

REQUESTOR NAME: **BC Sustainable Energy Association**

INFORMATION REQUEST ROUND NO: 2

TO: **FortisBC Inc. (FBC)**

DATE: **November 23, 2012**

PROJECT NO: **3698682**

APPLICATION NAME: **Application for a Certificate of Public Convenience and Necessity (CPCN) for the Advanced Metering Infrastructure (AMI) Project**

75.0 Topic: Greenhouse Gas Emissions

Reference: Exhibit B-1, pp. 83-84, lines 30 – 2.

FortisBC says: “It is expected that with an AMI-enabled theft detection program, marijuana grow operators may choose to switch to alternate energy sources rather than pay for electricity. This reduction in gross load is accounted for by assuming a 1 percent growth in grow sites in the probable AMI forecast as opposed to the 2 percent assumed in the status quo model.”

75.1 Please confirm that “a 1 percent growth in grow sites ... as opposed to the 2 percent assumed in the status quo model” is intended to represent the reduction in energy demand from grow ops that FortisBC forecasts for the AMI case relative to the “status quo” case.

75.2 Please provide a calculation using GHGenius v.4.0 of the annual greenhouse gas emissions of one grow-op of typical energy consumption (as defined by FortisBC in its analysis of theft detection) using fossil fuel powered generation, specifying fuel type (diesel or gasoline) if possible.

76.0 Topic: Meaning of “IHD”

Reference: Exhibit B-1, Glossary of Terms, page vii

“IHD: means In-Home Display or In-Home Device.”

76.1 Please confirm that most of the time when FortisBC uses “IHD” in the filed materials it means In-Home Display, not In-Home Device. Please identify any instances in the filed materials where FortisBC intends “IHD” to mean In-Home Device.

76.2 Please confirm or comment on the following:

76.2.1 An In-Home Display is one type of In-Home Device.

76.2.2 Other examples of In-Home Devices would include smart appliances.

76.2.3 In the present context, the central function of an In-Home Display is to display electricity consumption and cost information.

76.2.4 An In-Home Display might or might not be connected to other In-Home Devices.

77.0 Topic: Function of ZigBee board in meter

Reference: Exhibit B-11, BCSEA IR#1 15.6.6, page 50

“FortisBC expects AMI meters to be the ZigBee network coordinator controlling the formation and security of the ZigBee HAN network. FortisBC believes this to be the case in Texas as well.

The Zigbee addressing scheme is capable of supporting more than 64,000 nodes per network and multiple network coordinators can be linked together to support extremely large networks.

The Itron meter supports up to 10 registered HAN devices.”

77.1 Please provide more information about the function of the ZigBee board in the meter as the “coordinator” of a home area network (HAN) consisting of one or more In-Home Devices.

77.1.1 Is the coordinator limited exclusively to registering devices on the HAN?

77.1.2 Does the coordinator authorize communication between one In-Home Device and another In-Home Device on the HAN?

77.1.3 Does the coordinator store any information other than authentication data? Please list the types of information that would be stored in the ZigBee board in the meter.

77.1.4 For clarity, please confirm that the ZigBee system requires at least one device on the home area network to serve the “coordinator” function.

77.1.5 Please confirm that there is one and only one ZigBee Coordinator for a HAN. Please confirm that if the Smart Meter is the ZigBee Coordinator, then no other HAN device can be a Coordinator for that HAN.

77.1.6 Please describe all the functions that the Coordinator in the Itron meters will perform for the system proposed by FortisBC.

77.1.7 Please explain the purpose of a Trust Center.

77.1.8 Please compare the functions and complexity of a ZigBee Coordinator to those of a ZigBee Router and ZigBee End Device.

77.1.9 Please classify the ZigBee types (Coordinator, Router, End Device) for In-Home Displays and Gateways for the system proposed by FortisBC.

77.2 What customer information is stored in the ZigBee board in the meter, particularly when the customer has a Home Area Network of which the ZigBee board in the meter is the coordinator?

77.3 Would it be feasible for FortisBC or Itron to configure the ZigBee board in the AMI meters so that the home area network “coordinator” function was not in the meter but in an In-Home Device, such as the In-Home Display or Gateway?

- 77.3.1 If this was feasible, would doing so reduce the basis for any customer concerns regarding privacy and security associated with having the customer's HAN information flowing through the utility's meter?
- 77.3.2 Does FortisBC have any objection to configuring the ZigBee board in the AMI meters so that the HAN coordinator function is within an In-Home Device? If so, please explain.
- 77.4 Would it be feasible for FortisBC or Itron to configure the ZigBee board in the AMI meters so that that it connects only with an In-Home Display and, at the customer's option, an in-home gateway device?
- 77.4.1 Would this architecture provide separation between the customer's home area network and the utility?
- 77.4.2 Would this reduce the basis for any customer concerns regarding privacy and security associated with having the customer's HAN information flowing through the utility's meter?
- 77.5 What happens if the customer wishes to have more than 10 In-Home Devices on the HAN?
- 77.6 Please confirm that each product added, deleted or changed from the customer's ZigBee network would need to be registered to the AMI meter and registered through FortisBC or its system process.
- 77.7 Please confirm that information regarding each of these HAN devices would be stored in the Smart Meter and the online registering service. If not please explain.
- 77.7.1 If so, please discuss the privacy and security issues regarding the storage of this level of information in a device (the Smart Meter) not owned by the customer.
- 77.8 If the types of products that are allowed on the ZigBee network was to be limited in some way (such as being limited to In-Home Displays and Gateways), could this limiting function be done at the time of registering? If not, please explain.
- 77.9 Is it true that the Smart Energy Profile requires the installation of special Certification codes?
- 77.9.1 Please explain the process involved in generating Certification codes. For example, does each ZigBee coordinator or AMI meter need its own code? How are the certificates obtained? What organization generates them? How are they disposed of?

78.0 Topic: ZigBee Coordinator
Reference: Exhibit B-11, BCUC IR#1 15.6.7, page 51

Regarding the concept of the customer's HAN device being the coordinator and the Smart Meter being an end device, FortisBC states:

"It is technically possible in both jurisdictions. The customer's HAN device would need to both be a Zigbee end device (to connect to the meter) and a Zigbee server (to connect to the customer HAN network)."

- 78.1 Please clarify why the customer's HAN device would need to be a Zigbee end device if it is the coordinator and the meter is an end device.
- 78.2 Please discuss the pros and cons of such a setup (meter as an end device).
- 78.3 Please discuss the hardware requirements and complexity for an end device versus a coordinator.
- 78.4 Please discuss the hardware ramifications if the Itron meter was an End Device instead of a Network Coordinator.
- 78.5 Please discuss the need for over-the-air updates if the Itron meter was an End Device instead of a Network Coordinator.

79.0 Topic: ZigBee Coordinator

Reference: Exhibit B-11, BCSEA IR#1 16.5, page 53; Exhibit B-11, BCSEA IR#1 Appendix 3.1, Section 5.2, Page 27, Figure 5; Exhibit B-11, BCSEA IR#1 Appendix 3.1, Section 5.3, Recommendation M1, page 29

FortisBC explains in regards to the ZigBee acting as the center control manager:

"The AMI meter will be ZigBee Network Coordinator. This ensures that FortisBC can ensure that only devices that will not harm the meter and that will adequately secure customer data can be registered."

- 79.1 Please discuss the relationship between the Network Coordinator and the Trust Center.
- 79.2 Please confirm that a customer with their own private ZigBee network of devices would have their own ZigBee Network Coordinator. Please discuss how this is managed.
- 79.3 Please discuss in detail the ways in which harm could be done to the meter and the types of devices that could harm the meter.
- 79.4 Please discuss in detail how the AMI meter being the ZigBee Network Coordinator ensures that customer data is adequately secure.
- 79.5 If the Smart Meter was an End Device and the Network Coordinator was in the customer's premises, please discuss in detail how this could be done to ensure no harm is done to the meter, and so that customer data could be adequately secured.
- 79.6 Please compare the privacy and security concerns for the two scenarios (Smart Meter as the Network Coordinator or as an End Device).

80.0 Topic: In-Home Displays and three utilities

Reference: Exhibit B-1, Section 8.2.3

In the referenced section 8.2.3, FortisBC states:

“BC Hydro, FEI and FortisBC will continue to work together to ensure that in-home display devices purchased will work for any of the three utilities.”¹

- 80.1 Please discuss how the three utilities plan to work together.
- 80.2 Please discuss how it was decided that the in-home display devices should work for any of the three utilities. Please include the advantages and disadvantages of doing so, and other approaches that were explored.
- 80.3 Were the potential issues with SEP versions (SEP 1.x or SEP 2.0) taken into account when this decision was made? Please discuss.

81.0 Topic: Home Automation and HAN in FortisBC AMI RFP
Reference: RFP, Exhibit B-11, Appendix BCSEA IR#1 8.1, page 29 of 124

In the RFP, FortisBC states:

“The following are FortisBC’s key objectives with respect to the implementation of AMI:....

e) Support customer in-home automation by providing usage information and price signals into the customer’s home.” [underline added]

- 81.1 Please explain what FortisBC meant by “in-home automation” as the phrase was used in the RFP.
- 81.2 Is there a distinction to be made between the smart meter supporting in-home automation by providing usage information and price signals into the customer’s home, and the smart meter providing the “coordinator” function for a home area network that includes home automation devices?
- 81.3 Could the smart meter support in-home automation by providing usage information and price signals into the customer’s home *without* providing the “coordinator” function for a home area network? If so, how.
- 81.4 At the risk of repeating IR 77.4, would configuring the ZigBee board in the AMI meters so that that it connects only with an In-Home Display and, at the customer’s option, an in-home gateway device support in-home automation while reducing the basis for any customer concerns regarding privacy and security associated with having the customer’s HAN information flowing through the utility’s meter?

82.0 Topic: SEP Versions
Reference: Exhibit B-11, BCSEA IR#1 1.1, 1.2, 1.3, 1.5.1; CSTS IR#1 54.1

FortisBC states:

“ZigBee SEP 1.1 may be the only available standard that can be implemented initially.” [underline added] [BCSEA IR#1 1.1]

¹ Exhibit B-1, Section 8.2.3,

“Only one version or the other can be implemented in the meter at any point in time. The HAN firmware can be upgraded “over the air” (remotely).” [BCSEA IR#1 1.2]

“It is expected that gateway devices will be available that can allow a meter running v2.0 to interoperate with devices running v1.1 (or vice-versa). The Zigbee Alliance intends to start working on such a solution by the end of 2012.” [BCSEA IR#1 1.3]

“The Zigbee Alliance expects to have a ratified specification [for SEP 2.0] by the end of 2012 (although the date has slipped previously). FortisBC does not have information regarding the hurdles that need to be overcome to achieve a ratified specification, nor what the risks may be.” [BCSEA IR#1 1.5.1]

“Zigbee Smart Energy v2.0 includes additional functionality related to:

- Deployments in multi-dwelling units;
- Supporting multiple energy service interfaces in a single premise;
- Supporting any transport layer based on IETF IP compliant standards, including but not limited to ZigBee IP, other RF-based and Power Line Carrier (PLC)-based transports; and
- Supporting internationally recognized standards to ensure long-term interoperability with multiple technologies.” [CSTS IR#1 54.1]

82.1 Does FortisBC agree that the customer privacy and security implications may be different for SEP 2.0 than for SEP 1.1? Why?

82.2 Does FortisBC plan to obtain Commission approval for implementation of SEP 2.0? Please explain.

82.2.1 Would FortisBC be averse to a Commission direction that FortisBC seek public input and obtain Commission approval before implementing SEP 2.0? If so, please explain.

83.0 Topic: Pilot testing

Reference: Exhibit B-11, BCSEA IR#1 1.5.3, page 2; Exhibit B-6, BCUC IR#1 28.1.2, pages 69-73

BCSEA-SCBC asked: “What testing has been done for v2.0 or is expected before it is considered complete? Does FortisBC plan any pilot testing?” [underline added]

FortisBC responded: “No testing has been done or is planned before the standard is considered complete. FortisBC expects to do pilot testing as described in the response to BCUC IR No. 1 Q28.1.2.”

In BCUC IR No. 1 Q28.1.2, the Commission asked when In-Home Display devices would be available to the ratepayer. FortisBC states “The IHD devices will be piloted in 2014, with availability to customers expected in 2015.” [underline added]

83.1 There may be confusion between pilot testing of In-Home Displays and pilot testing of SEP 2.0. Please clarify.

- 83.2 Please confirm that FortisBC will be the party conducting the pilot testing, or otherwise explain.
- 83.3 Will FortisBC prepare a report on the pilot testing of the In-Home Displays and/or SEP 2.0? If so, when? If not, why not?
- 83.4 A preliminary project plan is provided in Exhibit B-6, BCUC IR#1 40.1, and it is not clear where pilot testing of In-Home Displays and/or SEP 2.0 is accomplished. Please specify where in the preliminary project plan these tasks occur, or explain when they occur in relation to other project tasks.
- 83.5 Please confirm that pilot testing for In-Home Displays and/or SEP 2.0 is included in the AMI budget, and provide a reference.

84.0 Topic: Home Area Network and Home Automation
Reference: Exhibit B-11, CEC IR#1 51.1, page 75; Exhibit B-1, Glossary of Terms, page viii; Exhibit B-1, Section 4.1.1, page 41; Exhibit B-11, BCSEA IR#1 15.6.3

In response to CEC IR#1 51.1, FortisBC states that “The ZigBee™ Alliance website states: ZigBee Home Automation offers a global standard for interoperable products enabling smart homes that can control the following product categories:

- Appliances;
- Audio;
- Cards & Readers;
- Closures, e.g. window shades;
- Energy Efficiency;
- Health & Fitness;
- Information Systems;
- Lighting;
- Networking Devices;
- Payment Equipment; and
- Security”

In the AMI Application glossary, FortisBC defines HAN as the “*Home Area Network*” and:

“Home Area Network – This optional network connects the AMI meters with customer-purchased IHDs. This will allow will allow a customer to view power usage within their home and enable them to make informed decisions affecting the level or timing of their electric consumption”.

“**IHD:** means In-Home Display or In-Home Device.”

FortisBC states:

“Customers will be required to provide a unique identifier for their HAN devices to FortisBC (such as the MAC address of the device) so that FortisBC can associate that device with the electricity account and ensure data is exchanged with only that device.

Only information that is required to securely connect HAN devices to the AMI network will be collected from the customer, and only if the customer requests a HAN device to be connected.” [BCSEA IR#1 15.6.3]

- 84.1 For clarity, please confirm that in FortisBC’s definition of Home Area Network “IHD” refers to In-Home Displays, rather than In-Home Devices.
- 84.2 Does FortisBC see the Home Area Network (with the ZigBee Coordination function in the ZigBee board in the meter) and ZigBee Home Automation as one and the same? If so, why? If not, why not?
- 84.3 Does FortisBC agree that some of the smart home products that are capable of being controlled by ZigBee Home Automation may have little or nothing to do with electricity consumption?
- 84.4 Is the concept that all of the smart home product categories capable of being controlled by ZigBee Home Automation will be registered through FortisBC and the ZigBee board on the utility meter?
 - 84.4.1 If so, is that an optimal design? Is it necessary and/or desirable for FortisBC to be the operator of a website at which a customer registers various home automation devices?
 - 84.4.2 Would FortisBC agree that in terms of privacy and security of customer information there is distinction to be made between requiring the customer to provide to FortisBC a unique identifier for an In-Home Display (showing electricity consumption and cost) and requiring the customer to provide to FortisBC a unique identifier for other types of In-Home Device that have no direct involvement with electricity consumption?
- 84.5 How does FortisBC’s concept of how the ZigBee board in the meter will be configured to connect to In-Home Displays and other In-Home Devices compare with FortisBC’s understanding of *BC Hydro’s* concept of how the ZigBee board in the meter will be configured to connect to In-Home Displays and other In-Home Devices?
 - 84.5.1 Will they operate in the same way? If not, please indicate how they operate differently and why.
- 84.6 Please confirm that a customer who wanted to have a home automation system that did not ‘pass through’ the electricity meter would be able to receives electricity consumption and price information from the meter through a Gateway.
 - 84.6.1 Please confirm that this would limit the exposure of the customer’s home automation system to only the Gateway.
 - 84.6.2 Please confirm that the Gateway would be the only HAN device coordinated by the ZigBee board in the meter.

85.0 Topic: Control messages
Reference: Exhibit B-11, BCSEA IR#1 15.6.8

“FortisBC expects the AMI system to be able to send control messages (on/off, thermostat setpoints) to customer devices that are equipped to receive these commands.

These controllable devices incorporate settings that allow the customer to decide whether to accept signals from the utility or not.

FortisBC has no intention of sending control signals to customer devices for any reason. If customer demand warranted such a service, FortisBC would only send such control signals at the explicit request of a customer or as part of an approved rate structure.”

85.1 To clarify, please confirm that “FortisBC has no intention of sending control signals to customer devices for any reason” means except with customer permission and as part of future rate structures that have not yet been planned or approved by the Commission. Alternatively, please explain.

86.0 Topic: Home Automation in FortisBC AMI RFP
Reference: Exhibit B-6, BCUC IR#1 30.2.1, page 48-49

FortisBC states:

“If another HAN technology/protocol becomes dominant in home automation, FortisBC expects the market to respond with protocol-bridging gateway devices capable of interfacing Zigbee to other protocols. These gateway devices already exist, for example devices that can interface ZigBee PRO, WiFi, 6LoWPAN and JenNet, plus an interface to an INSTEON and/or X10 networks”.

86.1 Does this mean that if the AMI system is implemented as proposed a customer will be able to choose to install a gateway device that connects the ZigBee board in the Itron meter to the customer’s own home automation system of the types described?

86.1.1 Would this be a practical way to separate the customer’s home area network from the utility’s electronic network?

86.1.2 Would this promote innovation and customer choice by allowing manufacturers to offer non-ZigBee In-Home Displays and In-Home Devices?

87.0 Topic: Alternative In-Home Displays
Reference: Exhibit B-11, BCSEA IR#1 19.1, page 56

Asked about Blue Line Innovations In-Home Displays, FortisBC states:

“FortisBC is not an expert in the operation of Blue Line Innovations In-Home Displays that work without advanced meters. However, the Company understands that they work by placing a sensor on the customer’s meter that reads the spinning disc (on electro-mechanical meter) or the optical port (on

digital meters) and wirelessly transmits those pulses to a display device in the home in which the pulses are converted to energy consumption.”

- 87.1 Can the Blue Line product and other sensor based In-Home Display products read the optical port of the particular Itron meter that FortisBC has proposed?
- 87.2 Does FortisBC have any objection to customers attaching such sensors to existing or AMI meters? If so, please explain why and indicate what criteria would make attaching these sensors acceptable.
- 87.3 Does FortisBC agree that sensor type In-Home Display systems can be a viable alternative to a ZigBee In-Home Display system? If not, why not?
- 87.4 Is FortisBC willing to pilot test In-Home Display systems other than ZigBee systems?

88.0 Topic: Meter-to-IHD performance

Reference: Exhibit B-11, BCSEA IR#1 24.3, page 62; Exhibit B-11, BCSEA IR#1 24.3.2, page 62-63; Exhibit B-11, CSTS IR#1 54.1

FortisBC states:

“ZigBee currently has challenges in an apartment environment or at long distances. There are vendors working on solutions and within future Zigbee specifications there is a design for a federated trust centre solution that would allow for meshing of meters with per suite security to address the apartment range challenges. [BCSEA IR#1 24.3]

The need for repeaters is implementation specific. If they are required, they need to be powered. [BCSEA IR#1 24.3.1]

FortisBC does not guarantee that the HAN signal will communicate with customer devices or that communication will be error-free. The customer is responsible to get the signal to the location of their ZigBee devices. [BCSEA IR#1 24.3.2]

- 88.1 What efforts will FortisBC make to implement measures to provide communications from the meter to the In-Home Display in apartment buildings and other challenging communications situations?
- 88.2 It is noted that SEP 2.0 includes additional functionality related to "deployments in multi-dwelling units" [Exhibit B-11, CSTS IR#1 54.1]. Will this help meter to IHD performance in apartments? If so, how?
 - 88.2.1 Will SEP 2.0 improve meter to IHD performance if a single customer requires service, with no intermediate customers?
 - 88.2.2 Please discuss security and privacy issues regarding how SEP 2.0 will improve meter to IHD performance in multiple unit dwellings.
- 88.3 Please confirm that within future Zigbee specifications there is a design for a 'federated trust centre' solution that would allow for meshing of meters with per suite security to address the apartment range challenges.

89.0 Topic: IPv6
Reference: Exhibit B-11, BCUC IR#1 26.1, page 65

FortisBC states:

“FortisBC has not completed a final design of the entire AMI system, but the preliminary design indicates that IPv6 will be used in the Home Area Network, RF Local Area Network and between the HES and MDMS.”

- 89.1 Please explain in detail why IPv6 would be used in the Home Area Network.
- 89.2 What factors were considered in making the preliminary decision to use IPv6 for the Home Area Network? Examples of factors include complexity (protocol and product), cost, need for increased or global address space on a Home Area Network, battery life, compatibility, etc.) What alternatives were examined?
- 89.3 When will FortisBC complete the final design of the entire AMI system?

90.0 Topic: Update speeds of In-Home Displays
Reference: Exhibit B-11, BCSEA IR#1 19.2, page 56; Exhibit B-11, CSTS IR #1 54.12; BC Hydro RFEI, Exhibit B-11, BCSEA IR#1 Appendix 9.0, Section 1.6.2, page 13 of 16

FortisBC states in response to a BCSEA IR: “There should be no significant difference in update speeds between non-ZigBee In-Home Display and ZigBee HAN enabled devices. In either case, FortisBC understands the units should update information no less than approximately every 30 seconds.”

FortisBC states in response to CSTS IR #1 54.12: “On the HAN side the Zigbee SEP 1.x says that a device may not query a meter more frequently than every 2 seconds for longer than 15 minutes.”

The BC Hydro Request for Expressions of Interest regarding In-Home Feedback Devices states:

“REQ 24. Near Real-Time Display of Information

When viewing cumulative consumption information, the device shall update every 30 seconds.”

REQ 25. Fast-Polling Display of Information

The device shall utilize a ‘fast polling’ mode that persists for 15 minutes when the device is put into consumption display mode. While in this mode, the device shall display updated power (energy per hour in kW and \$) information every 2 seconds.” [BCSEA IR#1 Appendix 9.0, Section 1.6.2]

- 90.1 Does FortisBC expect the In-Home Display units to meet the BC Hydro RFEI REQ 24 and REQ 25 requirements? If not, please explain.
- 90.2 Please explain the difference between the display of “cumulative consumption information” (to be updated no less than every 30 seconds) and display of “updated power (energy per hour in kW and \$) information” every 2 seconds.

- 90.3 If the device must display updated power every 2 seconds in fast polling mode, why would the display not be updated every 2 seconds?
- 90.4 More generally, please explain the purpose of fast polling.
 - 90.4.1 Why is there a 15 minute limit on fast polling?
 - 90.4.2 Is the 15 minute limit on fast polling imposed by the ZigBee board in the meter or by SEP (or something else)?
 - 90.4.3 After the 15 minute restriction has passed, how soon can a new 15 minute period be activated?
 - 90.4.4 Would FortisBC agree that non-ZigBee In-Home Displays do not have the same 15 minute restriction and could be queried indefinitely?

91.0 Topic: In-Home Feedback Devices requirements
Reference: Exhibit B-11, BCUC IR#1 9.2, page 27; Exhibit B-11, BCSEA IR #1 Appendix 9.0, Section 2, page 5 of 16

Regarding the BC Hydro Request for Expressions of Interest regarding In-Home Feedback Devices, FortisBC states: "FortisBC has not decided whether it is necessary to issue a document such as the referenced BC Hydro document."

- 91.1 Please indicate when FortisBC believes it will be a position to decide whether or not to issue a document specifying In-Home Device requirements.
- 91.2 Please discuss the factors or considerations that will determine whether or not FortisBC will issue such a Requirements document.
- 91.3 If FortisBC does not issue such a Requirements document, how will FortisBC ensure compatibility, interoperability and qualification of the In-Home Devices which will be attached to the smart meter's Home Area Network?
 - 91.3.1 How will manufacturers of In-Home Devices determine if their products are acceptable for use in the FortisBC service area?
 - 91.3.2 How will FortisBC determine what In-Home Devices are eligible for incentives under energy efficiency and conservation programs?

92.0 Topic: BC Hydro In-Home Feedback Devices RFEI document
Reference: Exhibit B-11, BCUC IR#1 9.2, page 27; Exhibit B-11, BCSEA IR #1 Appendix 9.0, Section 2, page 5 of 16

In the RFEI document, BC Hydro states:

"BC Hydro is mandated by the provincial government to provide customers with the ability to provision a home area network off of their smart meters by December 31, 2012, and ultimately launch an In-Home Device program under the Power Smart banner to encourage residential customers to conserve energy

by providing them with detailed and timely information about how and when they use electricity in their home.

Potential solutions may include:

- Stand alone display devices (IHDs), or
- Gateway solutions, which are bundled software and hardware devices designed to connect a customer's smart meter to home networks and PCs. Gateway devices themselves may be Wi-Fi devices, wired (Ethernet) devices, or USB dongles.

The product requirements document (please see section 6 of this document) outlines a minimum set of requirements identified as necessary to be compatible with BC Hydro's current systems and future marketing efforts."

92.1 Does FortisBC understand BC Hydro to have limited the acceptable In-Home Devices for its smart meter program to In-Home Displays and gateways?

92.2 Does FortisBC intend to take the same approach?

93.0 Topic: Price or cost information

Reference: Exhibit B-11, Table BCSEA IR1 Q2.4 – Digital Information Transmission, BCSEA IR#1 2.4, page 6

It is noted that cost or rate information is not listed in the table of data transmitted between the Meter and the LAN.

93.1 Is cost or rate information part of the information to be transmitted between the LAN and the meter?

93.2 Please describe how and where the cost or pricing information is provided from FortisBC to the In-Home Display.

93.2.1 Please confirm that cost or pricing information will not have to be input manually to the In-Home Display.

93.3 If a customer chooses to have an In-Home Display connected (wirelessly) to the smart meter, the In-Home Display will show the cost of electricity consumed by the customer. How exactly will the cost be displayed? Will it be on a 'running invoice' basis, i.e., the total to date of all charges since the last invoice? Will be the cost of energy being delivered at the time of the display (Tier 1 or Tier 2 rate as applicable times kWh consumption per minute or hour)?

93.3.1 Will the customer be able to toggle between different presentations of "cost"?

93.3.2 To what extent will the method of presentation of "cost of electricity" in the In-Home Display be determined by FortisBC versus by the manufacturer of the In-Home Display?

94.0 Topic: Task Force Roadmap diagram

Reference: Exhibit B-11, BCUC IR#1 2.4, page 4-6; Exhibit B-11, BCUC IR#1 3.5, page 14

FortisBC listed all digital information transmitted and received between the meter and the LAN in Table BCSEA IR1 Q2.4² and FortisBC agreed that the red arrow in the diagram depicts that information³ and that “the Itron meter with integrated Zigbee technology will contain both the Meter and Customer Facility Gateway depicted in Figure 1 and delineated by the purple oval”⁴.

Find below (Figure 1) the same diagram from Exhibit B-11, with further enhancements:

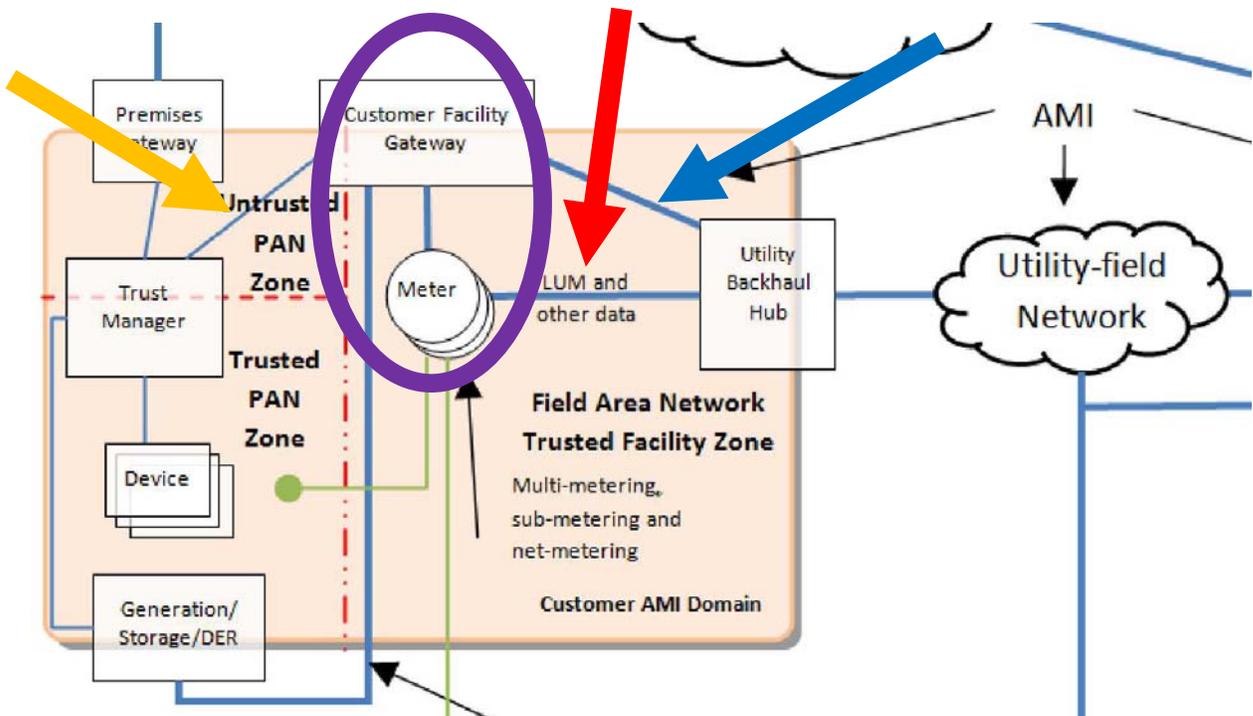


Figure 1 – Source: *The Canadian Smart Grid Standards Roadmap: A strategic planning document, Standards Council of Canada, October 2012, Section 5.2, Page 27, Figure 5 (Exhibit B-11, BCSEA #IR1 3.1); [with red, orange, blue arrows and purple ovals added for emphasis]*

94.1 Would FortisBC agree that the information listed in Exhibit B-11, BCSEA IR #1 2.5 (page 7) is depicted by the Orange Arrow in Figure 1, above? If not, please explain.

² Exhibit B-11, BCSEA IR#1 2.4, page 6
³ Exhibit B-11, BCSEA IR#1 3.5, page 14
⁴ Exhibit B-11, BCSEA IR#1 3.6, page 16

- 94.2 Considering that the “Logical AMI Diagram” shows a logical architecture, would FortisBC agree that the integrated Zigbee Technology is generally described by the “Customer Facility Gateway” in the diagram? If not, please explain.
- 94.3 Does FortisBC agree that the storing of ANSI C12.19 energy information⁵ is contained within the “Meter” as shown in Figure 1 above and is used for both sending information to the head end (Red Arrow) and to the IHD (Orange Arrow)? If not, please explain.
- 94.4 Please compare the translation process, computation requirements and storage requirements needed to transmit the ANSI C12.19 energy information back to the head end (Red Arrow) versus to the IHD (Orange Arrow).
- 94.5 Please confirm that “electricity pricing” information will be transmitted from the LAN to the Smart Meter (including the Zigbee card) as depicted by the Blue Arrow.
- 95.0 Topic: Trust manager**
Reference: Exhibit B-11, BCSEA IR#1 Appendix 3.1, Section 5.3, Recommendation M1, page 29

Please refer to Figure 5 on page 27 of the “Canadian Smart Grid Roadmap” which shows a diagram for a “Smart Grid Advanced Metering Infrastructure Logical Architecture” (Logical AMI Diagram)⁶. Figure 2 below shows the same Logical AMI Diagram with a red/blue broad arrow added for the purpose of the questions that follow.

⁵ Exhibit B-11, BCSEA IR#1 3.7.2, page 20

⁶ Exhibit B-11, BCSEA IR#1 Appendix 3.1, Section 5.2, Figure 5, page 27

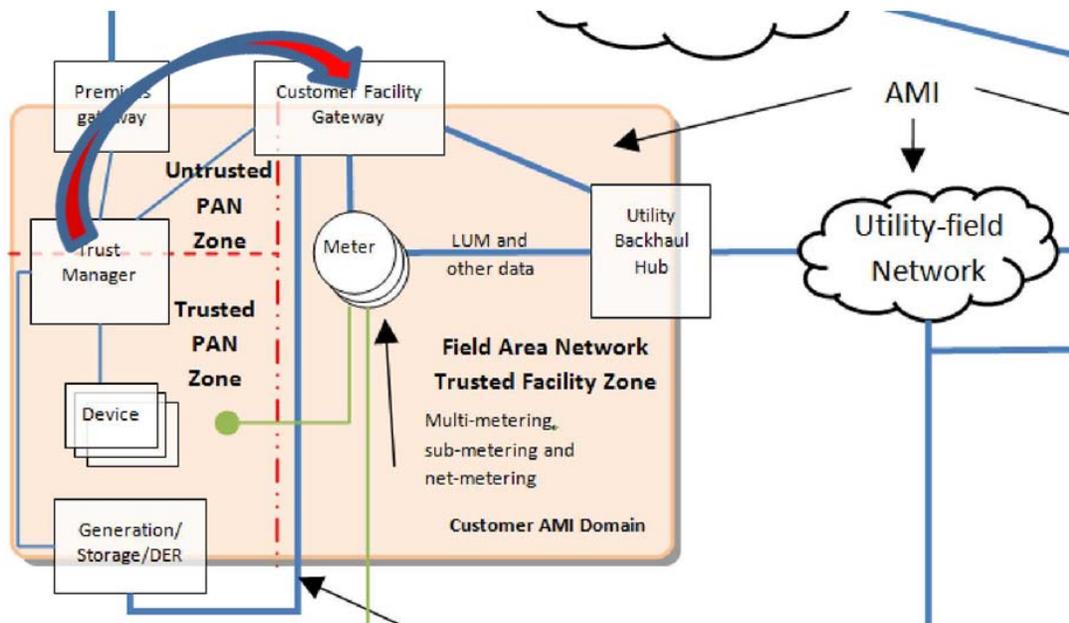


Figure 2 – Source: *The Canadian Smart Grid Standards Roadmap: A strategic planning document*, Standards Council of Canada, October 2012, Section 5.2, Page 27, Figure 5 (Exhibit B-11, BCSEA #IR1 3.1); [with red/blue broad arrow added for emphasis]

95.1 Looking at Figure 2 above, would FortisBC agree that the proposed Itron AMI solution shifts the “Trust Manager” function to the “Customer Facility Gateway” position as noted by the broad red/blue arrow. If not, please explain. If agreed, please answer the following questions:

95.1.1 Please discuss the ramifications of doing so from a privacy and security point of view.

95.1.2 Please discuss how FortisBC would meet the M1 Recommendation of the Task Force.

95.1.3 Please explain how “a clear and unambiguous separation (demarcation) between utility-owned and customer-owned equipment and services” is accomplished.

95.2 If the customer had the Network Coordinator within their own premises and their own control, would FortisBC agree that the “Trust Manager” could remain as shown in Figure 2. If not, please explain. If agreed, please answer the following questions:

95.2.1 Please discuss the ramifications of this solution on the privacy and security considerations.

95.2.2 Please discuss how this solution would meet the M1 Recommendation of the Task Force .

95.2.3 Please explain how this solution provides “a clear and unambiguous separation (demarcation) between utility-owned and customer-owned equipment and services” .

96.0 Topic: LCD screen on Itron meter
Reference: none

96.1 Does the proposed Itron meter have an LCD screen showing (a) electricity consumption in kWh and (b) cost on the meter itself (as distinct from on an In-Home Display)? If not, why not?

97.0 Topic: SEP 1.x and RIB rates
Reference:

BCSEA-SCBC understands that BC Hydro has developed, or has had developed for it, a specific version of SEP 1.x called SEP 1.1.2 to deal with the BC Hydro Residential Inclining Block (RIB) rate structure.

97.1 Will FortisBC have to adjust SEP 1.x to accommodate FortisBC’s RIB rate? If so, how will this be done (in general terms), and is it covered in the budget? If not, please explain why not.

98.0 Topic: Health
Reference: Exhibit B-11, BCSEA IR1 56.1

“56.1 Please show the calculation of the Exposure Limit for the RF-LAN, with references from Health Canada Safety Code 6 (2009).

Response: Exposure limit at the 902 to 928 MHz frequency band utilized by RF-LAN is specified in Table 6 21 of the Health Canada Safety Code 6 (2009). Using the row corresponding to 300 – 1,500 MHz, 22 the limit for power density in units of W/m² is frequency f (in MHz) divided by 150. Dividing 902 23 by 150 results in power density limit value of 6 W/m²; likewise, dividing 928 by 150 results in 24 power density limit value of 6.2 W/m². Using a conversion factor of 1 W/m² = 10 mW/cm², the 25 result is 6 mW/cm² to 6.2 mW/cm².” [underline added]

98.1 The conversion factor appears to be stated backwards. If so, please provide a revised response.

99.0 Topic: Health
Reference: Exhibit B-1

“58.1 Please show the calculation of the Exposure Limit for the ZigBee radio, with references from Health Canada Safety Code 6 (2009).

Response: The exposure limit at the 2,400 to 2,484 MHz frequency band used by RF-LAN is specified in Table 6 of the Health Canada Safety Code 6 (2009). Using row corresponding to 1,500 – 15,000 MHz, the limit for power density is 10 W/m². Using a conversion factor of 1 W/m² = 10 mW/cm², the result is 1 mW/cm².” [underline added]

99.1 The conversion factor appears to be stated backwards. If so, please provide a revised response.

100.0 Topic: Health

Reference: Exhibit B-6, Fortis response to BCSEA-SCBC IR 64.1

IR 64.1 says, "Can it be said that Health Canada Safety Code 6 is intended to protect only against thermal consequences of RF exposure? Or is Health Canada Safety Code 6 intended to protect against any levels of RF exposure?" Fortis responds, "No. ..."

100.1 For clarity, which question is Fortis saying "no" to?

101.0 Topic: Health

Reference: Exhibit B-6, Fortis response to BCSEA-SCBC IR 64.1

101.1 Is Fortis aware of research studies on RF energy and health that distinguish between possible health effects of the quantum of RF exposure and possible health effects of sudden pulsations of RF exposure?

102.0 Topic: Opt-out Provisions

Reference: Exhibit B-6, IR response to BCSEA-SCBC 68.0 and CEC 50.0.

In response to CEC IR 50.3, FortisBC says, "The benefits associated with the Project are dependent on the robust and cost-effective communications functionality of the AMI system."

BCSEA-SCBC would like to explore in more detail the possibilities and costs of opt-out options for customers who may for any reason desire not to have a wireless meter attached to their homes.

102.1 Please list and describe in more detail than in the response to CEC IR 50.1 the technically feasible alternatives for customers to opt out of having an electricity meter that communicates its information in a "wireless" manner using RF.

102.1.1 Does FortisBC assume that opting out would necessarily require manual meter reading?

102.1.2 Would it be technically and economically feasible to use PLC technology on a home-by-home basis to enable customers to opt out? Would this be possible on a residential block or neighbourhood basis? Please discuss the technical issues and costs.

102.1.3 Would it be technically and economically feasible to use fibre optic technology, internet cable technology or telephone line technology on a home-by-home basis to enable customers to opt out? Would this be possible on a residential block or neighbourhood basis? Please discuss the technical issues and costs.

102.1 Please describe any loss of "robust and cost-effective communications functionality of the AMI system" (per Fortis's response to CEC IR 50.3) that would be caused by:

- 102.1.1 Implementing opting out with PLC technology at a home-by-home level,
- 102.1.2 Implementing opting out with PLC technology at a block or neighbourhood level,
- 102.1.3 Implementing opting out with fibre optic, cable or telephone line technology,
- 102.1.1 "Allowing customers to retain their existing meters or to have "radio inactive" meters," as per Fortis's response to CEC IR 50.7.1.

103.0 Topic: Opt-out provisions

Reference: Exhibit B-6. IR response to CEC 50.3

FortisBC says, "FortisBC does not agree in principle with providing choices to individual customers that have a clearly demonstrable negative financial impact to other customers. Offering individual customers the extreme case "opt-out" option of having a manually-read meter of their preference without paying for the related incremental costs and lost benefits to other customers violates this principle."

103.1 Assuming a one-time window for opting out that takes place with the implementation of the AMI program and is not changed thereafter, please list the direct costs and the factors causing "demonstrable negative financial impact to other customers" and provide an approximate costing for opt-out options that use:

- 103.1.1 PLC technology at a home-by-home level.
- 103.1.2 PLC technology at a block or neighbourhood level.
- 103.1.3 Fibre optic, cable or telephone line technology at a home-by-home, block or neighbourhood level.
- 103.1.4 "Allowing customers to retain their existing meters or to have "radio inactive" meters," as per Fortis's response to CEC IR 50.7.1.

103.2 For opting out that might take place subsequent to the implementation of the AMI program, please list the direct costs and the factors causing "demonstrable negative financial impact to other customers" and provide an approximate costing for opt-out options that use:

- 103.2.1 PLC technology at a home-by-home level.
- 103.2.2 PLC technology at a block or neighbourhood level.
- 103.2.3 Fibre optic, cable or telephone line technology at a home-by-home, block or neighbourhood level.

- 103.2.4 “Allowing customers to retain their existing meters or to have “radio inactive” meters,” as per Fortis’s response to CEC IR 50.7.1.

104.0 Topic: Opt-out provisions

Reference: Exhibit B-6. IR response to CEC 50.3

FortisBC says, “Offering individual customers the extreme case “opt-out” option of having a manually-read meter of their preference without paying for the related incremental costs and lost benefits to other customers violates this principle.”

104.1 Would FortisBC be willing to consider allowing opt-out provisions for customers who would pay for that option, individually, or on a block or neighbourhood basis?

104.2 Please discuss how an opt-out program could be implemented and what terms would need to be addressed.

105.0 Topic: Opt-out provisions

Reference: Exhibit B-6, IR response to CEC 50.5

105.1 Please discuss the erosion of AMI benefits regarding “reduced theft reduction” in more detail. Is it possible that a modest amount of opting out would have little or no practical effect on theft reduction?

106.0 Topic: AMI Support for Electric Vehicle Charging

Reference: Exhibit B-6, Fortis response to BCSEA-SCBC IR 4.1

106.1 Please confirm whether the proposed advanced meters with SEP 2.0 would enable the drivers of electric vehicles to be billed for electricity usage through meters not their own.

106.2 Please confirm whether the proposed advanced meters with SEP 2.0 would enable the drivers of electric vehicles to pay securely for electricity usage through meters not their own, using credit cards or debit cards or other electronic payment system.