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April 13, 2018

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
P.O. Box 2319, 27th Floor
2300 Yonge Street
Toronto, ON M4P 1E4

Dear Ms. Walli:

Re: EB-2017-0049
Hydro One Networks Inc. application for electricity distribution rates beginning January 1, 2018 until December 31, 2022

We are counsel to Anwaatin Inc. (**Anwaatin**) in the above-mentioned proceeding. Please find enclosed the written evidence of Dr. Don Richardson, submitted on behalf of Anwaatin pursuant to Procedural Orders Nos. 3, 4, and 5.

Yours very truly,

Lisa (Elisabeth) DeMarco

Jonathan McGillivray

ONTARIO ENERGY BOARD

IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O. 1998, c.15 (Schedule B) s. 78;

AND IN THE MATTER OF an application by Hydro One Networks Inc. for electricity distribution rates beginning January 1, 2018, until December 31, 2022 (the **Application**).

EB-2017-0049

EVIDENCE

ANWAATIN INC.

April 13, 2018

EVIDENCE OF ANWAATIN INC.

INTRODUCTION

1. My name is Dr. Don Richardson. I am the principal of Shared Value Solutions Ltd., a consultant to Anwaatin Inc. (**Anwaatin**). My *curriculum vitae* is attached at Appendix A.
2. I present this evidence to support Anwaatin and the Ontario Energy Board (the **Board**) in their consideration of the unique rights and concerns of Indigenous customers relating to distribution reliability, the Distribution System Plan (**DSP**), revenue requirement, and customer engagement being considered in the EB-2017-0049 proceeding (the **Proceeding**). This evidence reflects my direct and informed knowledge of the electricity reliability and procedural concerns of Anwaatin's First Nation members and is not submitted as expert evidence.
3. Anwaatin's members for the Proceeding include Aroland First Nation, MoCreebec Eeyoud, and Waaskiiaysay Ziibi Inc. Development Corporation, which is an economic development corporation representing five First Nations in the Lake Nipigon Watershed: (i) Biinjitiwaabik Zaaging Anishinaabek (**BZA - Rocky Bay First Nation**); (ii) Bingwi Neyaashi Anishinaabek (**BNA**); (iii) Red Rock Indian Band; (iv) Whitesand First Nation; and (v) Animbiigoo Zaagiigan Anishinaabek (**AZA**) (collectively, the **Anwaatin First Nation Communities**).
4. The Anwaatin First Nation Communities are important customers of Hydro One Networks Inc. (**Hydro One**). They have unique needs and challenges that result from Hydro One's current and proposed spending (or lack thereof) on distribution assets serving the Anwaatin First Nation Communities and related cost and reliability issues.

5. The importance and unique needs of Indigenous communities as energy customers are reflected in the Ministry of Energy's 2017 Long-Term Energy Plan,[1] and the related implementation planning directives to each of the Board[2] and the Independent Electricity System Operator (**IESO**).[3] Further, the IESO has reiterated the express requirement to understand and meet specific needs of Indigenous customers in the area of the Anwaatin First Nation Communities.[4]

6. This evidence pertains to, and is intended to assist the Board in its consideration of, Issues 2, 4, 6, 23, 24, and 29 from the Final Approved Issues List. It is organized as follows:

   (i) Anwaatin First Nation Communities context and Indigenous communities customer reliability experience;

   (ii) Hydro One's processes and measures to consult with Indigenous rights holders in relation to distributed energy resources (**DERs**);[5]

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[1] Ministry of Energy, *Delivering Fairness and Choice: Ontario's Long-Term Energy Plan 2017*, "Chapter 7: Supporting First Nation and Métis Capacity and Leadership". Available online: https://files.ontario.ca/books/ltep2017_0.pdf.

[2] Order in Council 2122/2017 (Executive Council of Ontario), Minister's Directive (October 25, 2017) ("the [Board's Long-Term Energy Plan] implementation plan should also include, in keeping with the OEB's prescribed requirements for consultation, how the OEB will engage relevant interested or affected parties including Indigenous communities, regulated entities and consumers.")

[3] Order in Council 2121/2017 (Executive Council of Ontario), Minister's Directive, as amended (October 25, 2017) ("the [IESO] implementation plan should also include how the IESO will engage with the public, Indigenous communities and stakeholders including electricity transmission and distribution companies and large power consumers on the policy reviews, processes and programs enumerated below.")

[4] See e.g., Independent Electricity System Operator, *Northwest Ontario*, "Planning and Engagement in Northwest Ontario". Available online: http://www.ieso.ca/en/get-involved/regional-planning/northwest-ontario/overview.

[5] DERs, according to the IESO, "are any electricity producing resources or controllable (dispatchable) loads connected to a distribution system that are capable of serving electricity demand. DERs include but are not limited to generation, storage, and controllable load resources, but [exclude] persistent load reduction; DERs may operate individually or be aggregated into virtual units; DERs may connect directly to the distribution system or be integrated into a load." See Independent Electricity System Operator, "DER – North American Perspective", Robitaille, David (March 9, 2017) ["IESO DER North American Perspective"]. Available online: http://www.ieso.ca/-/media/files/ieso/document-library/standing-committee/gli/gldc-20170309-na-perspective.pdf?la=en.

(iii) the potential use of DERs to enhance reliability and adequacy of electricity service in First Nation communities; and

(iv) potential capital expenditure and payment models for resources to address distribution system reliability challenges in Indigenous communities.

I. ANWAATIN FIRST NATION COMMUNITIES CONTEXT AND INDIGENOUS COMMUNITIES CUSTOMER RELIABILITY EXPERIENCE

7. The Anwaatin First Nation Communities are located in the IESO planning regions of Northwestern Ontario and North/East of Sudbury. Indigenous communities, including the Anwaatin First Nation Communities, are Hydro One "outlier" communities[6], extremely vulnerable to power outages and can experience significant hardship when outages occur.

8. The hardships associated with poor electricity system reliability negatively affect the Anwaatin First Nations Communities' Aboriginal and Treaty rights by impeding their ability to fully and meaningfully exercise those rights. First Nation community members associated with Aroland First Nation, BZA - Rocky Bay First Nation, Red Rock Indian Band, BNA, and AZA experienced a power outage along the A4L transmission line in the Greenstone-Marathon planning area for nearly 24 hours between August 30, 2016, and August 31, 2016.[7] The power outage extended

[6] See EB-2016-0160, Anwaatin Final Argument (February 2, 2017) at 18 ("a full sixty percent (60%) of the delivery points serving the Anwaatin First Nation Communities are customer delivery point performance standard "outliers". Specifically, each of Longlac TS, Moosonee DS, and Beardmore #2 DS."; "delivery points in Northern Ontario are over five (5) times (500%) less reliable than the Ontario average, and delivery points in the Anwaatin First Nation Communities are a staggering 20.81 times (2081%) less reliable than the Ontario average.")

[7] Delivery points from the A4L transmission system may be distribution assets and may affect reliability. See EB-2016-0160, Transcript Volume 7, at 150-152. An excerpt from the transcript follows:

MS. DeMARCO: Where would I find what's referred to as the Beardmore SS?
MR. NG: So TCJ2.11.
MS. DeMARCO: Yes.
MR. NG: Page 1, the second map at the bottom, kind of in the middle, the top part of it, it says "Beardmore DS number 2".
MS. DeMARCO: Yes.
MR. NG: That's the location of the DS.
MS. DeMARCO: Okay. It's not listed in the list of assets in TCJ2.10. is that right?
MR. NG: That's because this is a distribution station.

from the west, near Cameron Falls, south of Lake Nipigon, to east of Longlac and north of Nakina, including Aroland First Nation, and affected thousands of people. Community members affected by the power outage reported significant related hardships, including:

(a) full loss of most refrigerated foods;

(b) loss of significant quantities of frozen meat, fish, and game birds, representing months of protected hunting and harvested food upon which First Nation families depend for their livelihoods;

(c) loss of hunting and harvesting time because of the necessity of dealing with the prolonged outage, and the need to invest time to replace lost meat, fish, and game birds with new protein sources through additional hunting and harvesting outside of the normal course;

(d) loss of significant quantities of frozen blueberries used for sustenance and upon which First Nation families depend for their incomes and livelihoods;

(e) significant additional time needed to engage in the traditional practice of honouring the bodies of harvested animals whose meat is spoiled and wasted by taking the harvested animal parts that spoiled during the long outage to the bush to be buried and honoured with tobacco;

MS. DeMARCO: Okay. And it's listed as part of the outliers for transmission -- let me get you a reference for that. I believe that's Anwaatin I, tab 10, schedule 3, page 6.
MR. McLACHLAN: Ms. DeMarco, maybe I can just clear this up a little bit.
The Beardmore DS is listed there because it is a delivery point from the transmission system off of the A4L circuit. But in that interrogatory response, where Mr. Ng has listed the assets and the age and replacement date and that, Beardmore is not listed there because it is not a transmission asset.
So he would not have any accountability or transmission funding for that asset. It is an accountability of the distribution asset.
MS. DeMARCO: This is very helpful because I was really running into confusion determining what's a delivery point that you are reporting on for the purpose of
CDPP -– which I understand Beardmore is. Is that fair?
MR. McLACHLAN: Beardmore is a delivery point from the transmission system.
MS. DeMARCO: Right, but it's not a transmission asset as listed in his --
MR. McLACHLAN: Correct, correct. It's a distribution asset.
MS. DeMARCO: Okay. So in comparing those metrics, CDPP versus anything related to a metric pertaining to a transmission system asset, we have different assets included in those two categories; is that fair?
MR. McLACHLAN: Yes, at it's most basic level, that's correct.

(f) increased sightings of, and dangers from, bears foraging at landfills for spoiled meats that were not subject to traditional methods of disposition;

(g) financial challenges for families with elders and caregivers who rely on traditional food sources to nourish their families with traditional meals, but who were forced to replace traditional food sources with store-bought foods, and use very limited household incomes to purchase food instead of paying for other family necessities; and

(h) additional financial expenditures in Aroland First Nation, community and band council planning to identify a source of funds for building a community freezer with a backup generator to provide elders and caregivers with assurance that harvested foods will be protected from substandard system reliability.[8]

9. First Nation communities in outlier areas also experience hardships resulting from repeated power outages during the winter, especially for young children and elders who rely on electricity for home heating. Community members report that the duration of power outages in recent years causes stress to families who must plan to pay for backup generators and find ways to ensure that young children and elders can be taken care of and kept warm during cold weather power outages. Winter power outages on the line between Otter Rapids and Moosonee / Moose Factory Island have resulted in declarations of a state of emergency during cold winter months, and have sometimes included boil water advisories due to distributed electricity related complications at water treatment facilities (e.g., on January 22, 2011).

[8] First-person video evidence submitted by Anwaatin in EB-2016-0160 provides a fuller view of the hardships discussed here. See Shared Value Solutions Ltd. "Aroland First Nation - OEB Hearings Video (Nov. 2016)". Available online: https://youtu.be/ofgea2QFzQY.

II. HYDRO ONE'S PROCESSES AND MEASURES TO CONSULT WITH INDIGENOUS RIGHTS HOLDERS IN RELATION TO DERS

10. The Application contains no or minimal evidence regarding Hydro One's consultation with First Nations on the potential role of DERs or behind-the-meter technologies to improve distribution system reliability in Indigenous communities.[9] Hydro One's recent Indigenous engagement included two basic sessions, neither of which addressed solutions to Indigenous reliability issues including the potential role of DERs in improving distribution system reliability in Indigenous communities. Most of the discussion in Hydro One's February 9 and 10, 2017, First Nations engagement sessions appears to have been on the cost of electricity and related delivery charges. There is no mention in the summaries of any discussion surrounding reliability solutions including DERs or behind-the-meter non-wires solutions.

11. Similarly, the Application provides minimal evidence that Hydro One is actively investigating DERs and other non-wires solutions as a means to mitigate or defer the cost of traditional grid expansion and improve distribution system reliability challenges in Indigenous communities.[10] Hydro One does not appear to have advanced any plans, investigations, or pilot programs to integrate DERs into areas of northern Ontario, including First Nation communities, that experience high frequency and duration of power outages and related electricity distribution challenges. Further, Hydro One does not appear to be broadly considering non-wires and distribution-connected DERs in areas where distribution and/or transmission system reliability is a significant issue.

12. There is currently no evidence supporting that Hydro One itself is actively consulting and communicating with First Nations and Métis communities on DER opportunities with respect to

[9] EB-2017-0049, Exhibit A, Tab 4, Schedule 2.
[10] Heinrich, Carsten, "Integration of Distributed Energy Storage in Low Voltage Networks", Master Thesis PSL1432, EEH – Power Systems Laboratory, Swiss Federal Institute of Technology (ETH), Zurich (November 9, 2015). Available online: https://www.ethz.ch/content/dam/ethz/special-interest/itet/institute-eeh/power-systems-dam/documents/SAMA/2015/Heinrich-MA-2015.pdf.

community energy plans, despite the recognition of DERs in multiple Integrated Regional Resource Plans.[11] Further, the Anwaatin First Nation Communities report that in the period leading up to the Application they have had no meaningful consultation or engagement with Hydro One relating to the "smart grid" and related DERs, despite the inclusion of aspirations for adopting various DERs to address cost and reliability issues in several Anwaatin First Nation Communities' community energy plans.[12]

13. Anwaatin therefore submits that Hydro One did not "deeply engage" with First Nation and Métis communities in discussions with respect to its strategy to increase system reliability within First Nations communities[13] through capital investments in DERs and other non-wires measures that can improve reliability, limit the scope of outages, remotely respond to outages, and reduce planned outages resulting in part from its distribution system.

III. THE POTENTIAL USE OF DERS TO ENHANCE RELIABILITY AND ADEQUACY OF ELECTRICITY SERVICE IN INDIGENOUS COMMUNITIES

14. Hydro One has stated that it will implement a three-pronged strategy that is intended to increase system reliability in First Nations communities.[14] The strategy consists of:

    (a) increasing capital investments and replacing equipment that affects reliability;

    (b) leveraging technology to allow Hydro One to better detect, limit the scope of, and remotely respond to certain types of outages; and

    (c) reducing planned outages by bundling work.[15]

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[11] The Parry Sound / Muskoka Sub-Region Integrated Regional Resource Plan recognizes community energy planning that is occurring on First Nation reserves and states that more research is needed to understand the cost and feasibility of using DERs. See Independent Electricity System Operator, "Parry Sound / Muskoka Sub-Region Integrated Regional Resource Plan" (December 16, 2016) at 5, 43 and 45. Available online: http://www.ieso.ca/parrysound-muskoka.

[12] See e.g., Aroland First Nation, *Community Energy Plan*, prepared by Shared Value Solutions Ltd. (October 5, 2016, discussed below.

[13] EB-2017-0049, Exhibit A, Tab 4, Schedule 2 at 7.

[14] Ibid.

[15] Ibid.

15. None of these strategies are "non-wires" measures, which may be lower cost and more effective for Indigenous and other customers. Research and case studies on rural and remote distribution grids indicate that, in rural grids, wire and pole replacements or expansions are particularly expensive, since power lines usually must be very long.[16] The application of DERs, however, can defer transmission investment and upgrades, creating opportunities for electricity grid investments or projects that use non-traditional transmission and distribution "wires approaches". Non-wires solutions include distributed generation, energy storage, energy efficiency, demand response, and grid software and controls. Non-wires solutions may defer or replace the need for more costly equipment upgrades, such as traditional transmission, distribution, or transformer equipment, by reducing load at a substation or circuit level.[17]

16. The advantages of DERs are numerous and include the capacity to improve both distribution system reliability and resilience. The New York Independent System Operator (**NYISO**) has found that DER benefits include:

    (a) energy and demand bill management (**avoided costs**);

    (b) power outage mitigation or critical power support during power outages (**resilience**);

    (c) power quality improvement (**enhanced reliability**);

    (d) direct compensation by grid operators or providers for services (**revenue**); and

[16] Bade, Gavin, "APS to deploy 8 MWh of battery storage to defer transmission investment", Utility Dive (August 9, 2017). Available online: https://www.utilitydive.com/news/aps-to-deploy-8-mwh-of-battery-storage-to-defer-transmission-investment/448965/ ("[t]he new generation of less expensive and more intelligent DERs and energy storage technologies located on both the [transmission and distribution] grid and customers' properties has opened the door to a compelling array of new options for how to best utilize existing infrastructure."); Feldman, Brett, "Non-Wires Alternatives: What's up next in utility business model evolution", Utility Dive (July 12, 2017). Available online: https://www.utilitydive.com/news/non-wires-alternatives-whats-up-next-in-utility-business-model-evolution/446933/; Eller, Alex, "Distributed energy technologies challenge conventional thinking around grid planning", Energy Storage News (February 6, 2018). Available online: https://www.energy-storage.news/blogs/distributed-energy-technologies-challenge-conventional-thinking-around-grid.

[17] Ibid.

(e) financial incentives as defined by local, state or federal policymakers (**avoided costs or revenue**).[18]

17. DERs can also offer increased flexibility and resilience by expanding the flexibility and resources available to grid operators.[19] The NYISO identified the following grid benefits from DERs:

(a) reduced grid losses achieved by providing power closer to the customer and by reducing peak loads;

(b) deferred need for generation, transmission or distribution capacity by reducing peak load;

(c) improved grid resiliency by directly serving customers during outage or power quality events or potentially supporting restoration processes; and

(d) improved energy security from increased fuel diversity.[20]

18. The US Federal Energy Regulatory Commission (FERC) has also recognized the potential reliability benefits of DERs as penetration increases, including reducing grid losses and reducing system peak load.[21]

19. Canadian authorities also support the benefits of DERs in reducing costs and improving reliability, particularly in remote communities. The Mowat Centre reported that DERs can provide a more affordable means of increasing available energy capacity, eliminating the need for costly new transmission infrastructure:

> Integrating DERs could reduce costs by ensuring that needed energy services are provided in the most efficient way possible. For example, in dense urban areas where demand is high and current transmission capacity is being maxed out, DERs could increase available energy capacity or decrease demand, obviating the need for very costly new infrastructure, for example a new transmission

[18] DNV GL. *A Review of Distributed Energy Resources*, prepared for the New York Independent System Operator (September 2014) at 4. Available online: http://www.nyiso.com/public/webdocs/media_room/publications_presentations/Other_Reports/Other_Reports/A_Review_of_Distributed_Energy_Resources_September_2014.pdf.
[19] Ibid at 9.
[20] Ibid at 20.
[21] FERC Staff, *Distributed Energy Resources: Technical Considerations for the Bulk Power System*, Staff Report, Docket No. AD18-10-000, February 2018, at 18. Available online: https://www.ferc.gov/CalendarFiles/20180215112833-der-report.pdf.

> station. In remote rural areas where service extended from the main grid is very expensive to build and maintain, DERs could prove a cheaper way to produce and distribute needed energy more locally. Effectively integrated DERs could also allow for a greater role for renewable energy, reducing emissions. This means that integrating DER[s] will require utilities and the government to change the way energy is planned and managed in Ontario. The one-size-fits-all approach to energy no longer works, and flexible solutions for communities and consumers will need to be considered.[22]

20. The IESO's *Ontario Planning Outlook* (the **OPO**) further supports using DERs to enhance system reliability, reduce the need for new investments, and avoid stranded assets:

> The higher demand outlooks provide greater opportunities for harnessing DERs without stranding assets as the risk of underutilizing assets becomes less of an issue. **DERs can be part of the solution in addressing higher demands and reducing the need for new grid-connected resources. DERs can also enhance supply security and resiliency.** This potential is illustrated by the experience of New York City during Hurricane Sandy. The storm left eight million people without power in New York, and some of the hardest hit areas were left without power for two weeks. In the heart of New York City, however, NYU's Washington Square campus remained powered by a 13.4 MW natural gas-fired combined heat and power (CHP) system that had recently been installed. In Ontario, several customers (for example, Metrolinx) have installed small CHP systems in their facilities that are capable of providing heat and power during an interruption of grid power. At the same time, distributed energy resources and other local solutions are receiving greater attention with greater involvement of customers and communities in regional planning. Addressing barriers to the adoption of [DERs], such as cost allocation and integration issues, could help to better realize their potential benefits.[23] (emphasis added)

21. The IESO's August 2016 *Market and System Operations & Transmission and Distribution Outlook* noted that "DERs may eventually play a larger role in helping manage the bulk system,

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[22] Carlson, Richard & Sholzberg, Reuven. "Technology is disrupting the energy sector. What does this mean for consumers and what should be done about it?" Mowat Centre (February 14, 2017). https://mowatcentre.ca/technology-is-disrupting-the-energy-sector-what-does-this-mean-for-consumers-an

[23] Independent Electricity System Operator, *Ontario Planning Outlook: A technical report on the electricity system prepared by the IESO* (September 1, 2016). Available online: http://www.ieso.ca/sector-participants/planning-and-forecasting/ontario-planning-outlook.

including providing load-following and flexibility".[24] The IESO provided a graph of actual and forecasted DER installation penetration levels for residential and non-residential solar PV (attached at Appendix B), showing residential growth exceeding 25 gigawatts by 2021, and noting that "system planners, both transmission and distribution, should be assessing the penetration of large amounts of DERs that may require changes to forecasting, dispatch, and control of the bulk power system."[25]

22. Moreover, the Electricity Distributors Association (**EDA**) fully acknowledged the importance of DERs in prudent distribution planning:

> DERs will factor more prominently in power generation, distribution, and management, and by their nature offer significant potential for new technologies to support grid modernization, micro grids, more energy storage and improved conservation efforts. The growing presence of DERs will certainly bring LDCs even closer to the core of the province's electricity system… over the next decade innovative LDCs will advance from primarily one-way deliverers of power to two-way, networked generators, distributors, and managers of electricity – all in support of customer demands. Their ingenuity will trigger an ecosystem of integrated power flows and digitally enabled intelligent grid architecture… The roles and responsibilities of LDCs, as well as the Independent Electricity System Operator, should evolve in parallel to changing market conditions and demands as DER penetration increases…
> LDCs must be central to providing DER enabling technologies due to operational and planning practicalities. **Their knowledge and experience with the distribution network will give insights for optimal DER locations for customers and will help maintain system integrity and reliability as DERs increasingly take hold in tomorrow's electricity system**…"[26] (emphasis added)

[24] Independent Electricity System Operator, "Module 5: Market and System Operations & Transmission and Distribution Outlook" (August 2016) at 32. Available online: http://www.ieso.ca/-/media/files/ieso/document-library/planning-forecasts/ontario-planning-outlook/module-5-market-and-system-operations-tx-and-dx-outlook-20160901-pdf.pdf?la=en.

[25] IESO DER North American Perspective *supra* note 5.

[26] Electricity Distribution Association, *The Power to Connect: Advancing Customer-Driven Electricity Solutions for Ontario* (February 2017). Available online: https://secure2.eda-on.ca/iMIS15/EDA/EDA_Priorities/EDA_Policy_Papers/PowerToConnect_Feb2017.aspx.

23. Finally, the Minister of Energy has also recognized the importance of DERs. The Ministry directed the Board in 2010 to take a series of steps to establish, implement, and promote a "smart grid" (the **Smart Grid Directive**).[27] The Smart Grid Directive (attached at Appendix C) included having the Board guide regulated entities in the preparation of plans for the development and implementation of the smart grid, including Regional Smart Grid Plans and the objectives of: maintaining reliability of the electricity grid and improving it wherever practical, including reducing the impact, frequency, and duration of outages; enabling a flexible distribution system infrastructure that promotes increased levels of distributed renewable generation; enabling improved control and automation on the electricity grid where needed to promote distributed renewable generation; providing flexibility within smart grid implementation to support future innovative applications, such as electric vehicles and energy storage; and nesting within smart grid infrastructure planning and development the ability to adapt to and actively encourage innovation in technologies, energy services, and investment/business models. [28]

24. Despite the existence of these multiple sources touting DERs as a critical element of prudent distribution system operation and planning, Hydro One does not appear to include DERs in its DSP or otherwise in the Application.

25. Similarly, the Anwaatin First Nation Communities' community energy plans including various DERs strategies for cost containment and reliability do not appear to be reflected in the Application.

26. The Anwaatin First Nation Communities are of the view that DERs are credible and available strategy to support local community efforts to contain costs and improve electricity reliability in Indigenous communities and their surrounding areas. Indigenous community energy plans

[27] Order in Council 1515/2010 (Executive Council of Ontario), Minister's Directive (November 23, 2010) ["Smart Grid Directive"].
[28] Ibid.

should reflect the status of Indigenous rights holders in the energy paradigm and encourage local Indigenous solutions. This includes the integration of local power generation, net metering, and energy storage into local systems where cost containment and reliability are at issue.

27. The Aroland First Nation Community Energy Plan, for example, notes that Aroland First Nation experiences 10 to 15 power outages annually, according to key informant interviews.[29] Power shortages during the winter can affect community members' ability to heat their homes, because of broad community reliance on electrical heat. Additionally, power outages can: (i) affect the water supply in the community, (ii) spoil months' worth of food that is hunted, fished and harvested throughout the year, and (iii) have negative effects on community members with health issues.[30] Aroland First Nation's current water treatment system relies on electricity to pump and treat the water.[31] There are times, despite the existence of a back-up generator, when poor diesel generator function causes the water supply to be compromised for several days following a power outage, and community members are forced to boil water for cooking and drinking.[32]

28. Aroland First Nation has determined that power generated in Aroland could mitigate planned and unplanned power outages relating to problems with the electricity distribution and transmission system. Aroland has investigated several distributed energy solutions and has considered installing DERs, including solar photovoltaic (**PV**), biomass generation, wind power, water power, and combined heat and power.[33] Aroland has pursued solar PV projects in other parts of Ontario and has been successful in securing several 500 kV Feed-in-Tariff projects.

[29] Aroland First Nation, *Community Energy Plan*, prepared by Shared Value Solutions Ltd. (October 5, 2016) at 39.
[30] Ibid.
[31] Ibid.
[32] See ibid at 69.
[33] Ibid.

IV. POTENTIAL CAPITAL EXPENDITURE AND PAYMENT MODELS FOR RESOURCES TO ADDRESS DISTRIBUTION SYSTEM RELIABILITY CHALLENGES IN INDIGENOUS COMMUNITIES

29. There are several potential capital expenditure and payment models for resources to address distribution system reliability challenges in Indigenous communities. They include: leveraging government funding, Pay-As-You-Save (**PAYS**) financing, and community geothermal financing. Hydro One indicates in its First Nations and Métis Strategy that communities would like to prioritize expansion of procurement, investment/ownership opportunities, and other business partnership opportunities for Aboriginal businesses. Hydro One also indicates that it engages First Nations on investment/ownership opportunities on a project-by-project basis and provided major transmission line examples, such as the Bruce to Milton Transmission Project and the Niagara Reinforcement Project.[34] Hydro One has not yet engaged First Nations on investment/ownership opportunities and other business partnership opportunities related to DERs in grid-connected communities. It has only recently begun exploring opportunities to partner with interested First Nation communities and to leverage federal and provincial government funding to support green energy and greenhouse gas-reducing energy projects.

30. Aki Energy, an Indigenous social enterprise group, has successfully worked with a provincial utility to establish: (i) a distributed energy model that uses rate-based PAYS financing; and (ii) a Community Geothermal Program for First Nations communities where geothermal heat pump systems are installed and maintained by Aki Energy First Nation contractors.

31. In each of these models, ratepayers pay little or no upfront capital costs to install the systems using "on-bill" PAYS financing and they see immediate energy reductions, cost savings, local socio-economic benefits, jobs, and business creation. The on-bill PAYS financing model can be adapted to other DERs, such as PV and storage, at either the household or community level, according to Aki Energy staff. I conducted a video interview of Shaun Loney, Director of

[34] EB-2017-0049, Exhibit I, Tab 6, Schedule Anwaatin-1 at 3.

Development at Aki Energy, on the potential of the PAYS model in Indigenous communities.[35] The video is provided in conjunction with this evidence.

32. Each of these opportunities may inform Hydro One in considering both non-wires solutions and alternate capital expenditure and payment models for DERs and related resource solutions in order to better address distribution cost and system reliability challenges in Indigenous communities.

[35] Note: Anwaatin's evidence at the hearing in EB-2017-0049 will include videotaped first-person interview testimony that supplements and provides detail on the PAYS financing model. This video is available online at: https://youtu.be/oXGrVVGx6Gw.

APPENDIX A

Curriculum vitae of Dr. Don Richardson

Donald R. Richardson, PhD

Managing Partner, Shared Value Solutions Ltd.

Professional History
06/2012 – present, Shared Value Solutions, Managing Partner
09/2004 – 06/2012, AECOM, Global Practice Leader – Socio-economics & Communications, National Leader – Indigenous Business Development
2001 - 2004, Stantec Consulting Ltd., Senior Community Infrastructure and Project Development Specialist
1998 - 2001, TeleCommons Development Group, Director
1994 - 2000, University of Guelph, Associate Graduate Professor (part-time), Faculty of Environmental Design and Rural Development
1987 - 1994, University of Guelph, McMaster University and Wilfred Laurier University, Sessional Lecturer

Education
PhD, Industrial Sociology, McMaster University
MA, Communications and Sociology, University of Guelph
BA, Sociology, University of Guelph
Diploma, Business and Marketing, Lambton College

Awards
Award of Merit – Consulting Engineers of Ontario: Aboriginal Traditional Ecological Knowledge Study
Brownie Award – Canadian Urban Institute: Stelco Swansea Works Remediation & Residential Rebuild

Years of Experience
25

Overview
Don Richardson has over 25 years of experience as a skilled facilitator supporting project implementation, impact assessments and building agreements between energy, infrastructure and resource management project proponents, community/non-governmental organizations, government agencies and rural/Indigenous communities. He fosters constructive engagement to create “shared value” between communities and infrastructure proponents.

Don currently manages stakeholder and government relations on several large scale environmental and infrastructure development projects. He is a recipient of the Canadian Urban Institute’s Brownie Award recognizing outstanding achievement in building and maintaining effective working partnerships with professionals, the local community and others involved in Brownfields redevelopment, and a Consulting Engineers of Ontario, Canada Award for Indigenous Traditional Knowledge achievements.

Specialties
Collaborative energy and infrastructure project management, environmental assessment, major project impact assessment, cumulative impact assessment, consultation, communication, facilitation, mediation, negotiation, environmental enhancement programs, natural resource management, and participatory communications.

Selected Global and Canadian Experience

Northand Power – Northern Ontario Power Generation Business Coordinator. Assistance in establishing joint-venture partnership among several entities including municipalities and several Anishnabwe First Nations for a proposed gas-fired power generating station in northern Ontario. [2014 – Present]

Anwaatin Inc. – Technical advisor for Indigenous low-carbon energy business development and Indigenous carbon offset projects. [Present]

Walker Industries and Anwaatin. Siting process for establishing a proposed commercial-scale biosolids-to-fertilizer and biomethane-to-pipeline-grid facility on First Nation owned lands in Ontario. [Present]

Multiple Northern Ontario First Nations – Feasibility study for extending natural gas infrastructure to communities adjacent to the TransCanada Mainline natural gas pipeline. [Present]

Matawa First Nations – Ring of Fire Mining Initiatives. Strategic regional and community infrastructure advisor for focused on rail, road, transmission telecommunication and water management infrastructure. [2011 – Present]

Aroland First Nation – Project coordinator for regional transmission line project development initiatives, including regional transmission and transmission line planning for the Ring of Fire mining development and connections to remote first Nations [2013 – Present]

Saugeen Ojibway Nation – Environmental Communications Capacity Building Advisor. Assistance in establishing a communications unit to enhance community engagement and informed community decision-making with respect to the proposed Deep Geological Repository for Low and Intermediate Level Nuclear Waste at the Bruce Nuclear Site. [2014 – Present]

Aroland First Nation. Strategic Advisor. Assistance to develop approaches to major infrastructure, mining, power, rail, road and land use projects that integrate indigenous First Nation values, environmental considerations and cultural heritage contributions. Includes liaison with major mining companies, CN Rail, TransCanada Pipelines, Cliffs Natural Resources, the IESO and several other entities with projects, operations and interests in the traditional territory of the Frist Nation. Work also includes coordinating First Nation led environmental assessments and risk assessments of contaminated sites to be incorporated within reserve lands. [2011 – Present]

Aroland First Nation. Project Director. IESO-funded Community Energy Plan project to provide the First Nation with a strategic sustainable energy plan [2015-2016]

Mississaugas of the New Credit First Nation. Strategic Advisor. Assistance to develop approaches to major Greater Toronto Area, Canada infrastructure projects that integrate indigenous values, environmental considerations and cultural heritage contributions. Work has included review and impact benefit agreement coordination with the proposed 1,000 kV ITC Lake Erie transmission line from Nanticoke to Pennsylvania, successfully positioning the First Nation as *the* Host First Nation for the 2015 Pan Am Games, and economic development relationship building with OPG and regional pipeline operators [2012 – 2016].

Bamkushwada-Great Lakes Power Transmission. Environmental Assessment Advisor. Working directly with joint venture partners, Brookfield Power, HydroOne Networks and six indigenous rural First Nation business partners involved in the proposed East-West Tie Transmission project along the north of Lake Superior, provided detailed work plan and budgeting support to the joint venture. [2011 – 2014]

Indigenous Aboriginal Community Energy Planning Program Development; Ontario Power Authority. Strategic Advisor. Assistance to develop a new funding program to provide indigenous rural

First Nation and Métis communities across Ontario with resources to undertake Community Energy Planning. [2010 – 2012]

Canadian Environmental Assessment Agency. Co-author. Guidance report on ways and means to improve the integration of indigenous Aboriginal Traditional Knowledge as part of federal Environmental Assessments. [2014]

Brookfield Power – First Nation Business Coordinator. Assistance in establishing joint-venture partnerships among several Anishnabwe First Nations for transmission line projects in northern Ontario. [2014]

Cumulative Effects Management Association (CEMA). Strategic Advisor. Project to identify practical paths forward for the integration of Indigenous traditional knowledge within oil sands mine closure and rehabilitation. (CEMA) is the leading multi-stakeholder group operating in the heart of Canada's Boreal Forest – the Regional Municipality of Wood Buffalo, Alberta. CEMA is comprised of more than 50 members who sit on one of four caucuses: Indigenous, Government, Non-Government Organizations and Industry. CEMA is a key advisor to the provincial and federal governments committed to respectful, inclusive dialogue to make recommendations to manage the cumulative environmental effects of regional development on air, land, water and biodiversity. [2014 – 2015]

Technical Review of Environmental Assessments Detour Lake Gold Mine Project Coral Rapids Power L.L.P, (representing Taykwa Tagamou First Nation). Strategic advisor for reviews of technical aspects and Aboriginal consultation for two provincial EAs and a federal Comprehensive Study EA for the proposed Detour Lake gold mine project. [2010 – 2011]

Ontario Power Generation, Deep Geological Repository for Low/Intermediate Level Nuclear Waste, Public Consultation Program, Canada. Project manager for public consultation and Indigenous community impact assessment components for the environmental assessment for Canada's first deep geological repository for nuclear waste. [2007 – 2013]

Walpole Island First Nation Community, Peer Review - Proposed Shell Canada Refinery Expansion, Sarnia, Ontario. Project manager working closely with First Nation technical staff, community elders, clan mothers and band councillors, facilitated the technical review and socio-economic impact assessment review of a proposed $10 billion, 200,000 barrel per day heavy oil refinery on the St. Clair River. [2007 - 2008]

Windsor Essex Parkway – Province of Ontario. Strategic advisor for community communications and Indigenous consultation for the Windsor Essex Parkway engineering, design and construction, reporting to Province of Ontario. [2011 – 2013]

Flin Flon & Creighton Education Outreach Campaign for HudBay Minerals - Strategic Advisor overseeing the design and implementation of a community outreach campaign to educate residents of the Flin Flon area about ways to reduce exposure to lead in relation to human health risks. [2010-2013]

Nuclear Waste Management Organization, Community Well-being Support. Stakeholder engagement specialist providing expert guidance to the Nuclear Waste Management Organization on community well-being and stakeholder and indigenous Aboriginal engagement aspects of site selection for a deep geological repository for used nuclear fuel in Canada. [2008 to 2013]

GE Canada, Environmental Programs - Community Relations Programs for Legacy Industrial Sites, Ontario. Implementing four stakeholder relations and communication management programs to manage issues associated with remedial activities for contaminated industrial sites, including First Nation engagement. [2005 - Present]

Walker Industries Southwestern Landfill Environmental Assessment, Oxford County, Ontario. Public consultation and communication coordinator responsible for planning and implementation of an extensive public consultation program to enable stakeholders and First Nation partners to actively participate in the planning and execution of an Individual environmental assessment for an industrial, commercial and institutional Ontario, Canada landfill. [2012 – Present]

Gabriel Resources and Rosia Montana Gold Corporation, Environmental Assessment, Romania. Provided planning and strategic support for an extensive public and Indigenous Roma consultation program for the strategic environmental assessment for what may become one of the world's largest gold and silver mining operations. [2002 - 2004]

Global Environment Facility, Meso-American Barrier Reef System - Environmental Monitoring and Information System. Facilitated a multi-stakeholder program for the design and implementation of a distributed electronic information system for government and local/Indigenous partners from Belize, Guatemala, Honduras, and Mexico who are collaborating in the protection of the ecologically unique and vulnerable marine ecosystems of the western Caribbean. [2003 - 2004]

Environmental Monitoring Information Network (EMIN), Governance Component, Bangladesh. Provided advice and assistance on mechanisms and processes for achieving multi-stakeholder governance of the Network, including representation from indigenous peoples' organizations. The purpose of EMIN is to implement an information network to facilitate the planning and management of water and land resources as it relates to flood and erosion monitoring among national stakeholders and relevant agencies in the Brahmaputra-Jumuna Rivers region of Bangladesh. [2001 - 2003]

Keewaytinook Okimakanak First Nations, Aboriginal Smart Community Project Planning and Evaluation Component, Northwestern Ontario. Worked with First Nation community leaders in six Keewaytinook Okimakanak First Nations communities for this $10 million Smart Community Project. Activities incorporated participatory exercises that enable local residents to envision the integration of telecommunication systems, applications and related energy infrastructure within their communities, together with assistance in developing and implementing the monitoring and evaluation program for the community initiatives. [1999 - 2004]

Industry Canada, Smart Communities Engagement Best Practices, Nationwide. Project team leader for a cross-Canada fact-finding and analysis of community experiences, particularly among rural and Indigenous communities, to yield five community engagement best practices with concrete examples. [2002 - 2003]

Industry Canada, Smart Communities Performance Measurement and Sustainability, Nationwide. Researcher and co-author for a cross-Canada fact-finding and analysis of community networking experiences, particularly among rural and indigenous communities, to yield a series of sustainability and performance measurement best practices with concrete examples. [2002 - 2003]

Caribbean Telecommunication Union, International Telecommunication Union, United Nations Educational, Scientific and Cultural Organization, Caribbean Development Bank, Canadian International Development Agency, Multi-stakeholder Collaboration to Enhance Rural and Remote Telecommunications, Caribbean. Planned and facilitated multi-stakeholder workshops for cross-Caribbean stakeholders: government, regulators, telecommunication operators, Indigenous communities, and rural community leaders. [2003]

Social Action Program Communication, Pakistan. Planned and facilitated multi-stakeholder planning for public-private district and provincial infrastructure and service delivery in Punjab, Sindh and Balochistan provinces. Focused on enabling partner organizations and indigenous peoples' organizations to develop a comprehensive results-based management plan and evaluation framework for this project. [1998 - 2002]

Government of Egypt and Food and Agriculture Organization of the United Nations, Rural Development and Agricultural Communication System, Egypt. Worked with Egyptian counterparts to develop and implement a program framework for the establishment and evaluation of a stakeholder driven Internet-based communication network that improves linkages between agricultural extension and research systems and rural community members. The project evolved from a four site pilot project to a fifty site program funded entirely by the government of Egypt and continues to generate significant improvements to the lives or rural community members across the country. [1998 - 2002]

Canadian International Development Agency, Institutional Support to the Development Support Communication Centre, Dikirnis, Nile Delta, Egypt. Responsible for enabling a government facility to transform itself for public-private service provision. Work included developing business planning, marketing and sales processes, facilitating and coordinating joint work plans to strengthen rural community development and agricultural communication, designing monitoring and evaluation frameworks, training program development, gender mainstreaming for agricultural services, introduction of improved electricity, water/irrigation and telecommunication and Internet services for the agricultural extension system, and the establishment of new decentralized, fee-for-service Rural Extension Units to provide more responsive extension services to small farmers across Egypt. The project enabled the Ministry of Agriculture to establish a physical hub in the Nile Delta to support the transition of Egypt's agricultural system from a state-controlled system to a market-based system. [1995 - 2001]

Grameen Bank / Grameen Phone, Bangladesh: Multi-Media Research and Evaluation - Project Director (1999). In partnership with Grameen Telecom, conducted a multi-media evaluation and case study of telephone demand in rural villages of Bangladesh, focusing on the impact of phone use on agricultural marketing, agricultural extension, poverty reduction and analysis of phone usage patterns.

SR Telecom, Ghana: Environmental Assessment and Rapid Market Appraisal /Demand Analysis for rural telephone system in Northern Ghana - Project Team Leader (1998-99). Coordinated a detailed environmental assessment, infrastructure assessment and socio-economic business planning study for a private sector telecom provider for demand-based telecommunication service among rural and agricultural stakeholders in Northern Ghana. The study included power infrastructure inventory and assessment, plus focus groups and survey interviews in 64 villages, together with meetings with village chiefs and key rural and agricultural leaders.

SR Telecom, Multiple Projects, Chile, Haiti, Ghana, and the Philippines. Co-ordinated a corporate strategic program to assist in the implementation and management of telecommunication infrastructure development projects in rural areas. Work included producing detailed socio-economic business plans, coordinating village-based market research programs, producing environmental impact assessments, conducting power infrastructure assessments, and developing strategic approaches to dovetailing telecommunication infrastructure with in-country programs for environment, health, agriculture, Indigenous community wellbeing, and socio-economic development. [1997 - 2000]

International Development Research Centre and International Fund for Agricultural Development, Rural Electronic Networking, Asia-Pacific. Managed multi-stakeholder communication and rural community development needs assessment, planning and development of evaluation frameworks for an eight country Asia-Pacific electronic networking project to enable rural and agricultural development projects to combine Internet connectivity with traditional communication media and outreach activities. Specific support for enabling rural development stakeholders to develop and evaluate practical telecommunications infrastructure and applications in the Philippines, Sri Lanka and Nepal, India. [1998 - 2001]

Community Basic Infrastructure Development, Various Locations. Provided multi-stakeholder communication and rural community development needs assessments, program planning and project

implementation for a variety of clients. Work included projects for clients such as the World Bank, Industry Canada, Rotary International, UK Department for International Development and UN agencies in Bangladesh, Belize, Bolivia, Cameroon, Canada, Colombia, Guatemala, Honduras, India, Italy, Nepal, Pakistan, South Africa, Sri Lanka, Tanzania, Thailand, Uganda, and the United States. [1993 - 2002]

Confidential Client, Waste Management Facility Site Selection, Ontario. Strategic advisor for a comprehensive analysis of stakeholder and political contexts for the siting of two major waste management "campus" facilities in Ontario, Canada. [2008 to 2011]

Environmental Assessment Guide - Métis Nation of Ontario. Co-author and Reviewer. Developed a guide on the environmental assessment processes for use by Métis Nation of Ontario (MNO) staff and Community Council leaders. [2009 – 2010]

Walker Industries Atlas Landfill Remediation Project, Welland, Ontario. Strategic advisor responsible for overseeing engagement of area residents, indigenous Aboriginal communities and government agency technical staff in shaping plans for the remediation and reopening of an abandoned industrial landfill on the banks of the Welland River. [2009 - 2010]

Walker Industries Niagara Falls Landfill Expansion Environmental Assessment, Niagara Region, Ontario. Public consultation and communication coordinator responsible for planning and implementation of an extensive public consultation program to enable stakeholders and Indigenous communities to actively participate in the planning and execution of a comprehensive environmental assessment for one of the largest private sector landfill expansions in Ontario. The project received provincial, regional and municipal approval with no objections from area stakeholders. [2002 – 2009]

Walpole Island First Nation Community, Peer Review - Proposed Shell Canada Refinery Expansion, Sarnia, Ontario. Project manager working closely with First Nation technical staff, indigenous community elders, clan mothers and band councillors, facilitated the technical review and socio-economic impact assessment review of a proposed $10 billion, 200,000 barrel per day heavy oil refinery on the St. Clair River. [2007 - 2008]

District of Greater Sudbury, Soils Study, Sudbury, Ontario. Planned and implemented a public consultation program for the largest human health and ecological risk assessment in Canada related to historic smelting operations. Work included multi-stakeholder planning to design the engagement of First Nations communities in the scientific fieldwork and results analysis. [2003 - 2009]

Government of Hong Kong, Kowloon Bay Waste Transfer Facility Environmental Assessment, Hong Kong. Project director for strategic planning and community stakeholder relations advice for the environmental assessment of a major waste transfer and waste diversion facility. [2008]

Shell Canada, Sarnia Refinery, Effluent Management Plan Review, Multiple Locations. Project manager for an internal multi-stakeholder review of the oil refinery's effluent management system and proposals for system upgrades. Work included significant attention to the stated requirements of external stakeholders: indigenous First Nations, communities in Michigan, and regulatory authorities. [2007]

Nuclear Waste Management Organization, Assessment of Benefits, Risks and Costs for Long Term Management Approaches for Used Nuclear Fuel: Community Well-being and Stakeholder Engagement Issues, Canada. Compared several Canadian economic regions with respect to community capacity to engage in complex social, economic and environmental planning processes. Report included recommendations for capacity building for equitable, transparent and meaningful stakeholder engagement, particularly with respect to poorer economic regions and economic regions with significant First Nations populations. [2004 - 2005]

APPENDIX B

IESO Graph of Actual and Forecasted PV Installation Penetration Levels

North American DER Penetration Levels

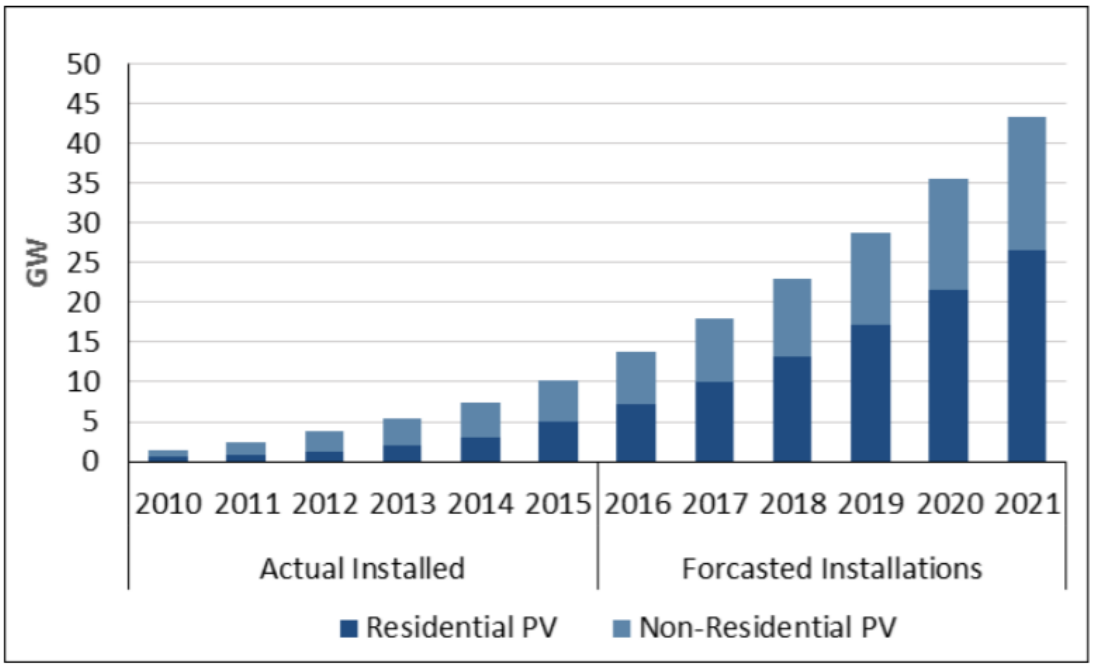

Figure 1: Actual and forecasted DER installation penetration levels.

Source: Independent Electricity System Operator, "DER – North American Perspective", Robitaille, David (March 9, 2017). Available online: http://www.ieso.ca/-/media/files/ieso/document-library/standing-committee/gli/gldc-20170309-na-perspective.pdf?la=en.

APPENDIX C

Minister's Directive to the Ontario Energy Board – Smart Grid

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.