

Ontario Smart Grid Forum: Report Back from the WORKING GROUP

Tuesday, August 9th, 2011




On August 2nd the Working Group met to...

1. Review of the *Forum Recommendation Tracking Log*, version 7.0 (comments reflected in ver. 8.0)
2. Review the NIST Energy Storage Use Cases
3. Identify E.V. information requirements that Ontario's electricity sector may need from the Ministry of Transportation
4. Discuss next steps regarding Third Party Access to Smart Metering Data

Storage integration framework

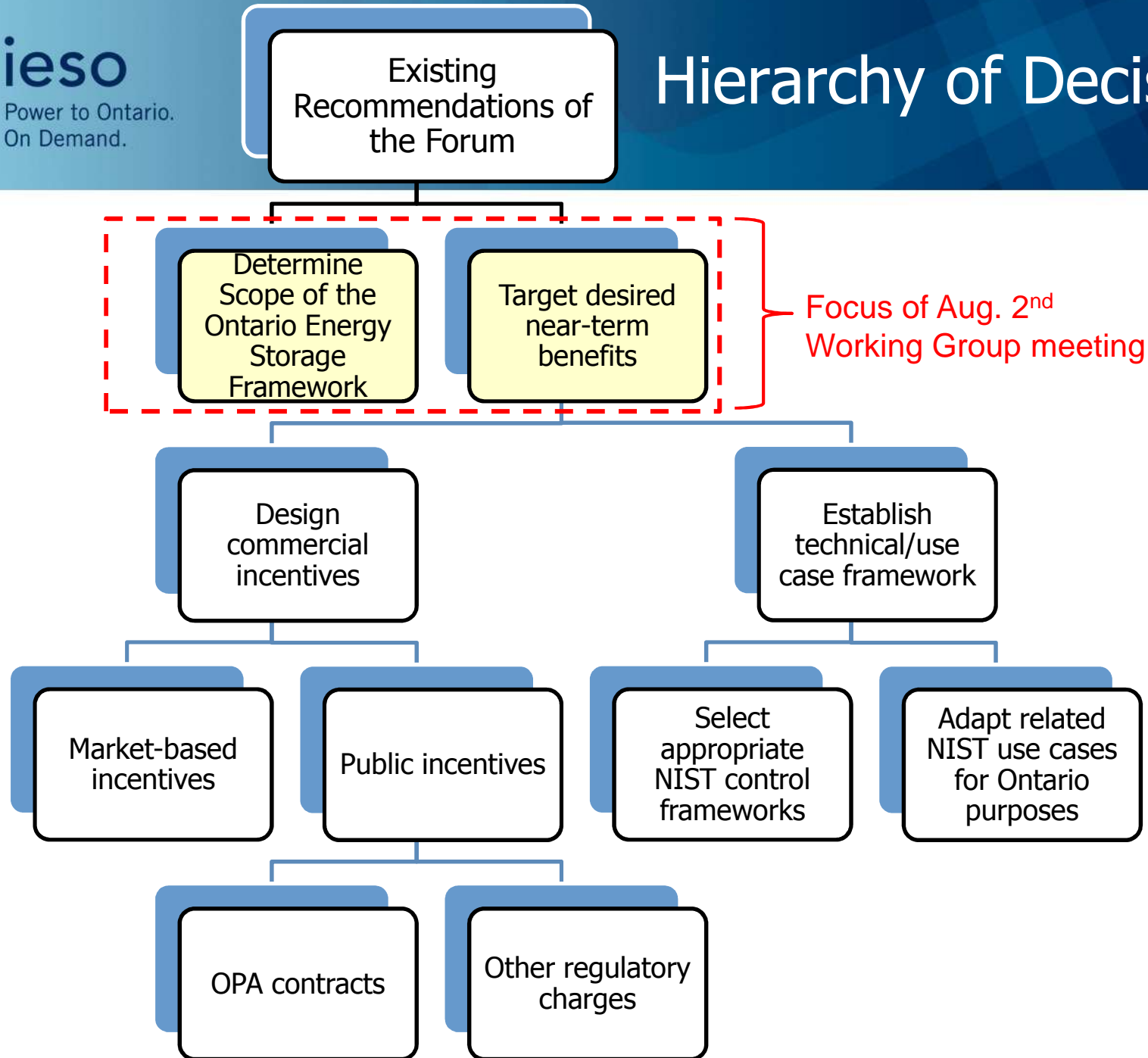
Modernizing Ontario's Electricity System: Next Steps

Second Report of the Ontario Smart Grid Forum
May 2011



“The Ontario Power Authority (OPA) and Independent Electricity System Operator (IESO), in consultation with industry and the Ontario Energy Board (OEB), should jointly develop a framework to promote the integration of distributed energy storage with the grid where it is cost-effective.”

Hierarchy of Decisions

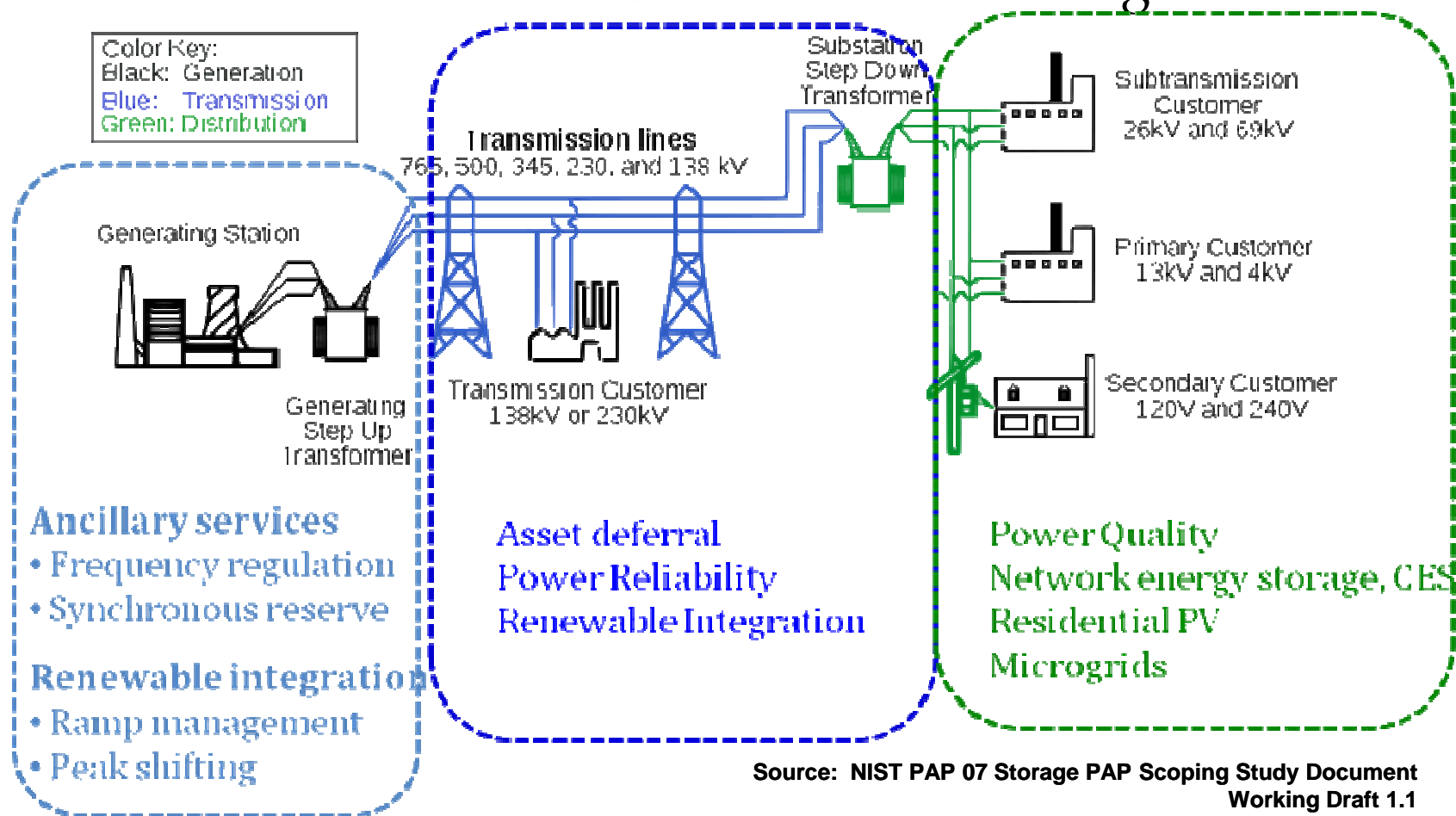


Potential storage services cited by NIST:

- “Examples of the different storage requirements for grid services include:
 - Ancillary Services – including load following, operational reserve, frequency regulation, and 15 minutes fast response.
 - Peak shaving
 - Black start, islanding
 - Renewable integration: ramp rate control, solar cloud ride thru
 - Managing diurnal cycles for wind/solar: large energy capacity, peak shift
 - Relieving congestion and constraints: short-duration (power application, stability) and long-duration (energy application, relieve thermal loading)
 - As part of microgrid”

Scope in terms of... storage benefits

- NIST scoping document also examines potential storage benefits in different domains of the smart grid:



Scale
and
usage:

Figure 2: Storage Power Requirements for Electric Power Utility Applications. (Electricity Storage Association, 2009).

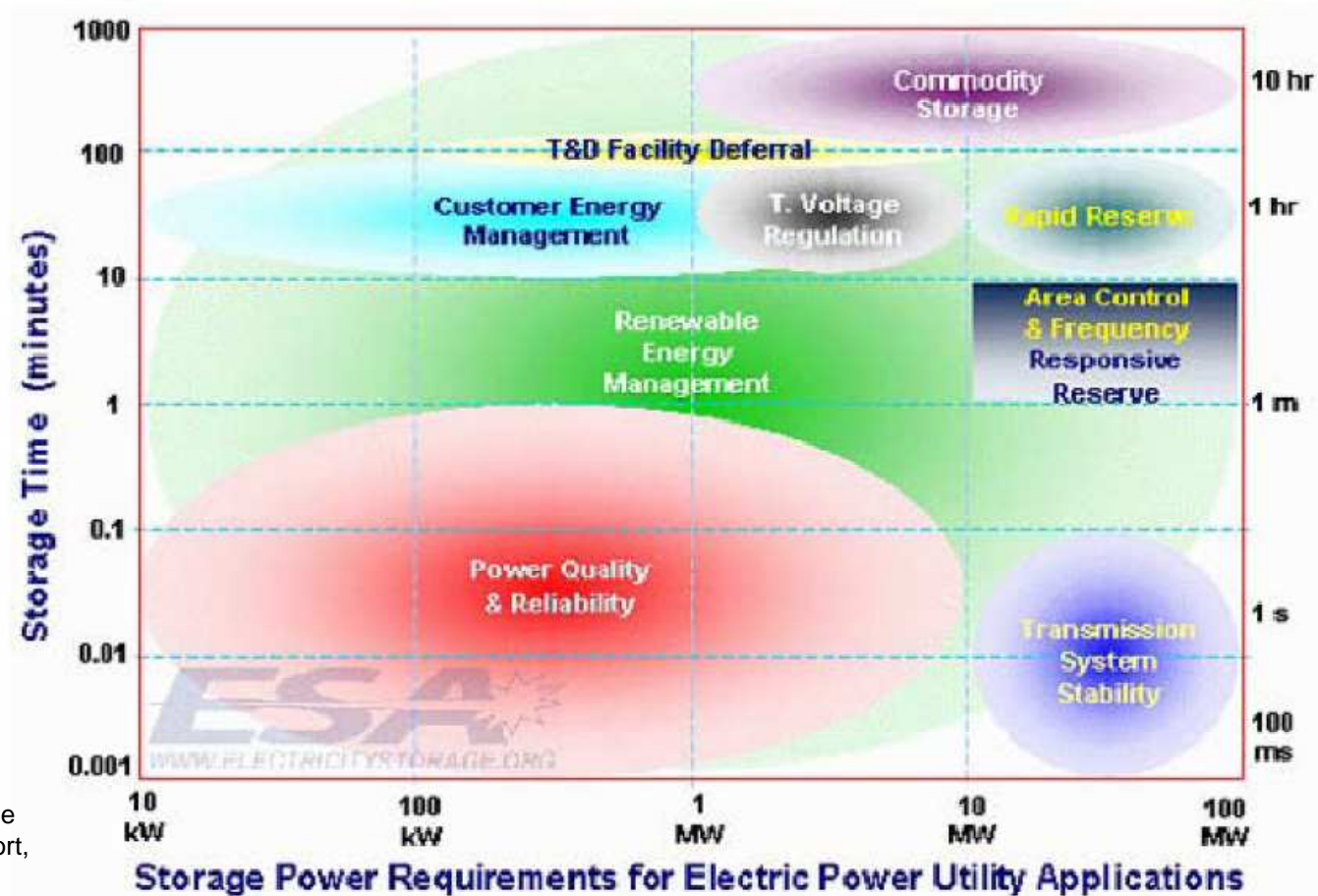


Diagram Source: Electricity Storage Association, as cited in OSEA report, "Storage Working Group Briefing Paper" December 2010

Types of Storage (identified by NIST PAP 07):

Chemical

- Hydrogen
- Biofuels
- Liquid nitrogen
- Oxy-hydrogen
- Hydrogen peroxide

Biological

- Starch
- Glycogen

Electrochemical

- Batteries
- Flow batteries
- Fuel cells

Electrical

- Capacitor
- Super capacitor
- Superconducting magnetic energy storage (SMES)

Mechanical

- Compressed air energy storage (CAES)
- Flywheel energy storage
- Hydraulic accumulator
- Hydroelectric energy storage
- Spring
- Gravitational potential energy (device)

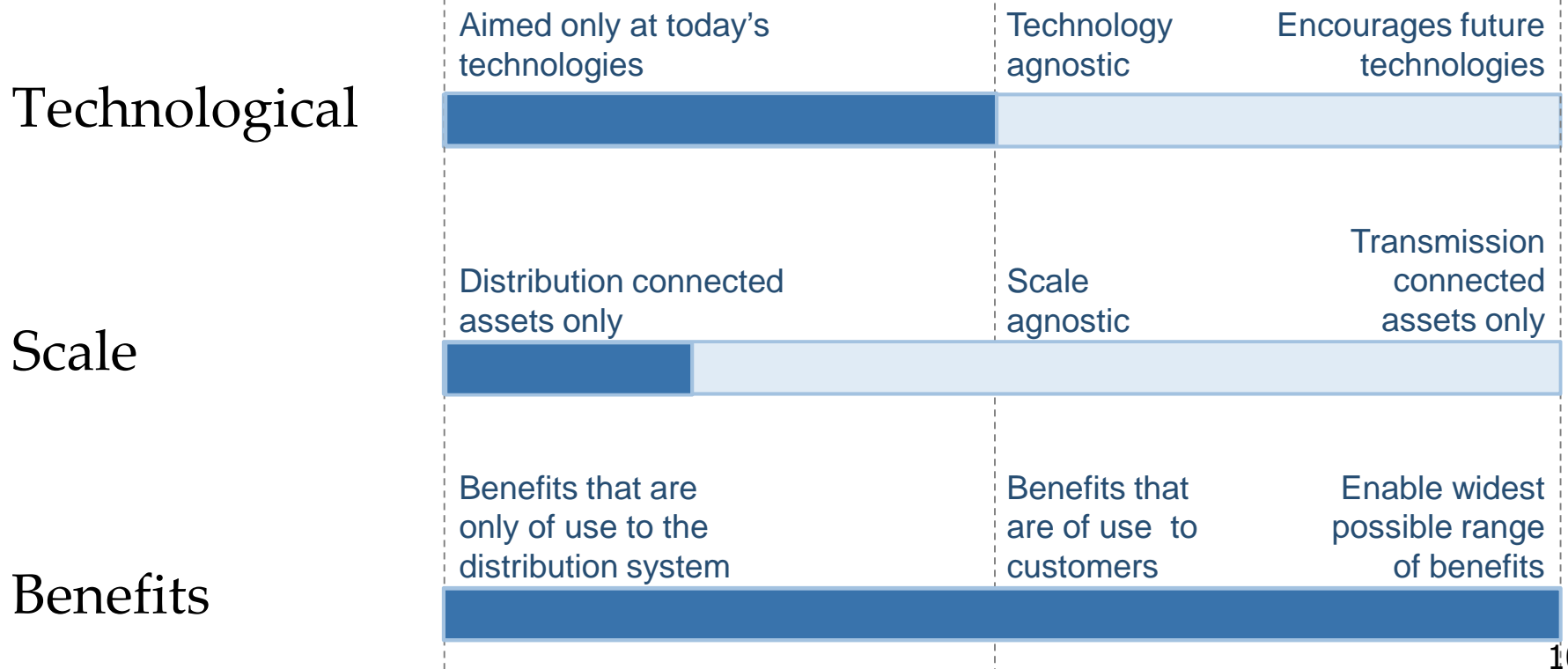
Thermal

- Ice Storage
- Molten salt
- Cryogenic liquid air or nitrogen
- Seasonal thermal store
- Solar pond
- Hot bricks
- Steam accumulator
- Fireless locomotive
- Eutectic system
- Fuel Conservation storage

Working Group Recommendation: Storage Framework Scope

The Working Group recommends the near-term framework should be agnostic to technology, put an emphasis on distribution-connected storage to begin with, and targets a wide range of benefits...

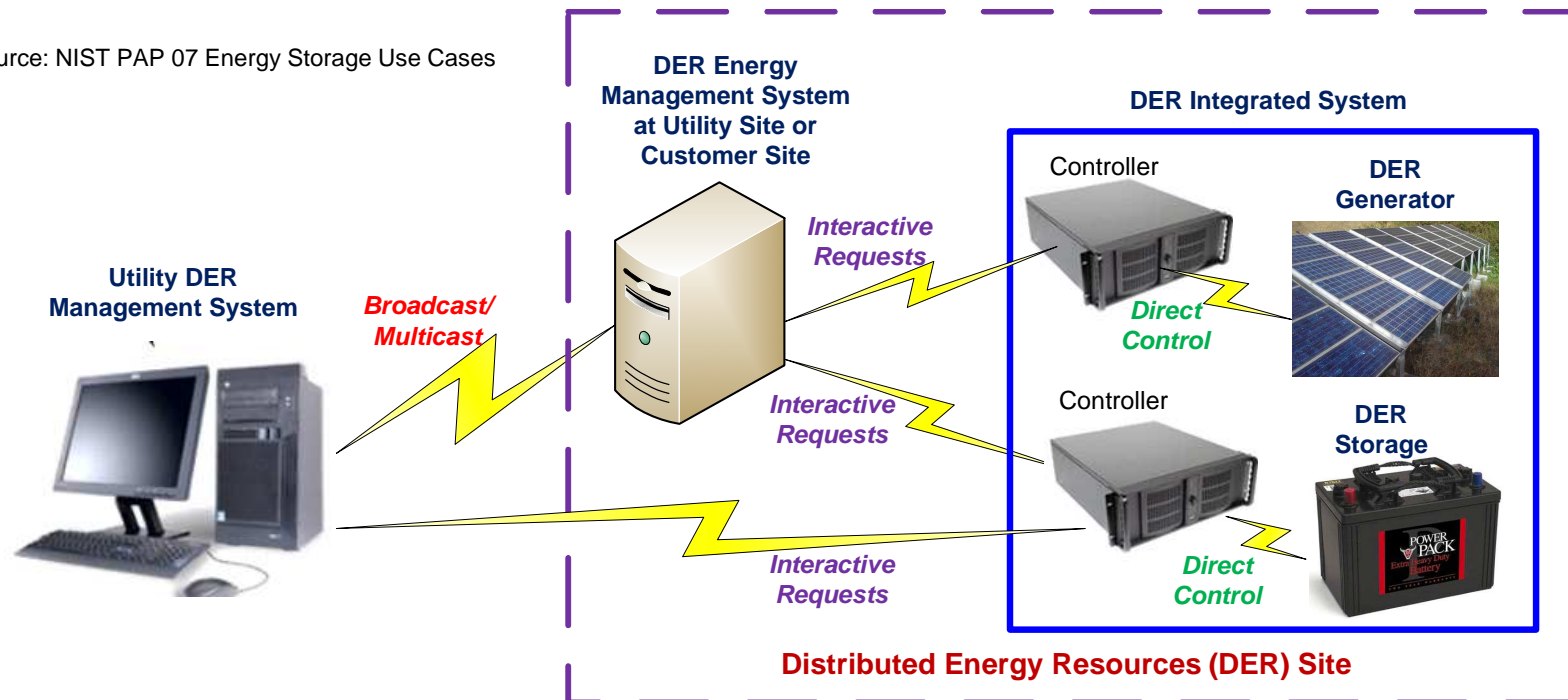
Recommended Scope Dimensions:



3 main types of use case interactions

1. Direct management by a ES-DER controller
2. Interactive management of ES-DER controllers
3. Broadcasting or multicasting to specific types/sizes/regions of ES-
DER inverters

Diagram Source: NIST PAP 07 Energy Storage Use Cases



3 main types of use case interactions

1. Direct management by a ES-DER controller :

- Localized, tightly-coupled control of the ES-DER device by its controller/inverter
- May or may not be fully automated
- Commands may originate from a building system or utility, but the controller issues the detailed commands to the storage device itself.

2. Interactive management of ES-DER controllers

- Loosely-couple control of the ES-DER device by its controller/inverter
- Commands may originate from a utility, ISO/RTO, third party, or the storage asset owner
- Well suited for energy market and electric vehicle interactions involving aggregators
- Supports Bulk Deployment, Resource-Specific Deployment, and Self Deployment

3. Broadcasting or multicasting to specific types/sizes/regions of ES- DER inverters

- Also well suited for energy market and electric vehicle interactions involving aggregators
- Well suited for price responsive events
- Well suited for distribution systems with a wide proliferation of distributed energy resources

NIST storage uses cases in summary:

- NIST Use Cases explore a variety of control arrangements including customers, LDCs, third parties and the ISO/RTO. Some of these arrangements are likely more suitable to different types of technologies and services than others.
- They address key issues that are of particular interest to the Forum (and its recommendations) including:
 - Role of Aggregators
 - Exploiting the reliability benefits of PEVs
 - Exploiting the reliability benefits of smart grid technologies and offsetting the variability of supply from renewables and managing power quality issues.

Possible components of an Ontario Storage Framework (?)

8 Layers of Interoperability

Economic/Regulatory Policy

- Green Energy Act
- OEB Codes and Guidelines

Business Objectives

- IESO Market Rules
- FIT/MicroFIT Program design

Business Procedures

- OPA contractual terms

Business Context

- IESO market manuals
- Ancillary Services Contracts

Semantic Understanding

- Object models: IEC 61850
- Application protocols: Web services, XML-based, ANSI C12.22, DNP3, MMS

Syntactic interoperability

- Transport layers: Internet, GPRS, AMI network, private network

Network Interoperability

- Storage Interconnection: IEEE 1547

Basic Connectivity Interoperability

- Safety codes and regulations

Q.: What aspects of designing commercial incentives for storage can the Working Group start on?

- Power Quality and reliability incentives as they apply to the distribution system were of particular interest to the Working Group.

Q.: What is the right venue to adapt the NIST Use Cases for practical use in Ontario?

- At some point, it was felt that the technical aspects of the framework will need some degree of regulatory endorsement
- Some members felt the OPA could be a crucial referee in this area if it holds contracts with storage asset owners.

Electric Vehicle Information Requirements

Electric Vehicle Recommendations in recent Ontario Smart Grid Forum Report:

1. “The Ontario Ministry of Transportation should track the registration of electric vehicles and ensure that necessary information is provided to the electricity industry in a meaningful and timely manner. Where necessary, legislation and regulatory changes that facilitate this information exchange and protect consumer privacy should be made.”
2. “The source of accurate and timely information about the installation of Level 2 and higher charging stations should be identified and made available to assure the safe and reliable operation of LDC networks. The Forum will work with the automotive and electricity sectors to identify and recommend the appropriate parties and mechanisms for supplying this information.”



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MINISTRY OF TRANSPORTATION

- Authority to licence & register all vehicles in the province
- '1 in 20 by 2020'
- Incentive programs for E.V. Purchases:
 - \$5,000 for a 4 kWh battery to \$8,500 for a battery of 17kWh or more.
 - Low speed vehicles (LSVs) are not eligible.
- Green licence plates, giving drivers access to the province's high occupancy vehicle (HOV) lanes, even with only one person in the vehicle
- Access to public recharging facilities at GO stations and other Ontario government parking lots

Current information Framework:

- OEM manufacturers have to provide information about E.V. Characteristics to the Ministry though only a limited amount of information is collected
- All road vehicles in Ontario must be registered
- E.V. Owners may apply for the incentive program, at which point they disclose certain details about the vehicle.
- General requirements to record vehicle sales, change of address, etc.

Ministry of Transportation Form: *Electric Vehicle Incentive Program Application Form* (Lessees, purchasers and their agents):

Section A: Applicant Information

Section B: Leased Vehicle Information (info. about the Lessor)

Section C: Agency Authorization

Section D: Vehicle Information

Section E: Incentive Claim amount

Section F: Declaration/Consent

Section G: Survey

Section H: Freedom of Information Disclaimer

Ministry of Transportation Form: *Electric Vehicle Incentive Program Application Form* (Lessees, purchasers and their agents):

Section A: Applicant Information

- May be an individual or legal entity
- **Address**

Section D: Vehicle Information

- Make, model and year
- Unique identifiers: VIN and Licence Plate
- Number of cylinders
- **Battery size (kWh)**
- Fuel type

Ministry of Transportation Form: *Electric Vehicle Incentive Program Application Form* (Lessees, purchasers and their agents):



Potential Barrier (?):

Section H: Freedom of Information Disclaimer:

*“Your personal information is being collected for the Electric Vehicle Incentive Program established under subsection 118(2) of the Public Transportation and Highway Improvement Act and **will be used solely for the purpose of administering the program.**”*

- What level of geographic granularity is required for **Electric Vehicle** Information?
 - The working group felt that individual addresses would be preferable, though there could still be some use for aggregated information.
- Is the Ministry of Transportation collecting adequately detailed information about the E.V.'s themselves to be of use to the electricity sector ?
 - No concerns raised in this area, though charging station information was seen as the more important data series by far... and this isn't collected by the Ministry....

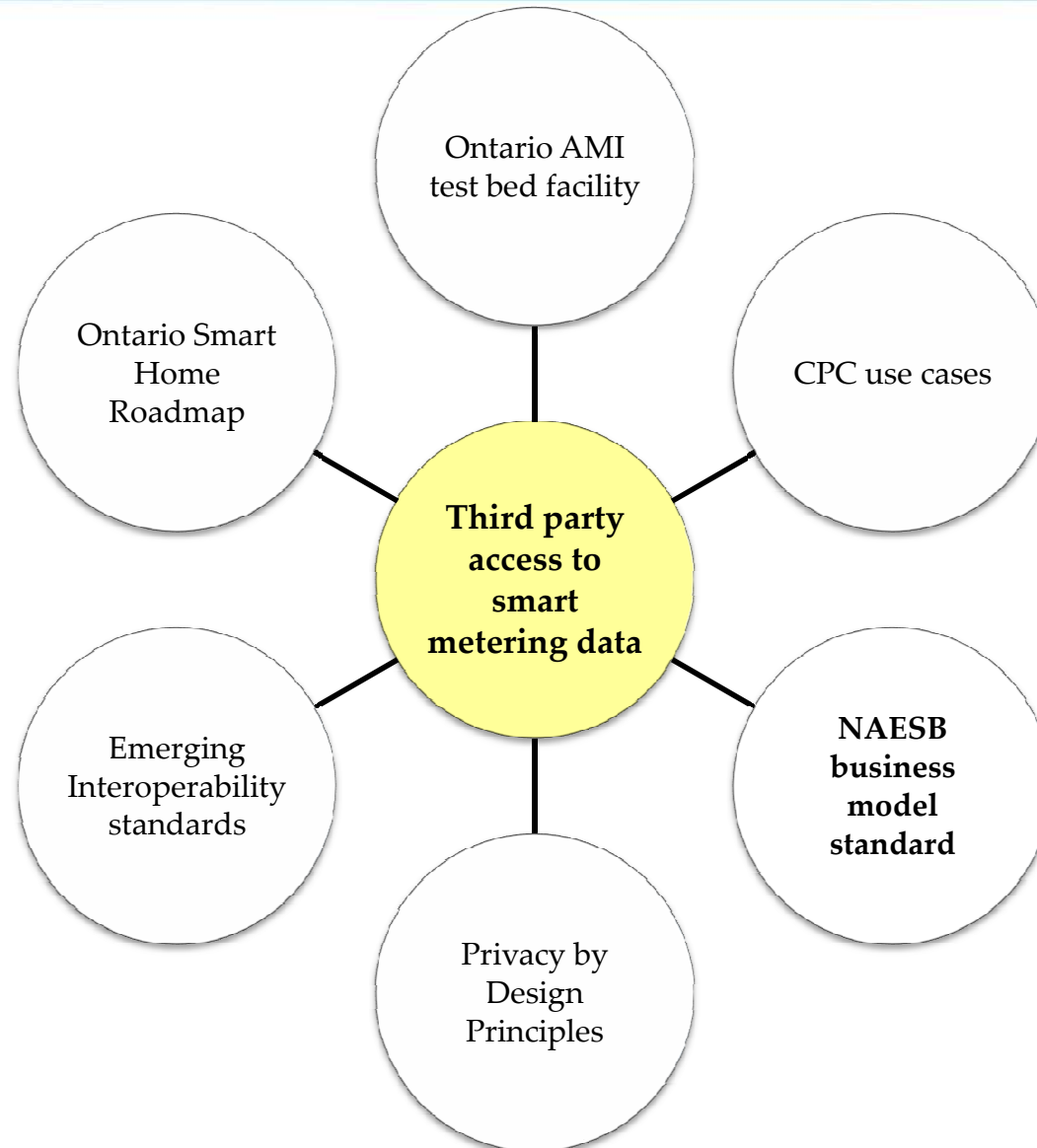
- Assuming the use of E.V. information by the electricity sector can be made allowable, is the electricity sector able to handle it? e.g.:
 - Legal liability for holding personal data?
 - Information privacy safeguards?
 - Mapping address data from Ministry of Transportation to utility premise IDs?
- No concerns raised by Working Group members.

Charging Stations:

Who should have the onus for reporting to the LDC? Building owner? Vehicle Owner? Owner/agent of the charging station?

- Owner/agent installing the charging station seems to be the logical choice
- Requirements for reporting to the LDC should be backstopped with legal consequences for failure to do so.
- In this case, it was felt that LDCs would require detailed information (particularly the level of the charging station) at the address level.
- Incentives for use of charging stations should somehow be connected to the use of the local transformer.
- Some members felt the LDC should own/install the charging units, though this was **not** a unanimous opinion of the Group.

Third Party Access to Smart Metering Data



- The Working Group reported on the NAESB standard, *“Request No.: R10012 Third Party Access to Smart Meter-based Information”*
 - Seen as directionally-consistent with Ontario’s “Privacy by Design” Principles
 - Needs to some be made be applicable to unlicensed third parties in order to be effective.

Is there further activity that can be undertaken by the Working Group at this time?

- Further develop an possible implementation framework for the NAESB model?
- Request the regulator to examine the issue?
- Joint meeting with the Corporate Partners Committee to discuss the matter further?

The Working Group felt it was nearing the end of what it can contribute to this issue on its own. A suggestion for a 'next step' might be a meeting of LDC billing/regulatory and customer service experts to examine the NAESB framework, though the right facilitator is important as well. Here, the OEB was raised as a possibility.

Thank you.