Ontario Energy Board

Report of the Board

Supplemental Report on Smart Grid

EB-2011-0004

February 11, 2013

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1. Introduction

In accordance with the Directive from the Minister of Energy dated November 23, 2010 (”Minister’s Directive”) the Ontario Energy Board (the “Board”) is required to provide guidance to licensed distributors, transmitters and other entities, such as the Ontario Power Authority, the Independent Electricity System Operator, and the Smart Metering Entity whose fees and expenditures are reviewed by the Board, that propose to undertake smart grid activities (collectively the “regulated entities”). The Minister’s Directive states that the guidance provided by the Board is to set out the Board’s expectations for regulated entities in the preparation of their plans for the development and implementation of the smart grid and identify the criteria that the Board will use to evaluate such plans. The Minister’s Directive is included as an Appendix to this report.

The Ontario Energy Board’s Report of the Board – A Renewed Regulatory Framework for Electricity Distributors: A Performance Based Approach (the “RRFE Report”) was issued on October 18, 2012. The RRFE Report noted that smart grid investments are considered integral to all utility investment and that planning for smart grid development and implementation by electricity distributors and transmitters will be an essential part of the broader network investment planning exercise. The RRFE Report indicated that the Board’s guidance to regulated entities with respect to smart grid activities, in response to the Minister’s Directive, would be provided in a Supplemental Report of the Board.

The Board has concluded that the objectives in the Minister’s Directive are aligned with the objectives of the renewed regulatory framework. The renewed regulatory framework set out by the Board in the RRFE Report is a comprehensive performance-based approach to regulation. It is designed to encourage cost-effective planning and operation of the electricity distribution network so that it is efficient, reliable and sustainable, and provides value for customers. Therefore, the Board will fulfill the

Minister's Directive by providing guidance on smart grid investments as part of implementing the performance-based framework set out in the RRFE Report.

2. Background

2.1 The Green Energy and Green Economy Act, 2009 and the Minister's Directive on Smart Grid

In 2009, the *Green Energy and Green Economy Act, 2009* ("*GEA*") established an additional objective[1] for the Board, namely, "to facilitate the implementation of a smart grid in Ontario". The *GEA* defined smart grid (by way of amendment to the *Electricity Act*[2]) as follows:

> (1.3) For the purposes of this Act, the smart grid means the advanced information exchange systems and equipment that when utilized together improve the flexibility, security, reliability, efficiency and safety of the integrated power system and distribution systems, particularly for the purposes of,
>
> (a) enabling the increased use of renewable energy sources and technology, including generation facilities connected to the distribution system;
>
> (b) expanding opportunities to provide demand response, price information and load control to electricity customers;
>
> (c) accommodating the use of emerging, innovative and energy-saving technologies and system control applications; or
>
> (d) supporting other objectives that may be prescribed by regulation. 2009, c. 12, Sched. B, s. 1 (5).

The Minister's Directive was issued pursuant to the authority provided by the *GEA* (by way of an amendment to the OEBA) and set out a number of objectives for the Board to consider in providing guidance on smart grid implementation, namely: customer control, power system flexibility and adaptive infrastructure. The Minister's Directive also set out a number of policy objectives to guide the Board's development of criteria for evaluating regulated entities' plans.

2.2 The Smart Grid Working Group

[1] *Ontario Energy Board Act,1998* ("*OEBA*"), section 1(1), paragraph 4
[2] *Electricity Act*, *1998*

On January 13, 2011, in response to the Minister's Directive, the Board established a Smart Grid Working Group (the "Working Group") to provide advice to Board staff on the technical aspects and related details in respect of the implementation of a smart grid. The feedback from the Working Group is summarized in a Board staff discussion paper "Developing Guidance for the Implementation of Smart Grid in Ontario" issued on November 8, 2011. The purpose of the discussion paper was to seek comments from stakeholders on the issues to be considered by the Board in providing guidance on the establishment, implementation and promotion of a smart grid in Ontario. These comments were considered by the Board in formulating the conclusions and policy direction set out in the RRFE Report.

2.3 A Renewed Regulatory Framework for Electricity Distributors: A Performance-Based Approach

The regulatory framework set out by the Board in the RRFE Report is a comprehensive performance-based approach to regulation that is based on the achievement of outcomes in order to ensure that Ontario's electricity system provides value for money for customers. The Board established the following outcomes for distributors:

Customer Focus: services are provided in a manner that responds to identified customer preferences;

Operational Effectiveness: continuous improvement in productivity and cost performance is achieved; and utilities deliver on system reliability and quality objectives;

Public Policy Responsiveness: utilities deliver on obligations mandated by government (e.g., in legislation and in regulatory requirements imposed further to Ministerial directives to the Board); and

Financial Performance: financial viability is maintained; and savings from operational effectiveness are sustainable.

The Board developed a set of related policies to implement the new performance-based framework and facilitate the achievement of these performance outcomes. The policies are supported by fundamental principles of good asset management; coordinated, long-term planning; and a common set of performance measures, including productivity expectations.

Of most relevance to smart grid activities and related guidance to regulated entities are the policies regarding capital planning, innovation, and coordination.

With respect to planning, the Board will be requiring distributors to file 5-year capital plans to support their rate applications. Distributors will conduct integrated planning of all capital investments, including: expansion and renewal of their networks; connection of renewable generation; smart grid development; and investments identified through regional infrastructure planning. The capital plans must demonstrate that policy objectives have been considered in a distributors' evaluation of suitable expenditures, including the needs of existing and future customers and the costs of meeting those needs. The evidence must also demonstrate that, where applicable, planning has been informed by appropriate consultation with customers, municipalities and neighbouring distributors and transmitters.

As the Board stated in the RRFE Report, with respect to innovation the Board intends to explore further opportunities to embed the facilitation and recognition of technological innovation into the performance and rate-setting framework for electricity distributors. Smart grid development and implementation activities will be a central focus of the effort to incent innovation, given the importance of grid-enhancing advanced technology systems and equipment to network modernization.

With respect to coordination, the effective use of regional infrastructure planning and the inclusion of regional considerations in distributors' and transmitters' plans will be a key factor in ensuring that the development and implementation of smart grid is successful. The Board expects smart grid development to be coordinated on a regional basis in furtherance of the government policy objective set out in the Minister's Directive to the

effect that smart grid implementation efforts should involve regional coordination in order to achieve economies of scope and scale.

The Board also provided conclusions on two specific issues: the treatment of smart grid investments, and "behind the meter" activities.

Specifically, the Board determined that in order to facilitate integrated planning, no distinction will be made for regulatory purposes between "smart grid" and more traditional investments undertaken by distributors and transmitters.

The Board also stated that facilitation of access to customer data is key to facilitating the provision of behind the meter services, which are in turn necessary to achieve the customer control objectives set out in the Minister's Directive. The Board acknowledged that distributors currently undertake behind-the-meter services in carrying out conservation and demand management activities. However, the Board concluded that the provision of behind the meter services and applications that fall within the parameters set out in sections 71(2) or 71(3) of the *OEBA* is a non-utility activity. In accordance with the Board's policies[3] related to activities under those sections, such activities must be accounted for separately from utility activities and be undertaken on a full cost recovery basis (i.e. not recovered in rates).

2.4 The Minister's Directive and the Renewed Regulatory Framework for Electricity

As discussed above, the Minister's Directive requires the Board to provide regulated entities with the Board's guidance and expectations in relation to the establishment and implementation of a smart grid within the parameters of three objectives set out in the Minister's Directive: customer control, power system flexibility, and adaptive infrastructure. The Board is also to be guided in developing its criteria for evaluating

[3] For example, see the Accounting Procedures Handbook for Electricity Distributors.

regulated entities' plans by ten policy objectives of the government, including efficiency, customer value, interoperability, and privacy. (See Appendix)

The Board has concluded that the objectives in the Minister's Directive are aligned with the objectives of the renewed regulatory framework. (See Table 1) Further, the Board has determined that the most effective and efficient way to fulfill the Minister's Directive is through the implementation of the performance-based framework established in the RRFE Report. This approach provides for a flexible and robust framework. It ensures that the smart grid objectives and policy objectives set out in the Minister's Directive are considered as part of the overall approach to regulation and rate-setting for regulated entities.

Table 1

		Renewed Regulatory Framework			
		Customer Focus	**Operational Effectiveness**	**Financial Performance**	**Public Policy Responsiveness**
Minister's Directive	**Customer Control**	✓			✓
	Power System Flexibility		✓		✓
	Adaptive Infrastructure		✓		✓
	Policy Objectives	✓	✓	✓	✓

This alignment of the RRFE and the objectives in the Minister's Directive enables the Board to provide guidance and direction in a holistic manner. The alignment establishes that the integrated approach to infrastructure planning adopted as part of the renewed regulatory framework fully encompasses the objectives of the Minister's Directive.

2.5 The Reconvened Smart Grid Working Group

The Board stated in the RRFE Report that it would reconvene the Working Group to advise Board staff in the development of the regulatory documents to implement the Minister's Directive and the renewed regulatory framework.

The Working Group was reconvened and met during November 2012. The presentations and notes from these meetings are posted on the Board's website.

The Working Group provided advice on formulating guidance with respect to smart grid development, primarily addressing factors that regulated entities should consider when planning investments and operations. A number of key issues were discussed at length, including facilitating customer access to data, network evolution, innovation, economic development, and cyber-security.

In general, the Working Group advised that the Board should favour less prescriptive rules and not direct regulated entities to make specific investments, given the evolutionary nature of smart grid. Furthermore, the Working Group noted that grid modernization is a relative concept because, for example, a modernizing investment for one utility may be standard practice for another utility.

The Working Group pointed out that the varying preferences of different types of customers are important considerations. Coordination and a long term view of investment were discussed in relation to planning an interoperable and flexible system. However, the most important tool that was identified for planning investments and operations is the ability to leverage the new information that distributors will be able to collect with smart grid enhancements.

Lastly, the Working Group suggested that the Board consider the need for a mechanism for ongoing advice in respect of the implementation of smart grid, including input regarding technological adoption, utility experience, and emerging standards.

The Board was assisted greatly by the work of the Working Group. The expectations and guidance provided in this report have incorporated the insights provided by the Working Group. In providing its guidance in the following sections, the Board has identified the need for ongoing advice on certain matters and will look to the Working Group for input.

3. Guidance and Expectations Regarding Planning and Investments

This section sets out the high level expectations of the Board with respect to smart grid activities that electricity distributors and other regulated entities should consider when developing their investment plans.

The Board's intention is to provide guidance in a holistic manner, recognizing that the modernization of the electricity system is a continuous process with no specific end-state. The circumstances and needs of an electricity distributor's system and its customers vary significantly across the province. The Board has sought to provide as much guidance as possible to provide a long-term view of electricity network enhancement without prescribing specific investments, technologies, methodologies or standards, or applying procurement requirements and targets.

It should be understood by regulated entities that cost of investments made in accordance with the Board's guidance are not guaranteed to be recovered. All planned investments that reflect the Board's expectations as set out below will be assessed against the Board's evaluation criteria, similar to the assessment of any other investments, when a utility files a capital plan for approval by the Board. This topic is discussed more thoroughly in Section 4.1 of this Supplemental Report.

3.1 Customer Control

The Minister's Directive sets out customer control objectives as follows:

> "For the purpose of providing the customer with increased information and tools to promote conservation of electricity, which will 'expand opportunities to provide demand response, price information and load control to electricity customers', in accordance with subsection 2(1.3)(b) of the Electricity Act."

The Board has identified Customer Focus as a key outcome for electricity distributors to achieve, whereby services are provided in a manner that responds to identified customer preferences. The Customer Focus outcome aligns with objectives in the

Minister's Directive as both emphasize realizing customer value and empowering consumers.

Customer engagement is an essential activity in order for utilities to achieve the outcome of Customer Focus as set out in the RRFE Report. In order for a distributor to provide services in a manner that responds to customer preferences, they must engage with customers to understand their expectations. To achieve the objectives set out for customer control as defined in the Minister's Directive, distributors (and other regulated entities) will need to identify those services that will provide customers with the ability to take action in regard to their energy use. Regulated entities and third party providers (i.e. private, unregulated businesses) must know what information and services customers value (i.e. their preferences) in order to tailor their offerings (e.g., education, data, or services).

In their investment plans regulated entities must demonstrate that they have undertaken activities to understand their customers' preferences (e.g., data access and visibility, participating in distributed generation, and load management) and how they have addressed those preferences. Customer engagement can occur through a variety of approaches, including surveys, data analytics, and analysis of customer feedback, inquiries, and complaints. As the Working Group pointed out, different customer classes (residential, commercial/institutional and industrial) will have different preferences and customer engagement is required to determine the different preferences across customer classes.

In considering whether a regulated entity's activities meet the customer control objectives, the Board has two specific requirements, that they facilitate customer education and support access to electricity consumption data.

3.1.1 Customer Education

Regulated entities must provide information and education to their customers regarding the potential benefits of smart grid. In order for customers to be able to take advantage of the new services and data access that smart grid will provide, they

will need to be informed. This might include increasing customer awareness of the data available to them and the value of the data for determining their consumption. It may also include providing information regarding new service offerings that reflect their service expectations and requirements (e.g., conservation, demand shifting, micro-generation, and storage). While regulated entities should inform customers of specific services and applications, they should not endorse any specific provider of services or applications that are delivered in a competitive market place by private agents.

3.1.2 Data Access

In the RRFE Report, the Board emphasized the importance of data access to the achievement of customer control objectives. The Board has determined that smart grid activities by regulated entities should facilitate data access. The Board notes that the Government of Ontario is currently exploring providing greater access to electronic data through its Green Button initiative, which may be able to provide customers with access to their electricity consumption data through a secure download from their utility's website. Currently, all customers have access to historical (e.g., previous 24 months) consumption data, via the smart metering initiative. However, this data is not universally available online or electronically in Ontario.

Distributors must investigate options for facilitating customer access to consumption data in an electronic format. The options should be aimed at providing a more user friendly approach which allows customers to use, analyze, and share their data in an electronic format. This will involve working towards providing access to hourly billing quality data to customers, and to any third party authorized by the customer, through a recognizable electronic format similar to the way data is provided to retailers under the existing Electronic Business Transaction Standards.

The Board recognizes that some customers will want access to non-billing quality data (i.e. “real-time” or “near real-time” data) to better manage their electricity costs. As part of its customer engagement activities (e.g., surveys), the Board expects that all regulated entities will work towards identifying customer preferences with respect to

data access and ensuring that new services are consistent with these evolving customer needs.

This “near real-time” data is expected to be delivered through “behind the meter devices” (e.g., an in-home display) supplied by third party service providers. In the RRFE Report, the Board concluded that achievement of the customer control objective in the Minister’s Directive will require that “behind the meter” services and applications be available to customers. Further, the Board determined that there is no element of natural monopoly in the market for behind the meter services and concluded that customer control would be best served by the forces of market competition.

As metering infrastructure is renewed and replaced over time, distributors must explore mechanisms that facilitate “real-time” data access and “behind the meter” services and applications for the purpose of providing customers with the ability to make decisions affecting their electricity costs. As discussed by the Working Group, when facilitating customer access to data, mechanisms should recognize that customer preferences regarding the detail and frequency of information varies by customer type (residential, commercial/institutional, and industrial) and is likely to be related to the cost of electricity. The Board agrees that this is an important aspect of the development of data access mechanisms and expects that distributors will demonstrate how they are monitoring customer data expectations and requirements.

The Smart Metering Entity (SME) must investigate opportunities for providing access to depersonalized, generic data to third parties for planning, research, and customer benchmarking purposes (e.g., allowing customers to compare their consumption with that of their neighbours). The Meter Data Management and Repository (MDM/R) operated by the SME contains a wealth of data on Ontario electricity consumption that is being utilized solely for billing purposes. The Board is of the view that this represents an unrealized value in the MDM/R, which was also noted by the Working Group.

Consistent with the views of the Working Group, recognizing that mechanisms will evolve, and consistent with the expectations set out above, the Board will not specify

standard protocols or methods by which data and information is made available to customers or third parties at this time. However, the Board will take action (e.g., prescribing standards for data access and presentment) in the event that customer-friendly data access mechanisms do not emerge.

Lastly, the Board is of the view that the emergence of standard data access mechanisms represents an area for future discussions and advice from the Working Group (e.g., monitoring standards development in other jurisdictions).

3.2 Power System Flexibility

The Minister's Directive sets out power system flexibility objectives as follows:

> "For the purpose of 'enabling the increased use of renewable energy sources and technology, including generation facilities connected to the distribution system,' in accordance with subsection 2(1.3) (a) of the Electricity Act, 1998, and recognizing the need for flexibility on the integrated power system."

As noted in Section 2, the Board has established Operational Effectiveness as an outcome whereby continuous improvement in productivity and cost performance is achieved and utilities deliver on system reliability and quality objectives. The power system flexibility objectives in the Minister's Directive align very closely with this outcome.

Regulated entities must demonstrate in their investment plans how they have incorporated necessary investments to facilitate the integration of distributed generation and more complex loads (e.g., customers with self-generation and/or storage capability). The Board's expectations regarding the implementation of power system flexibility by regulated entities are based on the conclusion in the RRFE Report that grid-enhancing advanced information and exchange systems and equipment are integral to all utility investment. The investments may include: instrumentation; modeling and forecasting; system monitoring and other investments that provide visibility; control; and perhaps automation in distributor's control rooms. With regard to connecting

distributed generation, the Board notes that it has made a number of amendments to the Distribution System Code to facilitate the connection of distributed generation.

Another example of relevant investments would be using intelligent devices on the system such that network maintenance is enhanced. This investment can be targeted to where and when it is needed and operational efficiencies can be achieved, including improved power quality and outage management to increase reliability of service to customers.

The Board notes that some distributors have already undertaken, with Board approval, pilot and demonstration projects related to power system flexibility, including systems that facilitate real time communications with distributed generators and software solutions that enhance network intelligence (e.g., outage responsiveness).

As distributors plan for the modernization of their systems they must consider cost and the expectations for service from their customers and invest accordingly. The Board does not intend to prescribe specific investments and technological choices to be implemented. The Board recognizes that there is a diversity of circumstances among distributors. For example, an investment considered standard practice for one distributor may represent a significant modernization activity for a different distributor because of differences in size, geography, or evolution of customer preferences.

3.3 Adaptive Infrastructure

The Minister's Directive sets out the adaptive infrastructure objectives as follows:

> "For the purpose of 'accommodating the use of emerging, innovative and energy saving technologies and system control applications,' in accordance with subsection 2(1.3)(c) of the Electricity Act."

As noted in Section 2, the adaptive infrastructure objectives in the Minister's Directive align with the outcomes of Operational Effectiveness and Public Policy Responsiveness. The Board's expectations for this area are based on the renewed

regulatory framework's goals of promoting ongoing productivity improvements and encouraging innovation.

Regulated entities must demonstrate in their investment plans that they have investigated opportunities for operational efficiencies and improved asset management, enabled by more and better data provided by smart grid technology. Investments that support and advance network operation and evolution (e.g., energy storage, interoperability, forward compatibility, and electric vehicles) are expected to be pursued when and where appropriate. As stated with respect to power system flexibility in Section 3.2, the Board does not intend to prescribe specific investments and technological choices for regulated entities.

Following Board approval, some distributors have already undertaken pilot and demonstration projects related to adaptive infrastructure, including electric vehicle charging, home energy management applications, and electricity storage options. The Board expects that distributors will report on the outcomes and learning from these pilots for the benefit all regulated entities. This expectation is consistent with the Board's policies (e.g., Filing Requirements: Distribution System Plans), which emphasize the need to avoid duplication of efforts in testing out and learning about new technologies.

The adaptive infrastructure objective in the Minister's Directive includes the following parameters: "Encourage Innovation" and "Maintain Pulse On Innovation." **When applicable and appropriate, capital and investment planning by regulated entities must demonstrate the consideration and/or adoption of innovative processes, services, business models, and technologies as well as an awareness of innovation and best practices.** As the Board identified in the RRFE Report, additional guidance from the Board regarding innovation is forthcoming. The Board intends to explore further opportunities to embed in the rate-setting framework for distributors (and eventually all regulated entities) the facilitation and recognition of technological innovation. Smart grid development and implementation activities will be a central focus of that effort.

Furthermore, the Board is of the view that regional coordination is of primary importance with respect to adaptive infrastructure. As noted in the RRFE Report:

> …the Board expects that smart grid development will be coordinated on a regional basis in furtherance of the government policy objective set out in the Minister's Directive to the effect that smart grid implementation efforts should involve regional coordination in order to achieve economies of scope and scale. (RRFE Report, p. 47)

The Board is of the view that, in fulfilling the adaptive infrastructure objective the Working Group could be relied upon to provide advice to the Board regarding the deployment of smart grid technologies and activities. Further, the Board believes that the Working Group could serve as a forum in which electricity distributors and other parties can share information regarding experiences and best practices regarding pilot project results, technological adoption, and innovative practices.

4. Plan Evaluation and Measuring Performance

This section sets out guidance on how the Board will evaluate investment plans and performance related to smart grid activities undertaken by regulated entities.

As noted in Section 3 of this Supplemental Report, the RRFE Report states that distributors will be required to file 5-year capital plans to support their rate applications and to monitor achievement of the performance outcomes.

All capital and infrastructure plans must enable the Board to assess whether and how a distributor as well as any other regulated entity has sought to control costs in relation to its proposed investments through the appropriate optimization, prioritization and pacing of investment expenditures. The evidence contained in the plan must demonstrate that relevant policy objectives have been considered in regulated entities' evaluation of suitable expenditures. This evidence can be qualitative or quantitative.

The Board is currently engaging stakeholders on the identification and development of qualitative and quantitative approaches and tools to support investment proposals (i.e. Distribution Network Investment Planning Working Group).

4.1 Evaluation

Planned investments made in accordance with the expectations and guidance provided in Section 3 will be assessed against the Board's evaluation criteria when a utility files a capital plan for approval by the Board. As the Board has determined that an integrated approach to capital planning is the appropriate means to achieve the outcomes established in the renewed regulatory framework and the Board's rate-setting objectives, the evaluation of smart grid investments will be no different from any other investment made by a regulated entity. In order to have expenditures approved by the Board, regulated entities will be required to demonstrate that the expenditures are consistent with the evaluation criteria set out by the Board. The following constitutes the

Board's current guidance on evaluation respecting all ten policy objectives set out in the Minister's Directive.

4.1.1 Efficiency, Customer Value, and Reliability

The Board notes that these three policy objectives already form part of the Board's core work. The Board's renewed regulatory framework is designed to support the cost-effective planning and operation of the electricity distribution network – a network that is efficient, reliable, sustainable, and provides value for customers. Overall, the protection of consumer interests and the promotion of economic efficiency and cost effectiveness within a financially viable industry are the foundation of the renewed regulatory framework and continue to underpin all expenditure evaluations and assessments. Pacing and prioritization of capital investments to promote predictability in rates and affordability for customers must be a primary goal in a distributor's capital plan. Utility plans must deliver value for money for customers and system reliability. In developing plans in response to the Board's smart grid guidance, distributors will be expected to demonstrate how their plans address these criteria.

4.1.2 Safety

Safety has always been a priority of the Board and is essential to good utility practice. The Board recognizes that the Electrical Safety Authority oversees safety issues directly through the development of its regulations, codes, and inspection program.

In developing plans in response to the Board's smart grid guidance, distributors will be expected to demonstrate how their plans address safety.

The Board agrees with the views expressed by the Working Group that safety improvements will result naturally from the additional information and automation afforded by smart grid technologies.

4.1.3 Cyber-security and Privacy

The privacy and security of customer data has always been a priority of the Board as evidenced in licence conditions prohibiting unauthorized release of customer

information. However, privacy is becoming even more important with increasing electronic transmission of customer data. The Board will not develop its own set of cyber-security and privacy standards but instead will require regulated entities to provide evidence of meeting appropriate cyber-security and privacy standards. For example, in the case of cyber-security, this could take the form of providing a third-party audit confirming compliance with the standards of the National Institute of Standards and Technology's (NIST) Guidelines for Smart Grid Cyber Security. With respect to privacy, a regulated entity could, for example, provide evidence that existing privacy laws and standards, as well as best practices such as the Privacy by Design framework set by Ontario's Privacy Commissioner, have been met.

The Board believes that the area of cyber-security is particularly suitable for future discussion and advice from the Working Group. The development of standards and practice in this very complex field will require the continued monitoring of developments in other jurisdictions to ensure that regulated entities are following the best practices.

4.1.4 Co-ordination and Interoperability

Utility co-ordination and co-operation in planning is a key component of the renewed regulatory framework. The effective use of regional infrastructure planning and the inclusion of regional considerations in distributors' and transmitters' plans will be key in ensuring that the development and implementation of smart grid in Ontario is carried out on a coordinated basis and best serves the interests of the region. Distributors and transmitters will be expected to file evidence in rate applications and leave to construct proceedings that demonstrates that regional issues have been appropriately considered and, where applicable, addressed in developing the utility's capital budget or infrastructure investment proposal. The Board has convened a stakeholder working group to prepare a report that sets out the details of an appropriate regional infrastructure planning process.

The Board does not intend to prescribe interoperability standards (e.g., communication protocols between meters and "behind the meter" technologies), but expects interoperability. The Board also intends to ensure that distributors support the

development and adoption of standards through, for example, co-ordination (e.g., common technology procurement) and regional planning (e.g., common communication protocols) as well as links with third-party providers and industry. The Board will assess distributor plans to ensure that they are facilitating interoperability and that, where appropriate, proposed technology investments enable future potential applications or requirements.

The Board believes that the area of interoperability presents itself as a subject for future input from the Working Group (e.g., monitoring standards development in other jurisdictions).

4.1.5 Economic Development

The Board recognizes that economic development opportunities associated with smart grid are a significant part of the *GEA* and the Government of Ontario's Clean Energy Economic Development Strategy. In defining economic development, the Minister's Directive refers to economic growth and job creation within the province of Ontario as well as the development and adoption of products and services from Ontario-based sources. The Board will consider qualitative and quantitative evidence on economic development when reviewing proposed expenditures by regulated entities. The Board does not foresee economic development as being the primary driver for a project. Further, regardless of the expected economic development benefits, the Board does not expect to approve expenditures which are not otherwise cost-effective, prudent, long-term investments.

4.1.6 Environmental Benefits

The attainment of environmental benefits is an important part of the Government of Ontario's energy policy, including the *GEA*. In setting out environmental benefits as a policy objective, the Minister's Directive refers to the use of clean technology, conservation and more efficient use of existing technologies. The Board will consider qualitative and quantitative evidence on environmental benefits and assess claimed benefits on whether they promote the integration of clean technologies, conservation, or

more efficient use of existing technologies. However, the Board does not intend to develop a methodology for calculating and quantifying environmental benefits. Regardless of the expected environmental benefits, the Board does not expect to approve expenditures which are not otherwise cost-effective, prudent, long-term investments.

4.2 Measuring Performance

An important component of the performance-based regulatory framework is a robust set of performance and monitoring requirements to ensure that distributors are achieving the outcomes established by the Board. The Board stated in the RRFE Report that it will develop standards, and measures that will link directly to the performance outcomes (i.e. Customer Focus, Operational Effectiveness, Public Policy Responsiveness, and Financial Performance). Using a scorecard approach, distributors will be required to report annually on their key performance outcomes.

As part of the development of consolidated capital plan filing requirements, which will provide the basis for evaluating distributors' capital plans, the Board has stated that performance measures related to plan execution will be developed. The development of such performance measures is being undertaken as part of the distribution network investment planning initiative. The Board expects that the results of this work may be incorporated into the scorecard and/or reporting mechanisms to monitor progress in meeting the outcomes set by the Board.

The Board has also established a stakeholder working group to provide staff with expert assistance and to review and evaluate proposals regarding performance standards and measures, and the development of benchmarking. The end result of this work will be a Supplemental Report of the Board expected to be issued in mid-2013.

5. Next Steps

As noted throughout this Supplemental Report, additional work, in consultation with stakeholders, is required in some areas (i.e. investment planning, regional planning, innovation, and measuring performance) to implement the Board's guidance regarding smart grid as part of the Board's integrated approach to electricity system investments and planning set out in the RRFE Report.

These consultations will conclude with the issuance of filing requirements and guidance, code amendments, and/or supplemental Board policies that will provide further information to distributors and other regulated entities regarding the implementation of smart grid.

The Board's thinking regarding smart grid will evolve over time as investments are made, existing infrastructure is renewed and replaced, current technologies mature and new technologies emerge, and standard methodologies and protocols arise. As this process unfolds, the Board will issue further guidance and/or direction as appropriate, taking into account information and advice that emerges from the Working Group.

Appendix: Minister’s Directive

Ontario
Executive Council
Conseil des ministres

Order in Council
Décret

On the recommendation of the undersigned, the Lieutenant Governor, by and with the advice and concurrence of the Executive Council, orders that:

Sur la recommandation du soussigné, le lieutenant-gouverneur, sur l'avis et avec le consentement du Conseil des ministres, décrète ce qui suit:

WHEREAS it is desirable that the Province and the Ontario Energy Board move forward together with a plan to implement the advanced information exchange systems and equipment that together comprise the Smart Grid ("Smart Grid"), as defined in the amendments to the *Electricity Act, 1998* made by the *Green Energy and Green Economy Act, 2009*;

AND WHEREAS in furtherance of this goal, it is desirable that the Province provide guidance and direction to the Board as to the principles and objectives which must be met in order to fully achieve the Province's objectives related to the Smart Grid in a cost-efficient manner;

AND WHEREAS the Minister of Energy has the authority, with the approval of the Lieutenant Governor in Council, to issue Directives pursuant to section 28.5 of the *Ontario Energy Board Act, 1998*, as amended by the *Green Energy and Green Economy Act, 2009,* in relation to the establishment, implementation or promotion of a Smart Grid for Ontario;

NOW THEREFORE the Directive attached hereto, is approved.

Recommended: _____
Minister of Energy

Concurred: _____
Chair of Cabinet

Approved and Ordered: NOV 2 3 2010
Date

_____
Administrator of the Government

O.C./Décret 1515/2010

MINISTER'S DIRECTIVE

TO: THE ONTARIO ENERGY BOARD

I, Brad Duguid, Minister of Energy, hereby direct the Ontario Energy Board pursuant to section 28.5 of the *Ontario Energy Board Act, 1998* (the "Act"), as described below.

The Board shall take the following steps in relation to the establishment, implementation and promotion of a smart grid:

1. The Board shall provide guidance to licensed electricity distributors and transmitters, and other regulated entities whose fees and expenditures are reviewed by the Board, that propose to undertake smart grid activities, regarding the Board's expectations in relation to such activities in support of the establishment and implementation of a smart grid.

2. For licensed distributors and transmitters, the guidance referred to in paragraph 1 shall be provided in particular to: (a) guide these regulated entities in the preparation of plans for the development and implementation of the smart grid, as contemplated in subparagraph 70(2.1)2(ii) of the Act ("Smart Grid Plans"); and (b) identify the criteria that the Board will use to evaluate Smart Grid Plans.

3. In developing the guidance referred to in paragraph 1, and in evaluating the Smart Grid Plans and activities undertaken by the regulated entities referred to in that paragraph, the Board shall be guided by, and adopt where appropriate, the parameters for the three objectives of a smart grid referred to in subsection 2(1.3) of the definition for "smart grid" as provided for under the *Electricity Act, 1998*, where such elements of said objectives are set out in Appendices A through C.

4. Further, in developing the guidance referred to in paragraph 1 and in evaluating the smart grid activities of the regulated entities referred to in that paragraph, the Board shall be guided by the following policy objectives of the government:

    (i) *Efficiency***:** Improve efficiency of grid operation, taking into account the cost-effectiveness of the electricity system.

    (ii) *Customer value:* The smart grid should provide benefits to electricity customers.

    (iii) *Co-ordination*: The smart grid implementation efforts should be coordinated by, among other means, establishing regionally

coordinated Smart Grid Plans ("Regional Smart Grid Plans"), including coordinating smart grid activities amongst appropriate groupings of distributors, requiring distributors to share information and results of pilot projects, and engaging in common procurements to achieve economies of scale and scope.

(iv) *Interoperability:* Adopt recognized industry standards that support the exchange of meaningful and actionable information between and among smart grid systems and enable common protocols for operation. Where no standards exist, support the development of new recognized standards through coordinated means.

(v) *Security:* Cybersecurity and physical security should be provided to protect data, access points, and the overall electricity grid from unauthorized access and malicious attacks.

(vi) *Privacy:* Respect and protect the privacy of customers. Integrate privacy requirements into smart grid planning and design from an early stage, including the completion of privacy impact assessments.

(vii) *Safety:* Maintain, and in no way compromise, health and safety protections and improve electrical safety wherever practical.

(viii) *Economic Development:* Encourage economic growth and job creation within the province of Ontario. Actively encourage the development and adoption of smart grid products, services, and innovative solutions from Ontario-based sources.

(ix) *Environmental Benefits:* Promote the integration of clean technologies, conservation, and more efficient use of existing technologies.

(x) *Reliability***:** Maintain reliability of the electricity grid and improve it wherever practical, including reducing the impact, frequency and duration of outages.

The Board may consider such other factors as are relevant in the circumstances.

5. In furtherance of the government's policy objective as described in item (iii) of paragraph 4 above, the Board shall undertake a consultation process with licensed electricity distributors and other relevant stakeholders for the purpose of developing a regional or otherwise coordinated approach to the planning and implementation of smart grid activities by licensed electricity distributors that promotes coordination

amongst them having regard to, among other things, cost-effective outcomes.

6. Nothing in paragraph 5 shall be construed as limiting the ability of licensed electricity distributors to engage in smart grid activities or the authority or discretion of the Board in exercising its responsibilities in relation to the smart grid activities of licensed electricity distributors pending the development of the regional or coordinated approach referred to in that paragraph.

APPENDIX “A”

CUSTOMER CONTROL OBJECTIVES

For the purpose of providing the customer with increased information and tools to promote conservation of electricity, which will “expand opportunities to provide demand response, price information and load control to electricity customers”, in accordance with subsection 2(1.3)(b) of the Electricity Act, the following objectives apply:

- **ACCESS:** Enable access to data by customer authorized parties who can provide customer value and enhance a customer’s ability to manage consumption and home energy systems.

- **VISIBILITY:** Improve visibility of information, to and by customers, which can benefit the customer and the electricity system, such as electricity consumption, generation characteristics, and commodity price.

- **CONTROL:** Enable consumers to better control their consumption of electricity in order to facilitate active, simple, and consumer-friendly participation in conservation and load management.

- **PARTICIPATION IN RENEWABLE GENERATION:** Provide consumers with opportunities to provide services back to the electricity grid such as small-scale renewable generation and storage.

- **CUSTOMER CHOICE:** Enable improved channels through which customers can interact with electricity service providers, and enable more customer choice.

- **EDUCATION:** Actively educate consumers about opportunities for their involvement in generation and conservation associated with a smarter grid, and present customers with easily understood material that explains how to increase their participation in the smart grid and the benefits thereof.

APPENDIX “B”

POWER SYSTEM FLEXIBILITY OBJECTIVES

For the purpose of “enabling the increased use of renewable energy sources and technology, including generation facilities connected to the distribution system,” , in accordance with subsection 2(1.3)(a) of the Electricity Act, and recognizing the need for flexibility on the integrated power system, the following objectives apply:

- **DISTRIBUTED RENEWABLE GENERATION:** Enable a flexible distribution system infrastructure that promotes increased levels of distributed renewable generation.

- **VISIBILITY:** Improve network visibility of grid conditions for grid operations where a demonstrated need exists or will exist, including the siting and operating of distributed renewable generation.

- **CONTROL AND AUTOMATION:** Enable improved control and automation on the electricity grid where needed to promote distributed renewable generation. To the extent practical, move toward distribution automation such as a self-healing and self-correcting grid infrastructure to automatically anticipate and respond to system disturbances for faster restoration.

- **QUALITY:** Maintain the quality of power delivered by the grid, and improve it wherever practical.

APPENDIX "C"

ADAPTIVE INFRASTRUCTURE OBJECTIVES

For the purpose of "accommodating the use of emerging, innovative and energy-saving technologies and system control applications," in accordance with subsection 2(1.3)(c) of the Electricity Act, the following objectives apply:

- **FLEXIBILITY:** Provide flexibility within smart grid implementation to support future innovative applications, such as electric vehicles and energy storage.

- **FORWARD COMPATIBILITY:** Protect against technology lock-in to minimize stranded assets and investments and incorporate principles of modularity, scalability and extensibility into smart grid planning.

- **ENCOURAGE INNOVATION:** Nest within smart grid infrastructure planning and development the ability to adapt to and actively encourage innovation in technologies, energy services and investment / business models.

- **MAINTAIN PULSE ON INNOVATION:** Encourage information sharing, relating to innovation and the smart grid, and ensure Ontario is aware of best practices and innovations in Canada and around the world.