

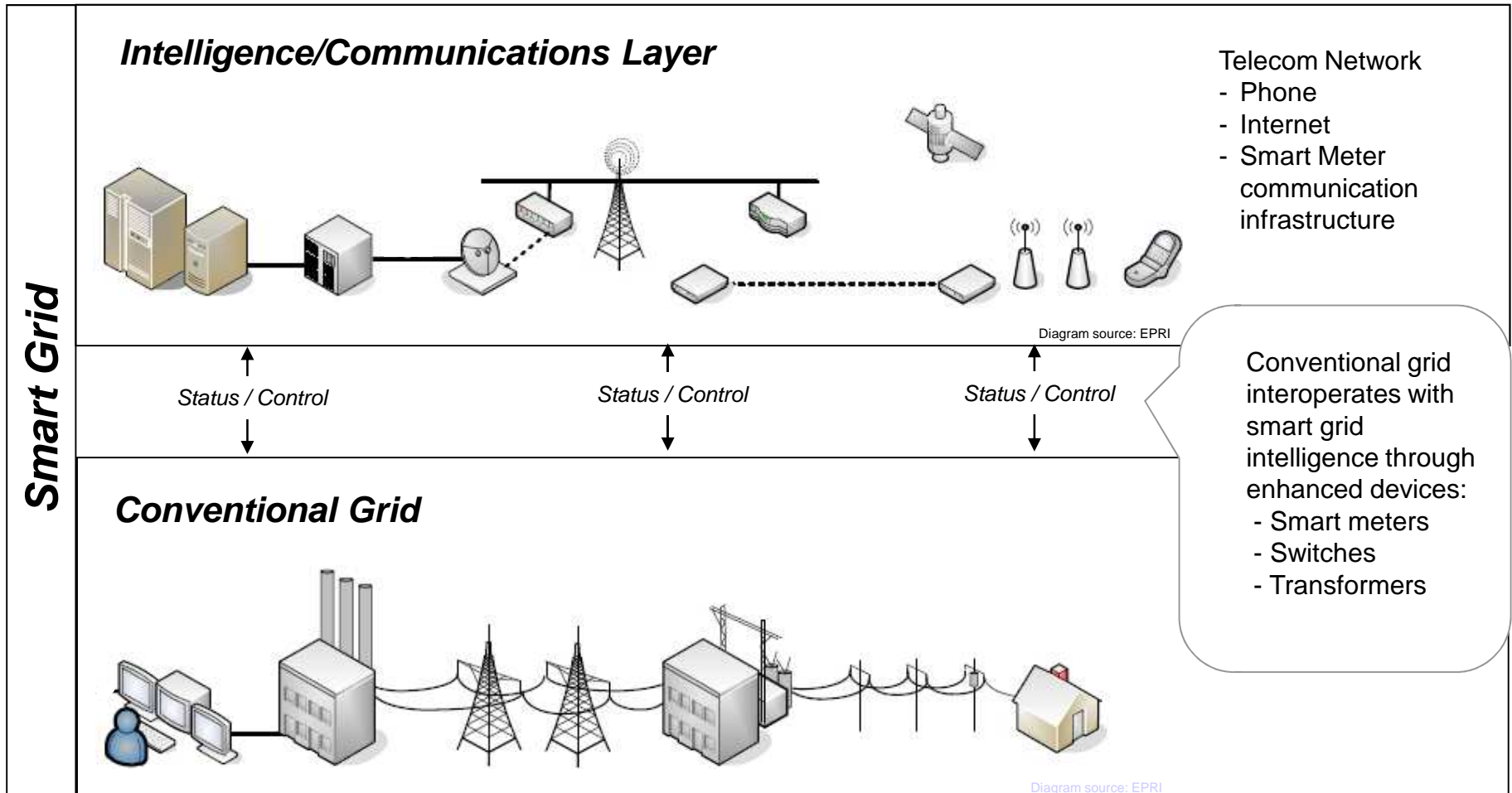


Building Ontario's Smart Grid Strategy

Smart Grid Forum

November 24, 2009

Toward a Modern Electricity System



Where are we now?

Ontario Smart Grid Forum recommendations February 2009

- A key recommendation was to facilitate smart grid development through legislation, regulation or through other policy tools

Key drivers for a smarter grid:

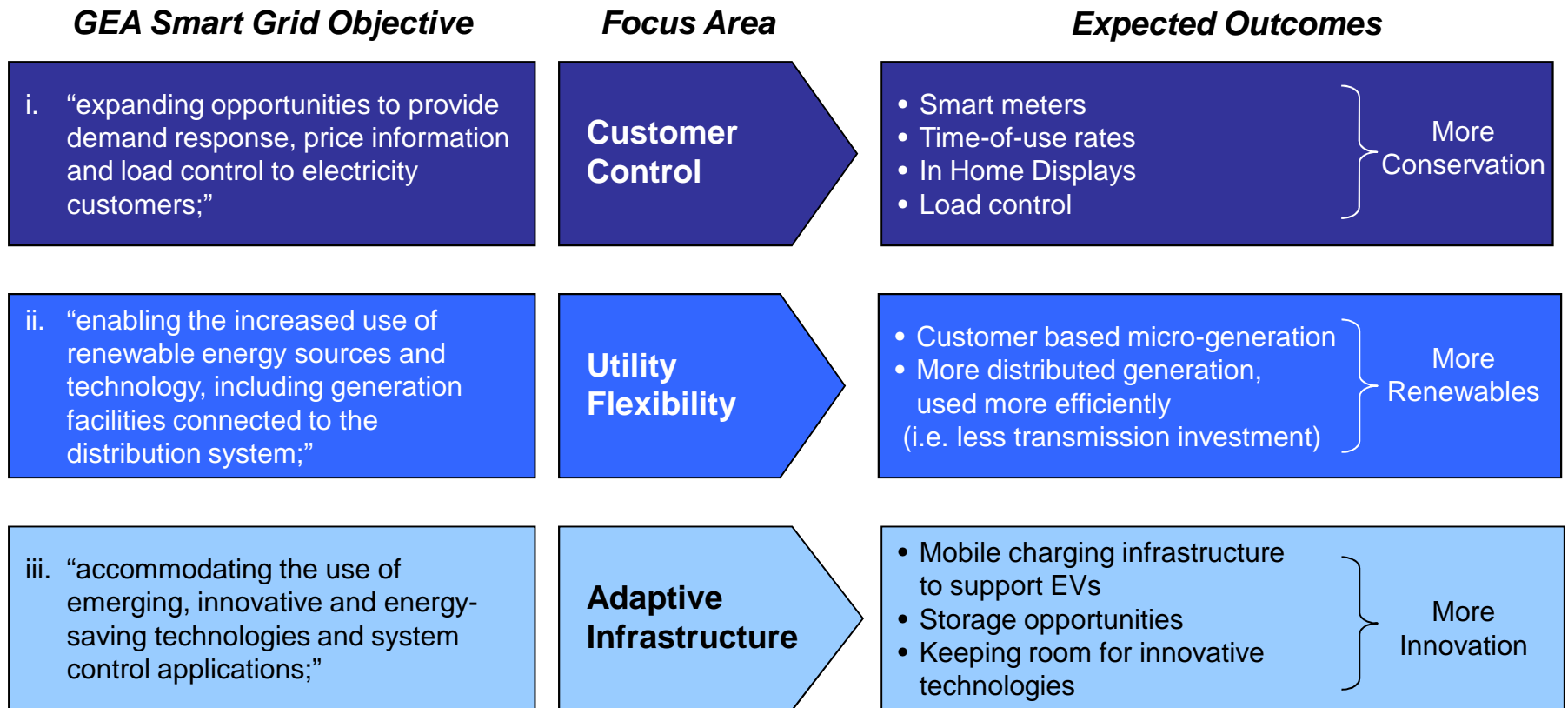
- Green Energy and Green Economy Act, 2009
- Smart Meter installations (~2.8 million to date) and clear timelines on TOU rollout
- Electric Vehicle objectives (1 in 20 by 2020)
- Aging infrastructure, particularly at distribution level

Other jurisdictions are looking at investing in a Smart Grid

- United States focus in on increased service reliability and improved security
- European Union focus is on the Smart Grid's ability to integrate distributed generation from renewable resources, given their shortage of non-renewable generation capacity (e.g., solar power in Spain)

The GEA Sets the Framework for a Smart Grid...

The GEA sets the objectives and framework for smart grid to “improve the flexibility, security, reliability, efficiency and safety” of the electricity grid.



... to Change Customer Behaviour...

GEA Smart Grid Objective

- i. "expanding opportunities to provide demand response, price information and load control to electricity customers;"

Focus Area

Customer Control

Expected Outcomes

- Smart meters
- Time-of-use rates
- In Home Displays
- Load control

More Conservation

Installation of a Smart Meter	Implementation of Time of Use Rates	Install an In Home Device	Add load control for Air Conditioning and Appliances	Give information on real-time usage to grid operator
<ul style="list-style-type: none"> ▪ Distributors get efficiencies for meter reading and can provide daily consumption data 	<ul style="list-style-type: none"> ▪ Customers have an economic driver to react to price signal ▪ Consumption and price signal are still not evident in real time, but available via internet or phone next day 	<ul style="list-style-type: none"> ▪ Includes display devices and smart thermostats ▪ Price shown in the home ▪ Provides more opportunity for Conservation. 	<ul style="list-style-type: none"> ▪ Price and other system signals like heat alerts can directly trigger load control for customers ▪ Evolution toward commercial and industrial customers. 	<ul style="list-style-type: none"> ▪ Grid operator and distributors can make better decisions on dispatch
Now	June 2011	The Future		

More opportunities for conservation and companies such as Energate, Aztec and Regen

... to Connect more Renewable Generation...

GEA Smart Grid Objective

ii. “enabling the increased use of renewable energy sources and technology, including generation facilities connected to the distribution system;”

Focus Area

Utility Flexibility

Expected Outcomes

- Customer based micro-generation
- More distributed generation, used more efficiently (i.e. less transmission investment)

More Renewables

Feed-in Tariff (FIT) and Micro FIT	Capacity Building / Demonstration Projects	Give information on real-time supply to grid operator	Large-scale distributed generation
<ul style="list-style-type: none"> ▪ Proponents have an economic incentive to build new renewable generation capacity ▪ Customers have an economic incentive to build in-home sources of generation 	<ul style="list-style-type: none"> ▪ Provides opportunities to test automation, protection, and control technologies to enable safer, more reliable integration of new renewable generation ▪ Allows for development of interoperability standards 	<ul style="list-style-type: none"> ▪ Real time monitoring and control to optimize operations, reduce costs and improve customer and generator satisfaction ▪ DGs can be back online faster after a fault 	<ul style="list-style-type: none"> ▪ Increasingly utilize in home sources of generation connected directly to distribution system ▪ Safely maximize green energy feeding into the distribution system
Now	The Future		
<p><i>More opportunities for distributed generation and companies such as Kinects, GE, and HD Supply</i></p>			

... and Support Innovative Technologies such as EVs

GEA Smart Grid Objective

iii. “accommodating the use of emerging, innovative and energy-saving technologies and system control applications;”

Focus Area

Adaptive Infrastructure

Expected Outcomes

- Mobile charging infrastructure to support EVs
- Storage opportunities
- Keeping room for innovative technologies

More Innovation

Installation of a Smart Meter and Implementation of Time of Use Rates	Premier’s EV Rebate	Capacity Building / Demonstration Projects	Charging Infrastructure in Place	Add Vehicle to Grid (V2G) control for grid operator
<ul style="list-style-type: none"> ▪ Potential communication channel for EVs to grid operators and distributors ▪ Customers have an economic driver to react to price signal 	<ul style="list-style-type: none"> ▪ Price and other incentives for purchase of EVs ▪ Signal to automotive manufacturers to accelerate introduction of EVs to marketplace 	<ul style="list-style-type: none"> ▪ Determine EV charging patterns and address technical issues ▪ Allows for development of communication and other standards ▪ Signals support for EVs 	<ul style="list-style-type: none"> ▪ Grid operator and distributors can make better decisions on dispatch and infrastructure investments to support EV loads ▪ Convenience for EV consumers – options for charging and billing 	<ul style="list-style-type: none"> ▪ Can utilize in-home or mobile sources of energy storage (EVs)
Now	July 2010	“1 in 20 by 2020” in the Future		

More opportunities for adaptive infrastructure and companies such as Better Place, GM, and Electrovaya

Focus on Jobs

The Ontario Advantage

- Ontario is a leading jurisdiction for smart meter implementation – our aggressive smart meter rollout is a key enabler to future investment in the Smart Grid.
- Ontario has a growing industry in the customer control field (e.g., in-home displays), which could create opportunities for export as the US begins to roll-out their own smart meters.

Emerging Business	<ul style="list-style-type: none"> ▪ Several Ontario companies with promising smart grid products are positioning themselves to become a cornerstone of the Green Economy. 	<ul style="list-style-type: none"> ▪ These can be nurtured by the demand created through smart grid implementation and can be further assisted through targeted funding.
Smart Grid Fund	<ul style="list-style-type: none"> ▪ The 2009 Ontario Budget of March 2009 called for “\$50 million over five years to enable the research, capital and demonstration projects necessary for the development of a smart grid in Ontario”. 	<ul style="list-style-type: none"> ▪ Funds may be leveraged with other funding programs such as those through Industry Canada and NRCAN or rate-base, or government initiatives (e.g. MRI, MEDT, NRCAN, etc.)
Capacity-building projects	<ul style="list-style-type: none"> ▪ Multiple demonstration projects are being planned, or are in progress across the province to test various aspects of the smart grid. <ul style="list-style-type: none"> ▪ e.g. Burlington Hydro – GridSmartCity project, Toronto Hydro - proposed smart grid demo, Hydro One - Smart Zone, etc. 	<ul style="list-style-type: none"> ▪ Results will inform operators on how various technologies will interact and will likely determine provincial standards for other LDCs in Ontario.

Challenges for Smart Grid development

Need for Coordination

- “Smart Grid” is a broad concept / LDCs have specific issues – many solutions are tailor-fit.
- LDCs will need direction on the objectives, priorities, and scope/costs of a provincial smart grid
- Without a clear strategy, Ontario’s smart grid will not have a common focus and may not be appropriately coordinated (e.g. common standards, procurements and objectives)

New Technology and Limited Information

- Smart grid technologies need to be tested before widespread implementation
- Standards are still evolving and will likely be impacted by US / European standards
- Research, testing and sector outreach will help inform the development of a strategy
- More information and experience is needed to develop a robust and integrated provincial roll-out strategy to prevent duplication of effort, control costs and reduce stranded investment

Competition

- Although there are many innovative Ontario-based smart grid tech companies, they are facing strong competition from larger players in the United States.
- Existing buy-American policies are creating competitive barriers for Ontario companies
- A strategy developed with industry can identify areas of opportunity for Ontario companies

Addressing the Challenges

Need for Coordination



Smart Grid Strategy

- Smart Grid Forum
- Government policy statement
- Working within international standards
- Codes and regulation

New Technology and Limited Information



Capacity Building and Learning

- Studies commissioned where needed
- LDC smart grid projects
- Information from other jurisdictions

Competition



Creating Investment Opportunities

- Smart Grid Fund
- Leverage other sources of funding, e.g. Federal
- Coordinated procurement

Objectives of a Smart Grid Strategy

The Smart Grid strategy should:

Define provincial smart grid objectives

- Provincial Policy Statement to guide agencies and LDCs in their role in implementing a smart grid.

Set timelines for implementation

- Realistic timeframes based on available technologies and how they can be used to achieve objectives

Identify responsibilities

- Roles and next steps for OEB, IESO, LDCs, OPA, and ESA, and appropriate regulatory framework where needed.

Identify areas where provincial coordination will be required

- Ensure information gathering efforts are focused on strategic objectives and that efforts are not duplicated, i.e. economies of scale can be achieved.

Set the framework to encourage manufacturing and identify Ontario-based investment opportunities

- MEI will be able to identify investment opportunities for smart grid technologies and encourage Ontario-based manufacturing in those areas

Near-term request for Smart Grid Forum

- MEI would like to ask the Smart Grid Forum to provide recommendations to the Minister on the key focus areas, technologies, and objectives of a smart grid, with a particular focus on Utility Flexibility and Adaptive Infrastructure where goals and technologies are less clear.
- Recommendations on smart grid focus areas should:
 - Focus on nearer and longer-term time horizons of six months, 18 months and beyond.
 - Consider implementation steps needed.
 - Suggest a near-term approach for capacity-building, including coordination of demonstration projects and how to share information.
- What advice can be provided on Consumer Control?
 - To complement the advanced stage of smart metering and TOU implementation, Consumer Control projects would proceed on a more expedited basis. Could be informed through existing knowledge gained as a result of the smart meter rollout and pilots from LDCs on the impact of in-home devices.
- How best to provide advice to government? Recommendations and forum discussions on these issues would be confidential advice to government and would lead to a policy statement on the smart grid to guide implementation in the new year.
- What is best approach to leverage expertise of forum member organizations in developing recommendations?