

# Ontario Smart Grid Forum: Meeting Support Presentation (all agenda items)

Tuesday, September 6<sup>th</sup>, 2011



1. Minutes of previous meetings
2. Review of Forum Recommendation Tracking Log, version 8.1
3. Report back form the working group
  1. Continued development of energy storage framework
  2. Emerging Smart Grid architecture framework
4. Recent Ministry of Energy electric vehicle announcements
5. Upcoming smart grid events
6. Roundtable update by Forum members

- **FINAL June 21<sup>st</sup> minutes:**
  - no further comments received.
  - Recommended as **FINAL**
- **DRAFT August 9<sup>th</sup> minutes** circulated for review.
  - Recommended comment deadline: Tues., Sept. 13<sup>th</sup>

## Forum Recommendation Tracking Log

Version 8.1 (dated, August 16th, 2011)

### Most Recent Changes:

- August 9<sup>th</sup> Forum meeting.
- No further changes proposed by CPC or Working Group at this time.

### For confirmation today:

- Five recommendations from 2009 Forum Report previously identified for **DELETION** (see table 4 starting on page 31)

## Report back from Working Group


The Working Group recently met to discuss two major topics:

1. Target benefits for the Ontario Storage Integration Framework
2. Emerging architecture considerations for the Smart Grid

# Ontario Storage Framework Recall: The Recommendation

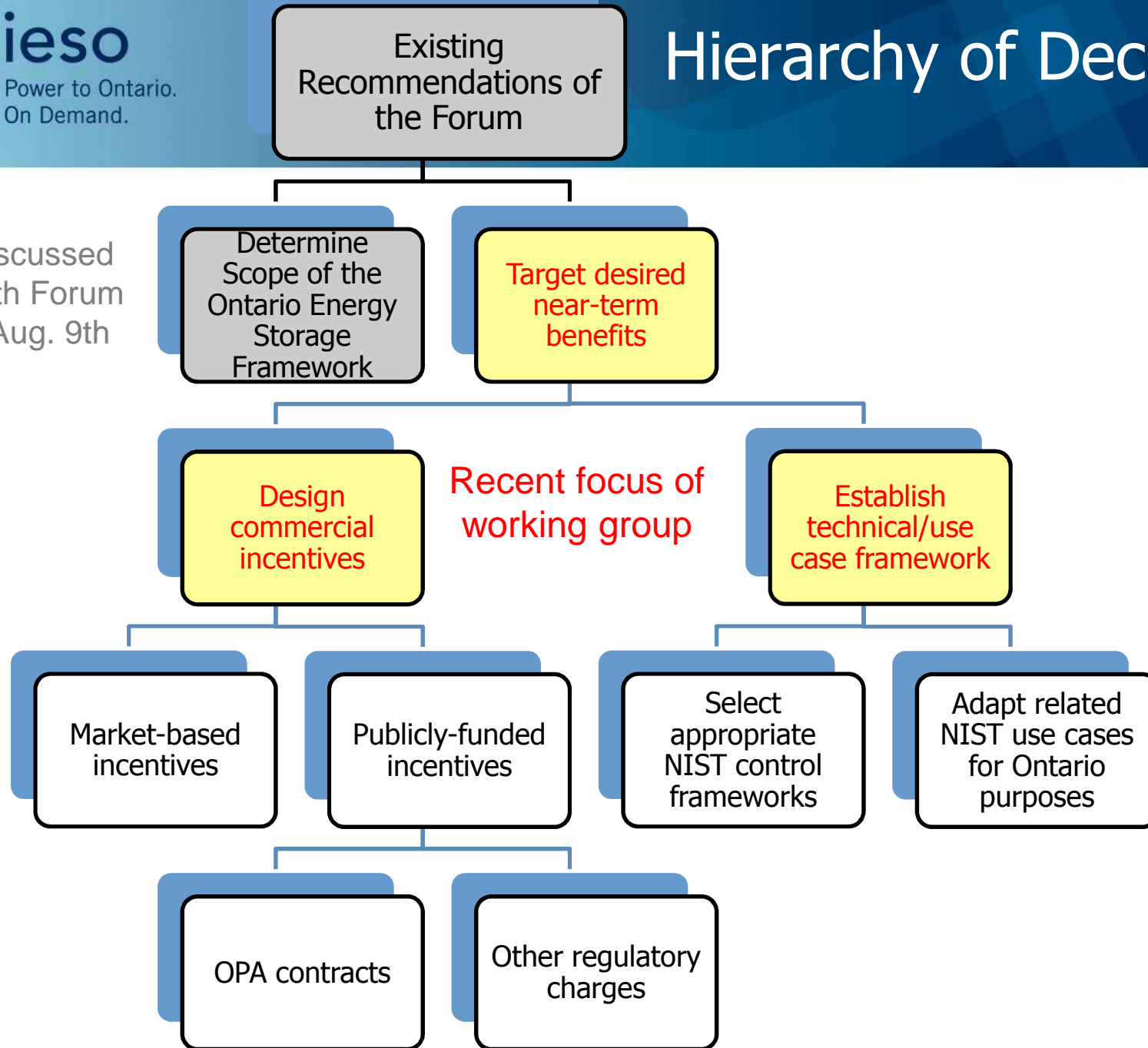
## Modernizing Ontario's Electricity System: Next Steps

Second Report of the Ontario Smart Grid Forum  
May 2011


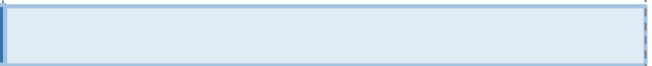

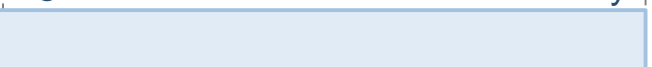

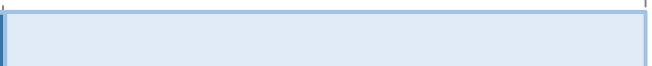


*“The Ontario Power Authority (OPA) and Independent Electricity System Operator (IESO), in consultation with industry and the Ontario Energy Board (OEB), should jointly develop a framework to promote the integration of distributed energy storage with the grid where it is cost-effective.”*

Discussed  
with Forum  
– Aug. 9th

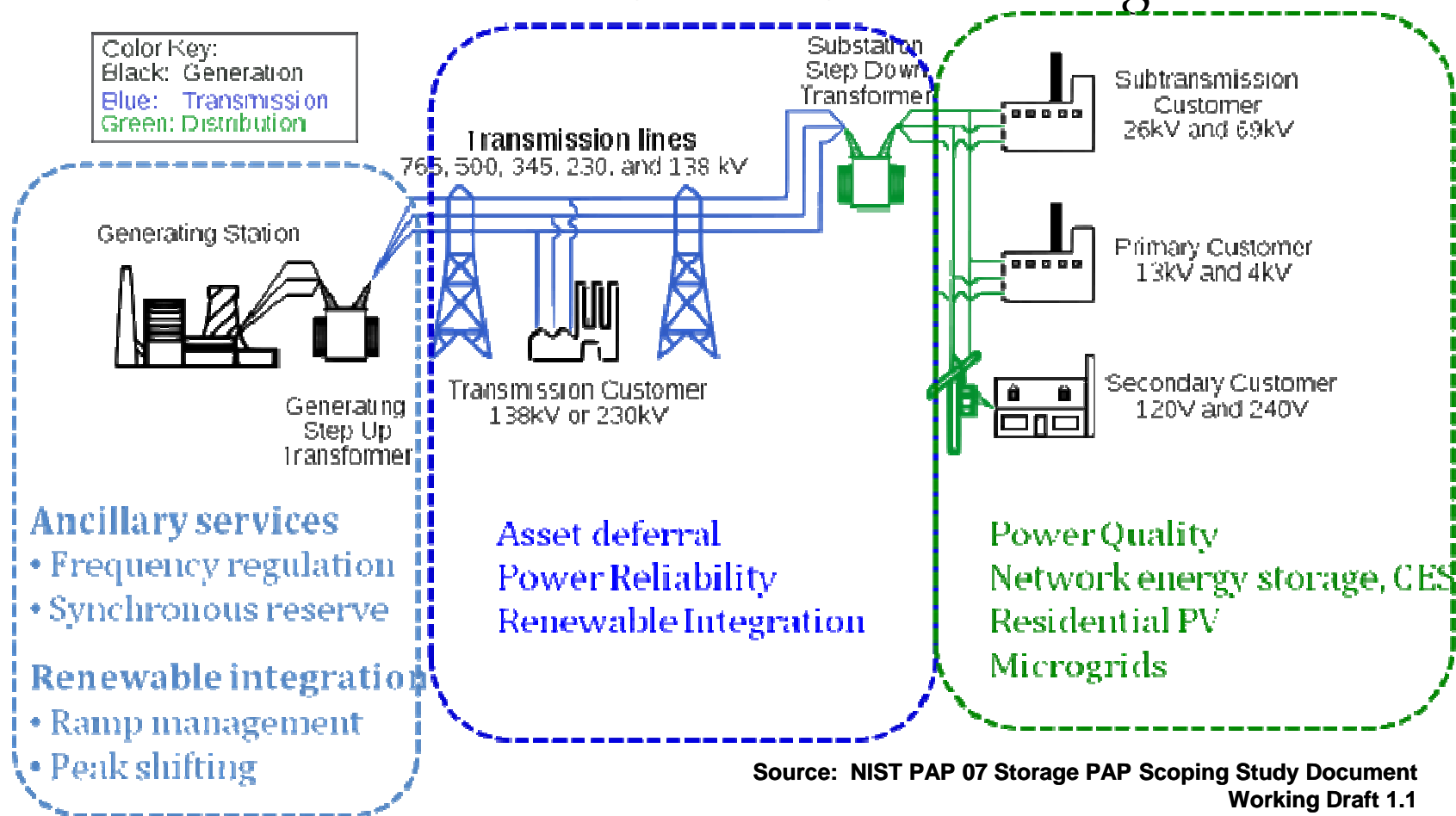


## Scope Dimensions:

<h3>Technological</h3>	<p>Aimed only at today's technologies</p> 	<p>Technology agnostic</p>	<p>Encourages future technologies</p> 
<h3>Scale</h3>	<p>Distribution connected assets only</p> 	<p>Scale agnostic</p>	<p>Transmission connected assets only</p> 
<h3>Services</h3>	<p>Services that are only of use to the distribution system</p> 	<p>Enable widest possible range of services</p>	<p>Services that are only of use to customers</p> 

# Recall: NIST's view of potential storage benefits

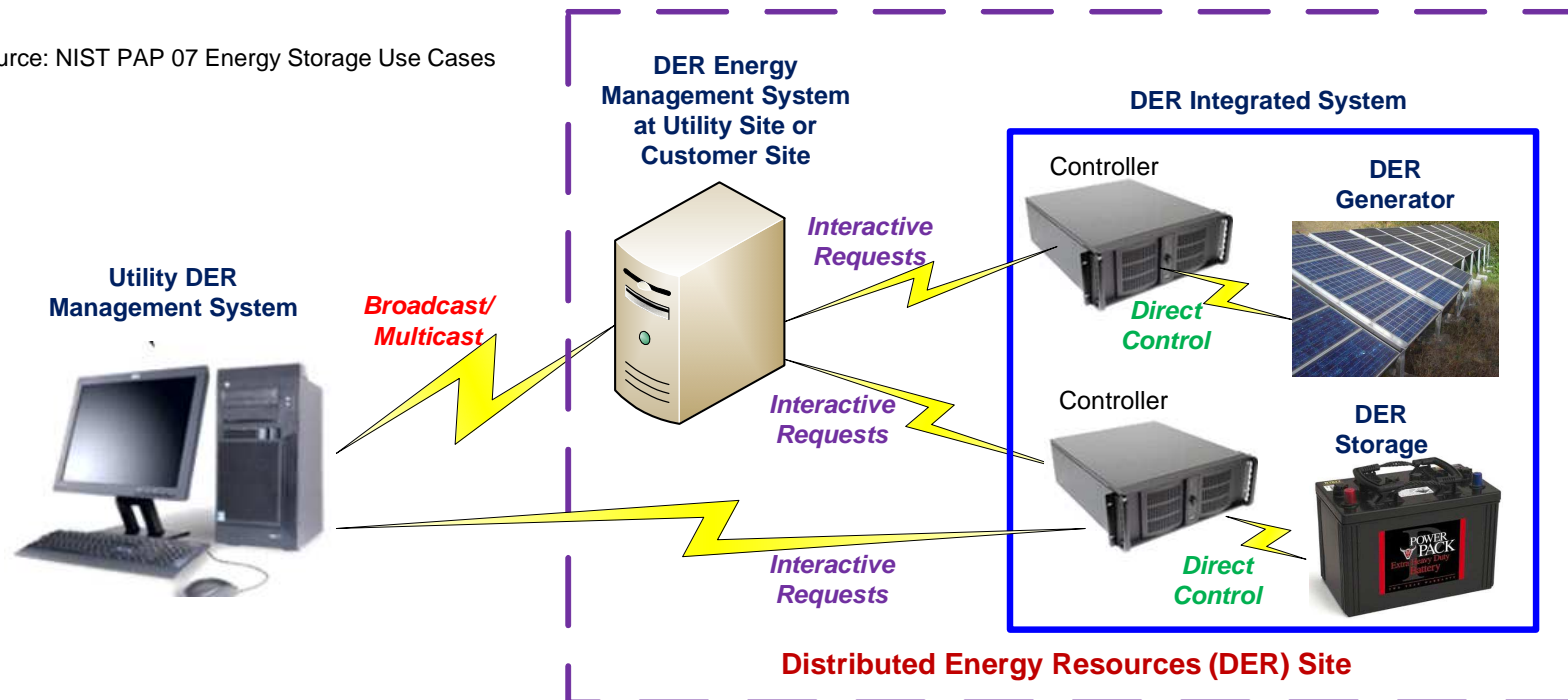
- NIST scoping document examines potential storage benefits in different domains of the smart grid:



## 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



# Targeting various benefits for the Ontario Storage Framework

The working group has begun a process of...

1. Identifying target benefits for the energy storage framework, including which parties those benefits might accrue to.
2. Identifying high-priority benefit areas
3. Mapping desired benefits to the applicable NIST use cases where applicable
4. Examining potential organizational responsibilities for linking benefits with the appropriate incentives based upon today's jurisdictional boundaries.

# Benefits and Use Cases of Interest

Accrual Category	General type of Benefit	Specific Benefits	NIST Use Cases
Utility	Ancillary Services and Reliability	• Load following	3.3.2 Electric Storage Use Case: RTO/ISO Dispatches Electric Storage to Meet Power Demand
		• operating reserve	3.2 ISO/RTO Management of ES-DER (via service provider) <ul style="list-style-type: none"> <li>• Enrollment &amp; Qualification</li> <li>• Scheduling &amp; Award Notification</li> <li>• Deployment &amp; Real-Time Communications</li> <li>• Measurement &amp; Performance</li> </ul>
		• 15 minutes fast response	4.2.3 Use Case: Secondary DA Functions – Automated Distribution Systems with Significant Distributed Energy Resources (DER)

# Benefits and Use Cases of Interest

Accrual Category	General type of Benefit	Specific Benefits	NIST Use Cases
Utility	Power Quality  <b>Working Group High Priority</b>	<ul style="list-style-type: none"> <li>• Frequency</li> <li>• Regulation</li> </ul>	3.3.4 Use Cases: Distribution Var Management 3.3.5 Use Cases: Distribution Energy Management 4.3.1 Use Case: Volt/Var Optimization: Energy Conservation Mode 4.3.2 Use Case: Emergency Override: Maximum Var Support Mode 4.3.3 Use Case: Static Var Mode 4.3.4 VAR Mode PV4: Passive Mode

# Benefits and Use Cases of Interest

Accrual Category	General type of Benefit	Specific Benefits	NIST Use Cases
Utility	Reliability	<ul style="list-style-type: none"> <li>• Black start</li> </ul>	{needs further investigation}
	<b>Working Group Lowest Priority</b>	<ul style="list-style-type: none"> <li>• Islanding</li> </ul>	3.3.3 Utility Dispatches Electric Storage to Support Intentional Islanding
Utility	Asset deferral	<ul style="list-style-type: none"> <li>• Peak shaving</li> </ul>	4.1.1 Use Case: Electric Vehicle Load Management
	<b>Working Group High Priority</b>	<ul style="list-style-type: none"> <li>• Relieving congestion and constraints:               <ul style="list-style-type: none"> <li>• short-duration (power application, stability) and</li> <li>• long-duration (energy application, relieve thermal loading)</li> </ul> </li> </ul>	4.1.2 Use Case: PEV Participates in Utility Events

# Benefits and Use Cases of Interest

Accrual Category	General type of Benefit	Specific Benefits	NIST Use Cases
Utility	Renewable Integration  <b>Working Group High Priority</b>	•ramp rate control	4.3.1 Use Case: Volt/Var Optimization: Energy Conservation Mode 4.3.2 Use Case: Emergency Override: Maximum Var Support Mode 4.3.3 Use Case: Static Var Mode 4.3.4 VAR Mode PV4: Passive Mode
		•solar cloud ride-through	3.1.6 Use Case: Electric Storage Provides Fast Voltage Sag Correction
		•Wind variability ride-through	4.3.1 Use Case: Volt/Var Optimization: Energy Conservation Mode 4.3.2 Use Case: Emergency Override: Maximum Var Support Mode 4.3.3 Use Case: Static Var Mode 4.3.4 VAR Mode PV4: Passive Mode
		•Managing diurnal cycles for wind/solar: large energy capacity, peak shift	4.2.4 Use Case: Short-Term DER Generation and Storage Impact Studies

# Benefits and Use Cases of Interest

Accrual Category	General type of Benefit	Specific Benefits	NIST Use Cases
Customer	Microgrid facilitation	•Enable capabilities of micro grid	{needs further investigation}
Customer, Utility, & Service Providers	Distributed Generation facilitation	•Enable integration of distributed generation and optimize its use through the utilization of storage.	2.1.1 Distributed Resources (LV Generation) Domain

# Benefits and Use Cases of Interest

Accrual Category	General type of Benefit	Specific Benefits	NIST Use Cases
Customer, Utility, & Service Providers	Price arbitrage	•Participate in a demand response program	3.2 ISO/RTO Management of ES- DER (via service provider) <ul style="list-style-type: none"> <li>•Enrollment &amp; Qualification</li> <li>•Scheduling &amp; Award Notification</li> <li>•Deployment &amp; Real-Time Communications</li> <li>•Measurement &amp; Performance</li> </ul>
		•Participate in the Ontario electricity market (directly or through an aggregator)	3.1.1 Use Case: Energy Storage (ES) Owners Store Energy from the Power System 3.1.2 Use Case: Energy Storage (ES) Owners Discharge Energy into the Power System
		•localized optimisation	3.1.5 Use Case: HAN Business Processes Involving Customer Energy Management

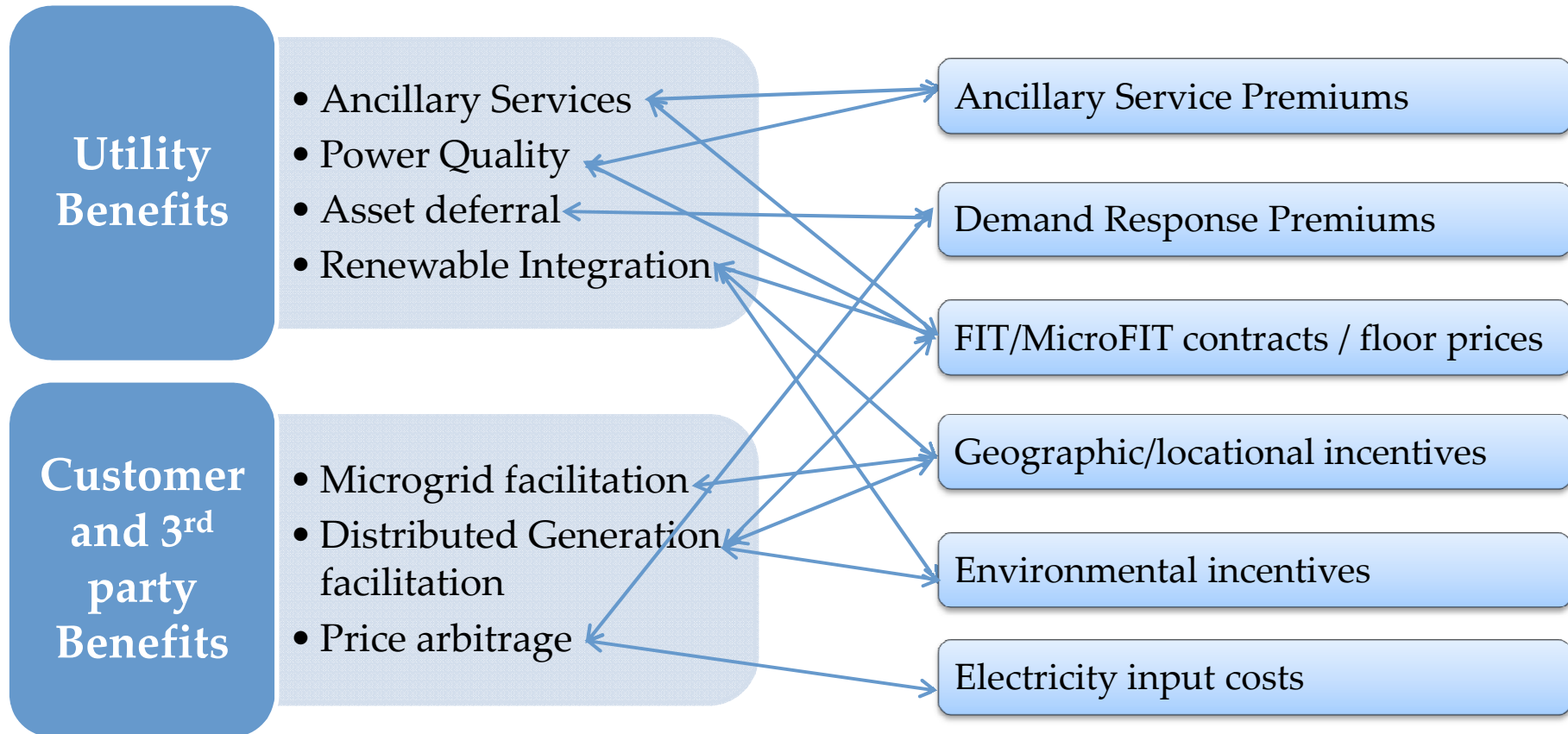
# Benefits and Use Cases of Interest

Accrual Category	General type of Benefit	Specific Benefits	NIST Use Cases
Utility, Customer, & 3 <sup>rd</sup> party service providers	Electric Vehicle utilisation	•Provide ancillary Services	<ul style="list-style-type: none"> <li>•2.1.2 Use Case: Storage for Load Following at EV Charging Stations</li> <li>•4.1.2 Use Case: PEV Participates in Utility Events</li> </ul>
		•Optimize charging cycles	3.1.8 Use Case: PEV as Storage Scenario

# Storage benefits, incentives and the relationships between them

## Target Benefit Categories:

## Potential Incentives:



# Potential Organizational Responsibilities for linking incentives with desired benefits.

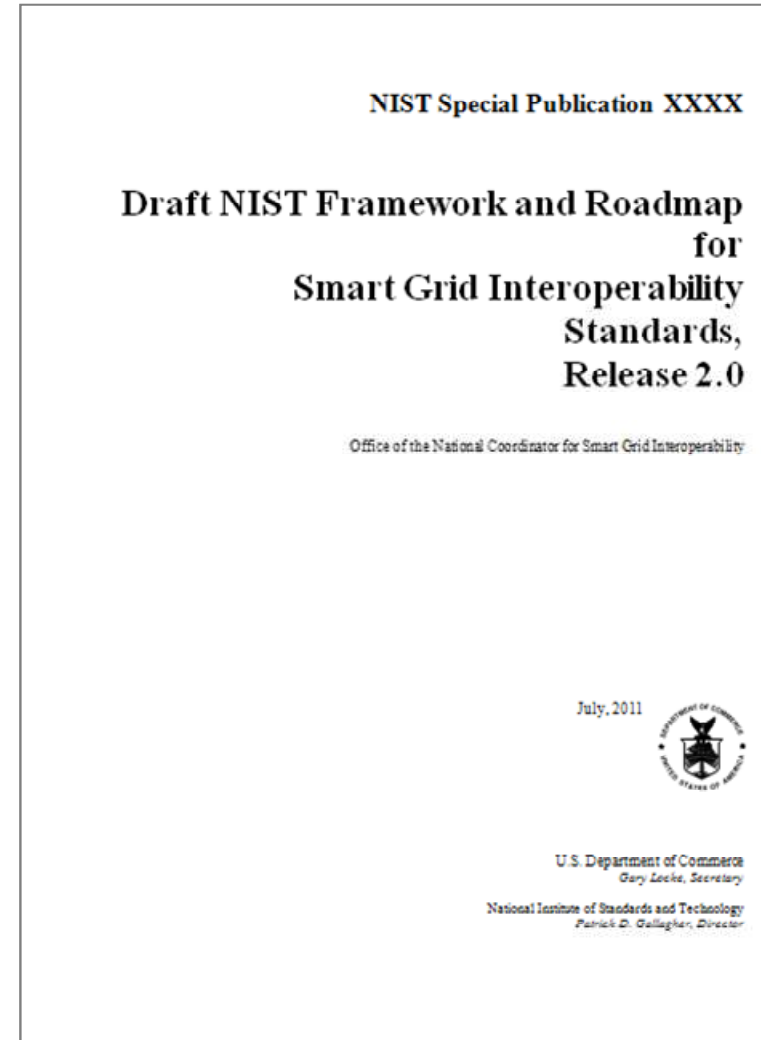
Incentives:		Ancillary Service Premiums	Demand Response Premiums	FIT/ MicroFIT Contracts/ Floor prices	Geographic/ locational incentives	Enviro. incentives	Electricity input costs
<b>Utility Benefits</b>	Ancillary Services	OPA, IESO, LDCs	n/a	OPA	n/a	n/a	n/a
	Power Quality	OPA, IESO, LDCs	n/a	OPA	n/a	n/a	n/a
	Asset deferral	n/a	OPA LDCs	n/a	n/a	n/a	n/a
	Renewable Integration	n/a	n/a	OPA	OPA, OEB, LDCs, IESO	???	n/a
<b>Customer and 3rd party Benefits</b>	Microgrid facilitation	n/a	n/a	n/a	OPA, OEB, LDCs, IESO	n/a	n/a
	Distributed Generation facilitation	n/a	n/a	OPA LDCs	OPA, OEB, LDCs, IESO	???	n/a
	Price arbitrage	n/a	OPA, OEB LDCs	n/a	n/a	n/a	IESO OEB

## Other, general comments raised at the Working Group meeting:

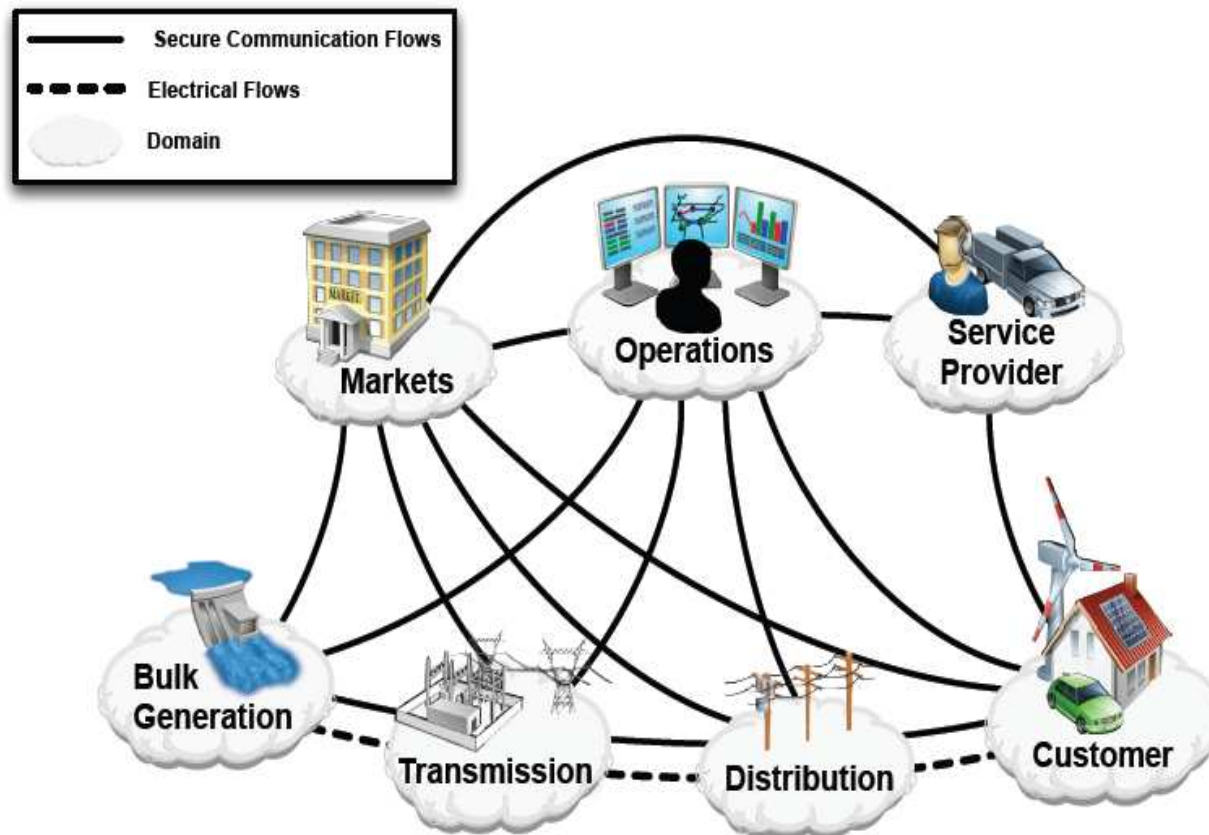
- Power quality and enabling distributed, renewable generation are among the highest priority benefits that should be targeted by storage framework
- Any public subsidies/contracts for storage assets should consider an equivalency of treatment test for similar types of subsidies/contracts for generation.
- Input energy costs for storage may be a special case similar to *station service* load in the IESO-administered markets, and warrants further economic analysis.

## Working Group's examination of the NIST\* Architecture Framework

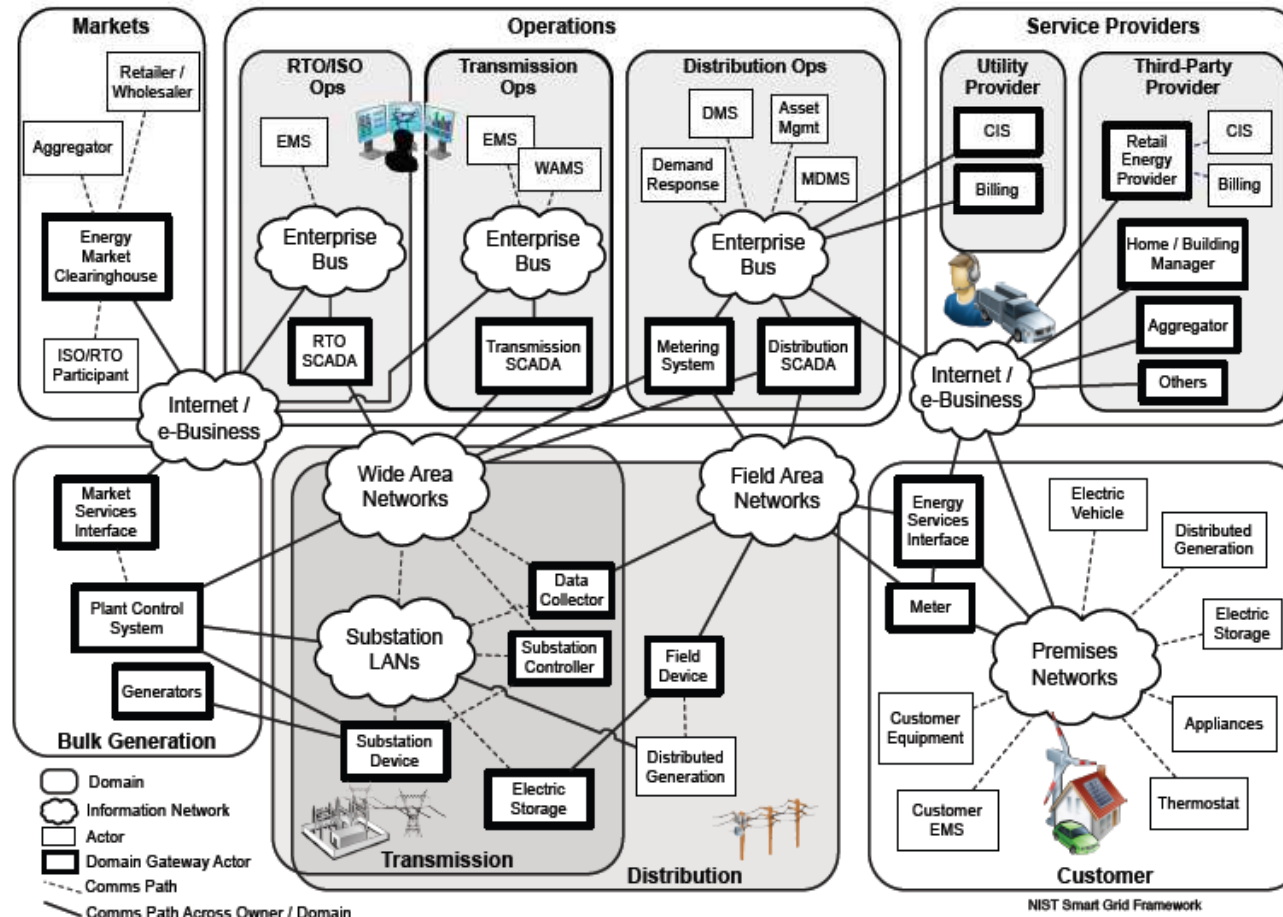
- Release 2.0 of the NIST framework is a highly-anticipated upcoming development on the interoperability front in the near future.
- Draft version has been on the NIST website since July.
- Corporate Partners Committee is also developing an architectural vision for future review by the Forum.
- **Of particular interest to the Working Group:** The NIST framework contemplates a defined meeting point with between utility systems and those of third parties...



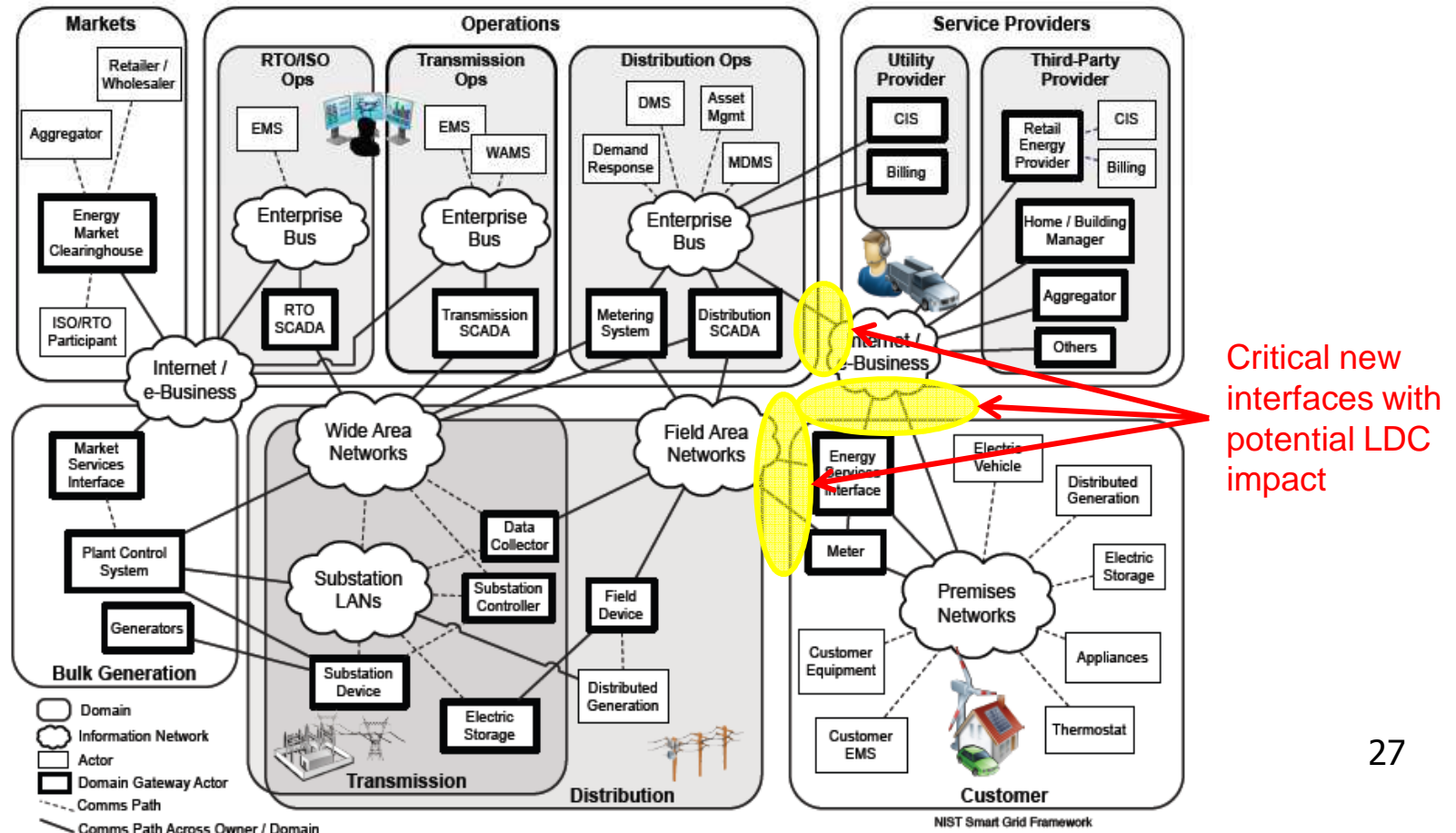
At a high level, the conceptual model of the smart grid in draft 2.0 remains unchanged...



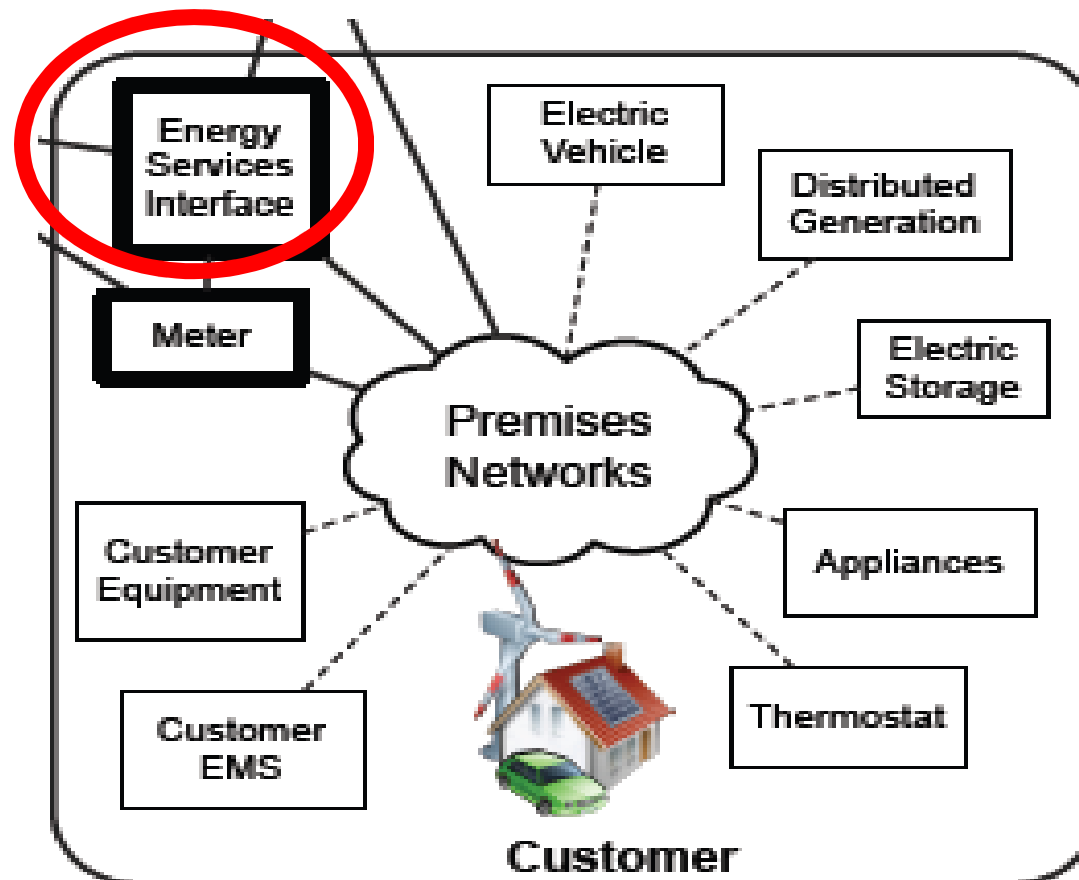
Within each domain, the major system artefacts originally portrayed in version 1.0 of the roadmap also remain unchanged...



Key interfaces between utility and 3<sup>rd</sup> party systems have already been emerging over the past 2 years...



Of ongoing interest to the Forum and the CPC, is what NIST refers to as the “Energy Services Interface (ESI)”



## Key concept of the ESI:

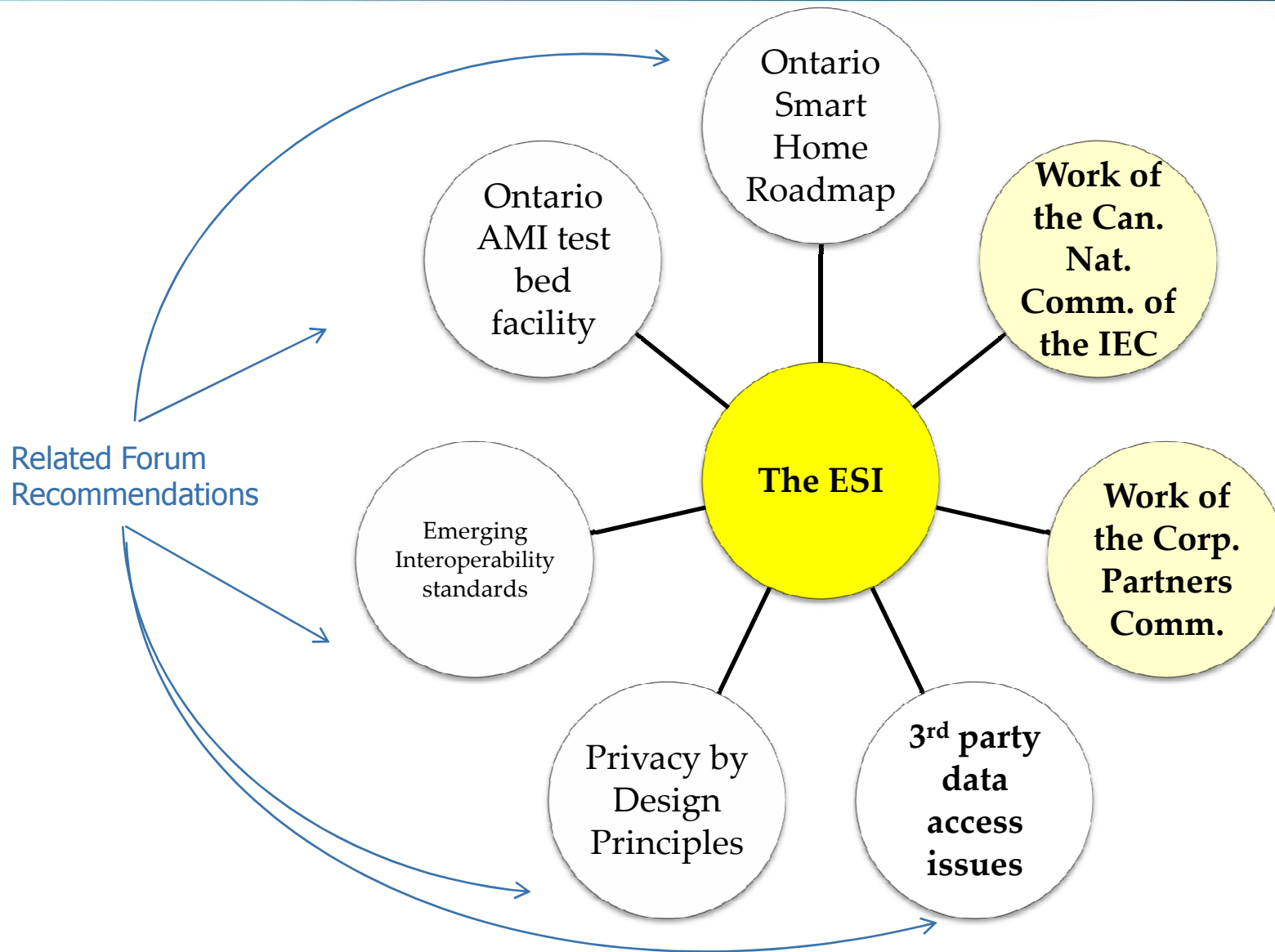
- *“The ESI serves as the information management gateway through which the Customer domain interacts with energy service providers. The service provider may be an electric utility, but that is not necessarily the case”*

Source: Draft NIST Framework and Roadmap for Smart Grid  
Interoperability Standards, Release 2.0

## SGF Working Group Observation:

- In Ontario, the ESI must always include the LDC at a minimum, and possibly, other parties **in addition to** the LDC.

# ESI tie-ins with Ontario issues:



- “The meter and the ESI have very different characteristics and functions. The **logical** separation of the meter and the ESI is a very important, forward-looking aspect of the reference model.”
- “To avoid undue expense and complexity for the consumer, the ESI should be able to communicate with Smart Grid-enabled appliances either with or without a separate data network in the home, and such communication should be “plug and play” and “auto-configuring,” requiring no technical expertise.”

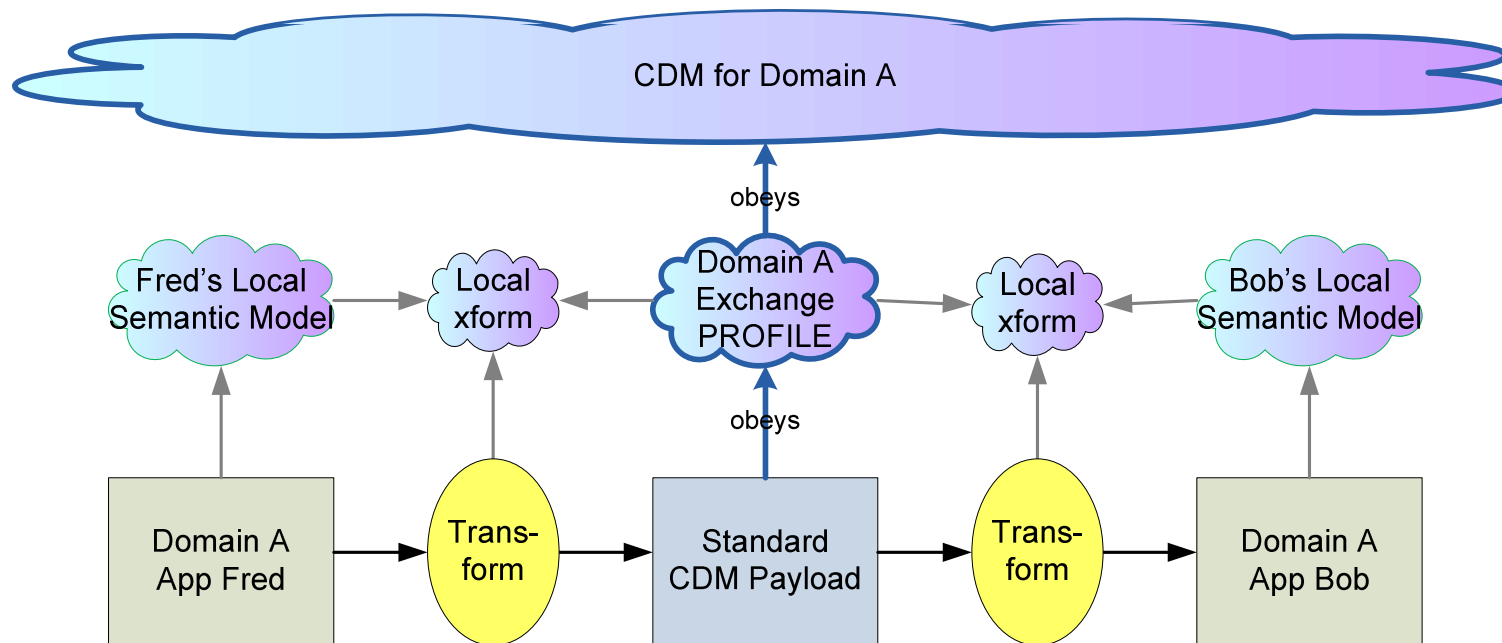
- “To minimize costs while maximizing flexibility, the ESI should support, at minimum, a defined subset of widely used standard data communication protocols chosen from among those discussed in and listed in Chapter 4.”
- “Many consumers and businesses are located in multi-unit buildings. Any data communication interface supported by the ESI should be capable of coexisting with other data communications technologies that may be used in the customer premises without interfering with each other.”

## Legacy Devices and Systems (cont'd):

*“Three key goals of legacy integration and migration are:*

- 1. New systems should be designed so that legacy aspects do not unnecessarily limit future system evolution.*
- 2. A reasonable timeframe for adaptation and migration of legacy systems needs to be planned to ensure legacy investments are not prematurely stranded.*
- 3. Legacy systems should be integrated in a way that ensures security and other essential performance and functional requirements are met. “*

- Canonical Data Models (CDMs)
  - Insulate each application/domain from having to know about local semantic models



## Other, general comments raised at the Working Group meeting:

- The construct of the ESI seems like a sound starting point, but it in an Ontario context, it must be emphasized that it will **always** involve the LDC. The ESI should not become a conduit by which 3<sup>rd</sup> party service providers can sidestep the LDC to access metering data and other critical utility information.
- The ESI is the critical location where many of the Ontario Information and Privacy Commissioner’s “Privacy by Design” principles will be applied. We should consider a review by the IPC once the architecture has been further developed.

Other, general comments raised at the Working Group meeting (cont'd):

- Beyond Ontario's current challenges with proprietary AMI systems, other legacy system challenges loom on the 5-10 year horizon including distribution SCADA systems and internet interfaces with customers (e.g. meter data and billing presentment).

## Two recent government announcements

1. EV charging stations (*“Ontario Leading The Way For Electric Cars”* August 9, 2011)
2. Support for Magna (*“Ontario Plugs Into Clean Cars, Creates Over 700 Jobs”* August 29, 2011)



## Upcoming Smart Grid Events

(Up to October 11<sup>th</sup>)

# Upcoming Smart Grid Events (to October 11<sup>th</sup>)



<b>September 12-15</b>	<b>Gridweek 2011</b> Washington, DC <a href="http://www.gridweek.com/2011/">http://www.gridweek.com/2011/</a>
<b>September 15-16</b>	<b>Ontario Energy Association Annual Conference</b> Niagara Falls <a href="http://www.energyontario.ca">www.energyontario.ca</a>
<b>September 22</b>	<b>Corporate Partners Committee</b>
<b>September 27</b>	<b>SGF Working Group</b>
<b>September 26-29</b>	<b>EMC Canada "EV 2011" tradeshow</b> Toronto <a href="http://www.emc-mec.ca">www.emc-mec.ca</a>
<b>October 11<sup>th</sup></b> (NOTE DATE CHANGE)	<b>Smart Grid Forum Meeting</b>





ieso

Power to Ontario.  
On Demand.

Thank you.