonstrated in Ontario to other jurisdictions.

3 KEY FINDINGS

There are a number of major benefits to having additional energy storage resources on the grid. However, the current value proposition of various storage technologies needs to be clarified for each target beneficiary (or customer).

- Energy arbitrage is not the key benefit – and possibly the least valuable to the system. Best practices for developing the value proposition from other electricity markets should be explored and adopted as needed. An example of a best practice would be the Energy Storage Association's (ESA) approach to engaging FERC on what resulted in Order 755 which allows for compensation based on performance. Part of the success of the approach was attributed to the ESA tailoring their data, analysis and recommendations to areas of activity to which FERC had the ability to take action.

- The value proposition for storage technologies in Ontario will be a product of the industry's ability to engage key customers, such as LDCs, and key market authorities such as the IESO, OEB and the relevant policy makers in the province in the value creation process.

Major transformational technologies are on the horizon and could be applied in Ontario.

- There are transformational opportunities to move energy storage technologies into a larger national and regional framework for management of energy resources and assets. For example, with power-to-gas technologies inexpensive off-peak electricity from low emission sources can be used to produce hydrogen, which can then be added to the natural gas mix as a form of storing energy from electricity.

While various levels of government are supporting energy storage R&D and demonstration, the overall level of activity is modest and viewed as uncoordinated between the various entities providing support.

- Various levels of government have been involved in supporting the R&DD and deployment of energy storage technologies in Canada and Ontario. There are a small number of meaningful pilot and demonstration projects underway or in the final planning phase. However, in comparison to other jurisdictions the level of activity in this area is relatively modest.

- There is sufficient innovation capacity in Ontario to help in the development and demonstration of emerging energy technology systems – most specifically in the arena of energy storage. However, there is insufficient support to accelerate the pace of commercialization activities. The energy sector R&DD efforts are largely fractionated and uncoordinated.

While demand response technologies are often seen as an alternative to energy storage, there will be room for both in the electric grid of the future.

- Both energy storage and demand management technologies are valuable tools to provide needed frequency and capacity support services to grid system operators now and in future. The evidence suggests that both are complementary and that neither is totally sufficient by itself to provide the optimal technical support services that will be needed as smart grid systems are developed and deployed.

The landscape in Ontario provides fertile ground for the development of this new industry.

- There is a small but growing 'proto-cluster' of small and medium companies in Ontario that are active in developing both energy storage and energy management systems and services. This technology sub- sector appears to be a key niche for Ontario economic development associated with the broader emergence of smart grid imperatives.

- The Ontario developers of energy storage systems are having difficulty in finding local customers for their products. This has an impact, not only on the domestic market, but also on the industry's ability to export technologies. Local customers could be engaged throughout the innovation process and be used to validate and market Ontario products to international customers.

Market reforms will be required in order to facilitate both the introduction of energy storage technologies in Ontario and the growth of the industry's export capabilities.

- Energy storage is less a technical issue and more a contracting and policy issue. Advancing pilot projects that provide an opportunity to engage the planning bodies such as the OPA and operating bodies such as the IESO would do more than the current approach to technology demonstrations. Incremental distributed and scalable projects are required to encourage the market development required for storage technologies to grow.

- The electricity market in Ontario does not have an easy entry for support service suppliers such as energy storage systems. The value provided by the fast ramp rates from storage systems would greatly benefit the system via frequency support, flexible interruptible loads and spinning reserve.

- The multiple values provided by energy storage are distributed throughout the electricity system in such a way as to make it difficult to collect them into an uncomplicated business case. Often the least value is provided to the highest investor – often the LDCs.

- LDCs are given few incentives to invest in storage technologies, and have no mandate to participate in local technology development. Allowance to include the capital investment in the rate base is often not granted until well after the fact – and often not at all.

Entities in Canada and Ontario are making efforts to help realize this potential.

- The Ontario Energy Board has been made aware of the disincentives and regulatory barriers that presently exist to deploying energy storage solutions in this province. There are efforts and activities under the Renewed Regulatory Framework for Electricity that are intended to address such problems.

- The Clean Energy Institute of Ontario – presently in the early design stages- may become an effective mechanism for gathering together the key stakeholders in the energy storage area, and assisting in collaborative efforts to move forward with commercialization.

- There are several major agencies in Canada and Ontario involved in assisting LDCs to adopt emerging energy storage technologies via co-funding partnerships for R&DD or pilot installations. These would include SDTC, NRCan, the Ontario Ministry of Energy, MaRs, OCE, and HydroOne.

- There are also several Ontario electricity agencies that can – through regulation, legislation, market design or RFP/contract mechanisms – enhance and accelerate the adoption of economically promising DES technologies. These would include the OEB, the OPA, the IESO, HydroOne (and other progressive LDCs) and to some extent the Smart Grid Forum.

4 RECOMMENDATIONS

The bulk of the conversation at this conference focused on aspects of market development required for distributed storage technologies and smart grid technologies in general. The challenge issued to the industry and industry stakeholders was to get past technology demonstrations to scaled market experiments and deployments. A number of measures could help further advance prospects or energy storage. In order to sustain the momentum being created in Ontario, it is recommended:

- That the various levels of government ministries and agencies supporting development of energy storage technologies increase the effort to coordinate their activities into an effective industrial commercialization support chain.

- That more effort is put into making the broader benefits of energy storage more easily understood by those who advance the adoption of green energy solutions.

- That resources be re-deployed to energy storage insofar as it can become a key solution to many existing problems in the electricity sector such as the persistent surplus of base load power, the intermittency of renewable generation and the need for smarter management of grid assets.

- That government decision makers determine the importance of encouraging the emergence of this new technology as an energy technology sub-sector of smart grid in Ontario – and work collectively with the key agencies to removing barriers to optimal economic deployment.

- That the agencies – primarily the OEB, the OPA and the IESO – work to establish electricity market mechanisms that capture the system benefits of energy storage, which could be used to justify the capital investments by developers and implementers of such systems.

- That the multiple benefits of commercializing energy storage be identified, both for local deployments and for export to other electricity markets.

5 CONCLUDING STATEMENTS

It is hoped that the key findings and recommendations from this conference will provide some food for thought and guidance to energy sector stakeholders – especially in the realm of policy, value chain and economic opportunity. In addition, barriers to successful development, demonstration and deployment of storage technologies have been identified and will require specific attention by all parties.

The author wishes to thank the members of the planning committee who helped to shape the framework of what became a very successful and meaningful conference event:

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FINAL DISCLAIMER NOTE: These summary notes will attempt to transcribe the key elements of both the verbal and the visual presentations of each of the key presenters and panelists. Since this is a report of event proceedings and not a white paper or a consultant study, the author takes no responsibility for any actions arising from the reading of this report – be they project activities, capital investments or policy implementations.