

Notice of Inquiry

Regulatory Process for the Alberta Smart Grid Inquiry Application No. 1606102 Proceeding ID 598

The Alberta Utilities Commission (AUC or Commission) has been directed to inquire into, and report to Alberta's Minister of Energy on how smart grid technology can be used to modernize Alberta's electricity system. The AUC will use the information, submissions and consultations from its inquiry to prepare a report to the minister with a target release date of December 25, 2010. The report will provide findings, pros and cons, and options on relevant issues, but will not make recommendations.

A number of reasons for the inquiry were listed in Schedule B of the [Order-in-Council 93/2010](#) which initiated the inquiry and are listed below:

- (a) The policy of the Government of Alberta to strengthen and modernize Alberta's interconnected electric system to support its goals of clean energy production, wise energy use and sustained economic prosperity;
- (b) The interest of the Government of Alberta in implementing policies supporting the development and deployment of smart grid technology in support of achieving the goals stated in (a) above; and
- (c) The smart grid being characterized as the modernization of Alberta's electricity system, through the application of advanced control and information technology, to meet the future needs of the province. Characteristics of the smart grid that were identified in the order-in council include, but were not limited to, the following:
 - 1. Inclusivity: The smart grid applies to the entire electricity system including generation, transmission, distribution, and consumers;
 - 2. Reliability: The smart grid provides enhanced ability to warn of and identify potential failures and take remedial action before users are affected, that is, the smart grid self-heals;
 - 3. Security: The smart grid withstands cyber attacks;
 - 4. Environmentally friendly: The smart grid reduces the environmental impact of the Alberta electricity system through the application of advanced technology that will provide for the integration of more renewable generation, more effective load management, and better information for consumers;
 - 5. Accessibility: Electricity market participants must have access to all necessary information to make informed choices.

Appendix A

Instructions: Please answer all questions from your perspective.

1.0 Introduction

The term smart grid can have varying meanings depending on technology developments and unique local needs of each electric system. The Commission's approach therefore is to first understand the current status of the smart grid in Alberta and to determine which elements of the smart grid are most important to stakeholders. This information will help the Commission understand the characteristics, principles, objectives, and goals for developing a smart grid for Alberta. To assist the Commission in the Smart Grid Inquiry please respond to the following before 3:00 p.m. on June 11, 2010.

- 1) Define smart grid.
- 2) Define the functionality and applicability of the smart grid in the context of Alberta's electricity market by the following system segment:
 - a. Generation
 - b. Transmission
 - c. Distribution
 - d. Retail.
- 3) What are the principles and criteria that should guide the provincial deployment of a smart grid? Why?
- 4) Rank the importance of the following characteristics of a smart grid and explain the rationale for this ranking:
 - a) Cost effectiveness.
 - b) Increased use of digital information and controls technology to improve and maintain the system reliability, security, and efficiency of the electric grid.
 - c) Dynamic optimization of grid operations and resources (e.g., self-healing), with full cyber security.
 - d) Deployment and integration of distributed resources and generation, including non-traditional (i.e. renewable) resources.
 - e) Development and incorporation of demand response, demand-side resources, and energy efficiency resources to reduce overall usage (especially peak usage) and shift usage.
 - f) Deployment of so-called smart technologies (real-time, automated, interactive technologies that optimize the physical operation of appliances and consumer devices) for metering, communications concerning grid operations and status, and distribution automation.
 - g) Integration of smart appliances and consumer devices to enable active consumer participation.

- h) Deployment and integration of advanced electricity storage and peak-shaving technologies, load-shifting programs and plug-in electric and hybrid electric vehicles.
- i) Provision to consumers of timely information about energy consumption, costs, and control options.
- j) Development of standards for communication and interoperability of appliances and equipment connected to the electric grid, including the infrastructure serving the grid.
- k) Identification and lowering of unreasonable or unnecessary barriers to adoption of smart grid technologies, practices, and services.

1.1 Transmission facility owners

To determine the current state of the integrated electric system in Alberta, transmission facility owners are requested to provide the following information. If the respondent is not a transmission facility owner, proceed to the next section.

- 5) What smart grid activities and investments have you undertaken to date in your role as a transmission facility owner?
- 6) Provide the approximate length (in kilometres) of transmission lines within your service area by completing the following tables.

Transmission Line Length Single Circuit (route km)	
kV	Length
138	
240	
500	
Other (Please Specify)	

Transmission Line Length Double Circuit (route km)	
kV	Length
138	
240	
500	
Other (Please Specify)	

- 7) Provide the number of transmission substations owned.
- 8) Identify the communication technologies being employed to acquire substation data and the number of substations using each technology (e.g., number of substations using leased line, private microwave, fixed voice telephone, satellite, fiber optics etc).
- 9) Given the transmission facility owners' existing transmission infrastructure and policy programs, what will be the incremental investment to implement additional smart grid technologies?
- 10) What currently available metrics should be used to establish and track the transmission facility owners' existing performance with respect to operating reliability, security, power quality and operating efficiency? Why?
- 11) What metrics and reporting methodology should be used to determine the measureable benefits of implementing smart grid technology as well as assessing the progress towards attaining improvements in the performance related to operating reliability, security, power quality and operating efficiency? Why?

1.2 Electric distribution system owners

To determine the current state of the integrated electric system in Alberta, electric distribution system owners are requested to provide the following information. If the respondent is not an electric distribution system owner, proceed to the next section.

- 12) What smart grid activities and investments have you undertaken to date in your role as an electric distribution system owner?
- 13) Provide the approximate aggregate length (in kilometres) of distribution lines within your service area.
- 14) Provide the number of distribution substations within your service area.
- 15) Provide the number and corresponding percentage of distribution substations within your service area that are monitored by supervisory control and data acquisition (SCADA) systems.
- 16) Given the electric distribution system owners' existing distribution infrastructure and policy programs, what will be the incremental investment to implement additional smart grid technologies?
- 17) What currently available metrics should be used to establish and track the electric distribution system owners' existing performance with respect to operating reliability, security, power quality and operating efficiency? Why?

18) What metrics and reporting methodology should be used to determine the measureable benefits of implementing smart grid technology as well as assessing the progress towards attaining improvements in the performance related to operating reliability, security, power quality and operating efficiency? Why?

2.0 Deploying a smart grid in Alberta

In order to accommodate new technologies and opportunities that the smart grid may provide, new planning and regulations might need to be implemented. The Commission seeks to understand what barriers are currently preventing smart grid implementation and what regulatory steps should be taken to ameliorate any barriers. Therefore, please respond to the following.

- 19) What lessons can be learned from past systems engineering and implementation projects from other industries that are most applicable to smart grid design and deployment? Why?
- 20) What technologies are available to fulfill the expectations of a smart grid and will the choice of technology make any of the current technologies obsolete (e.g., energy storage and distributed generation/microgrids versus high voltage transmission lines)? Why?
- 21) Should the utilities be required to develop smart grid deployment plans? Why? If so, what should those plans consist of? Why?
- 22) What should a utility do in order to successfully deploy smart grid technology? Why?
- 23) What milestones should be used to measure the utilities' progress toward the development of a smart grid? Why?
- 24) What, if any, are the regulatory barriers with current legislation, wholesale markets, and/or retail markets to the deployment of a smart grid? Why? Which, if any, of these barriers should the Commission address? Why?
- 25) What incentives do utilities have to optimize smart grid deployment and adopt mechanisms that align utility and consumer interests?

3.0 Standards and other functionality requirements

Policies should lay the foundation for a smart grid future that encourages minimum functional requirements and common or open standards and protocols. This means that devices installed as part of the upgrade to a smart grid should be able to communicate with each other today and have the flexibility to accommodate enhancements in new technologies/processes over time. Standards and protocols can help achieve this goal. Therefore, please respond to the following.

26) In what areas are standards and protocols needed for the deployment of a smart grid in Alberta? Why?

27) For each area that a standard and/or protocol is needed, answer the following:

a) What is or should be the role of utilities in the standards-making process? Why?

b) What organization should issue the standards (e.g., the National Institute of Standards and Technology, American National Standards Institute, Institute of Electrical and Electronics Engineers, and/or the Commission)? Why?

c) Are there any specific standards, or type of standards, that the Commission should either consider adopting or avoid adopting in order to build a cost-effective, flexible smart grid? Why?

d) Are there any requirements for technological connectivity standards to enable market participants, utilities, and/or other third parties to communicate and transact with the Alberta Electric System Operator? Why?

4.0 Cost and benefits of a smart grid

There are both costs and benefits to implementing a smart grid. The Commission seeks to understand how to calculate both the benefits and costs of the smart grid in order to develop a sound regulatory approach to reviewing smart grid investments. Additionally, the Commission seeks to understand how to allocate smart grid expenditures to stakeholders. Therefore, please respond to the following and distinguish between investments in the generation, transmission, distribution and retail aspects of the smart grid.

28) What are the benefits and costs of a smart grid? Why? Which benefits and costs can be easily quantified, and how? Which benefits and costs are difficult to quantify, and how should they be addressed?

29) What tools and/or materials need to be developed to estimate, calculate, and assess the benefits and costs (including the non-quantifiable benefits and costs) of smart grid-related expenditures? Why? Who should pay for the development of these tools and/or materials? Why?

30) What tools and/or methods should the Commission consider to estimate, calculate, and assess the benefits and costs (including the non-quantifiable benefits and costs) of smart grid-related expenditures? Why?

31) How should smart grid-related costs be divided among ratepayers, shareholders, and/or third parties? Why?

32) For costs allocated to ratepayers, should all consumers pay for the deployment of a smart grid? Why?

33) How should any smart grid upgrades that are approved by the Commission be staged over a reasonable time horizon that mitigates rate impacts? Why?

34) Should the Commission authorize a utility or other party deploying a smart grid system to recover in a timely manner the remaining book-value costs of any equipment rendered obsolete by the deployment of a smart grid system, based on the remaining depreciable life of the obsolete equipment?

35) How should smart grid programs be designed and deployed to address the following sources of risk?

- a) Cost risks
- b) Technology risk
- c) Organizational and business process risk
- d) Customer risk

5.0 Market participation in the smart grid

Market forces already play an important role in both the wholesale and retail electric markets in Alberta. The Commission seeks to understand the potential opportunity and role for market participants in smart grid deployment. Therefore, please respond to the following.

- 36) Does the meter need to be owned by the electric distribution system owner or can the customer or a third party own the meter? Why?
- 37) What are the minimum requirements, features, and functionality all Alberta meters should possess? Why?
- 38) Should the deployment of the smart grid be undertaken using open standards-based solutions exclusively or are there segments that are more suited to proprietary technologies? Why?
- 39) Who owns the home energy usage data? Why?
- 40) Should consumers (and their authorized third party service providers) have the right to access real-time energy usage data directly from the meter with suitable privacy protection? Why?
- 41) How should a competitive bidding process for investments in smart grid technology be structured and monitored, i.e. are existing competitive procurement processes sufficient? Why? What, if any, reporting requirements should be made? Why?
- 42) How should consumer education and dissemination of information about smart grid technologies, demand response programs, and alternative pricing structures be carried out? What entity or entities should be responsible for the messaging? Why?

6.0 Pricing considerations

The cost of serving retail customers may vary over the year, the day, or perhaps even instantaneously. Some of the benefits of smart grids, especially those including smart meters, are dependent on retail pricing that more closely reflects these wholesale (*i. e.*, generation, transmission and distribution) cost differences. Wholesale pricing changes may be required to ensure that retail prices are able to fully reflect costs on a more precise basis. Therefore, please respond to the following.

- 43) To what extent could the government's smart grid objectives be met through pricing structure changes implemented using the existing network, billing system and meters? For example, can prices vary by time of year, time of day, hourly or instantaneously. Please answer for each class.
- 44) Which of the government's smart meter objectives cannot be met fully without deploying smart grid or smart meter technology? Please answer for each customer class and explain the answer in detail.
- 45) Are there any rate designs that can best reflect and incorporate the potential benefits of the smart grid? Would practical considerations cause your response to be different, especially for different customer classes? Why?
- 46) Are there any pricing approaches that will not work or should be avoided with the deployment of a smart grid? Why?
- 47) What changes, if any, might be required in transmission, distribution and energy pricing structures to achieve all of the benefits of a smart grid and smart meters? Why?
- 48) How can or should any changes in transmission, distribution and energy pricing structures be implemented in the current competitive retail market structure in Alberta? For example, should regulation require all retailers to employ specific pricing structures that maximize the benefits of smart grid and smart meters or should the market be relied upon to determine retail pricing structures?

7.0 Other policy considerations

7.1. Conservation and wise energy use

The Government of Alberta's Provincial Energy Strategy lists wise energy use as one of its outcomes. Developing and implementing energy conservation measures is one of the levers identified by the Government to achieving a wise energy use outcome. Smart grid technology is cited as being able to play a critical role in enabling the deployment of demand response and conservation solutions. Smart meters with two-way communication capabilities combined with controllers on end-user equipment could assist in managing peak electricity demand. Likewise, end-use customer access to their usage information on a more timely and frequent basis may result in voluntary reduction in consumption. The Commission is interested in identifying the elements of the smart grid technology that would further the Government's energy strategy of wise energy use through conservation measures. Therefore, please respond to the following.

49) What are the technology, pricing, and policy issues that must be considered to enable the creation of appropriate demand response solutions using a smart grid technology? Why?

50) What would be considered to be the appropriate demand response programs that a smart grid technology should accommodate (*e. g.*, automated direct load control, aggregated load response, pricing schemes)?

51) What are the challenges and opportunities of integrating demand response solutions into the wholesale electric market? Are there any barriers present in the current wholesale market structure or rules that would limit the ability of demand response solutions to participate in the wholesale electric market?

52) What challenges and opportunities are present with the current legislation that would impact the ability of smart grid technology to achieve its full potential with respect to demand-side management solutions?

7.2. Generation and energy storage options

Smart grid technologies is cited as possessing the potential to integrate all sources of generation, including variable energy resources (*i. e.*, renewable energy resources including wind and solar generation facilities and certain hydroelectric resources), distributed generation as well as energy storage options seamlessly into the operation of the electricity grid. To ensure that all generation and energy storage options are afforded non-discriminatory access to wholesale markets and the electric power grid, the Commission seeks comment on the perceived barriers, and suggested solutions to removing those barriers, of integrating variable energy resources and energy storage options into the electric grid in a reliable and efficient manner. Therefore, please respond to the following.

53) What are the technology, pricing, and policy issues that must be considered to enable energy storage solutions, including the accommodation of plug-in hybrid vehicles using a smart grid technology? Why?

54) What are the challenges and opportunities of integrating distributed, renewable or intermittent generation resources into the wholesale electric market? Are there any barriers present in the current wholesale market structure, operation or rules that would limit the ability of distributed, renewable or intermittent generation resources to participate in the wholesale electric market?

7.3 Privacy and security considerations

Smart grid technology is expected to increase the volume and frequency of data flowing from all elements of the electricity system (i.e., generation, transmission, distribution and consumption) and transform the communication network into a two-way flow of information. A major technical challenge with managing and controlling this information will be the ability to maintain and protect network security and customer privacy. The Commission is interested in identifying the network security and customer privacy design principles that could be used to establish the minimum and best-practice standards for the deployment of a smart grid in Alberta. Therefore, please respond to the following.

55) What standards and protocols are needed to ensure network security (both physical and cyber) and end-use customer privacy are protected?

56) What should be the role of legislation or of the Commission in developing these privacy and security standards, if any?

7.4 Other considerations

57) How will the deployment of smart grid technology enable the Government of Alberta to achieve the desired outcomes stated in its Provincial Energy Strategy, namely clean energy production, and facilitate the proper accounting for the cumulative effects to the environment and greenhouse gas emissions from the generation and consumption of electricity?

58) What other smart grid-related issues should the Commission address in this inquiry?

59) Are there any current policies that need to be changed or any new policies that need to be in place before the benefits of smart grid investments can be realized?

Scope and objectives:

In carrying out the Alberta Smart Grid Inquiry, the Commission was ordered to conduct its inquiry with members of the Alberta electricity industry and other relevant parties.

The AUC will hold an inquiry for the purpose of gathering information with respect to all issues relating to the development and deployment of smart grid technologies in Alberta including, but not limited to, identification of:

- i. the current status of smart grid development in Alberta;
- ii. the status of smart grid deployment in other jurisdictions;
- iii. the guiding principles, objectives and goals for developing the smart grid in Alberta;
- iv. the enablers and barriers to the deployment and development of the smart grid;
- v. the functionality requirements for the smart grid in Alberta, including standards such as those required for the interoperability in the exchange of information;
- vi. the method of assessing costs and benefits of smart grid-related expenditures;
- vii. the necessary courses of action to develop and implement the smart grid, including defining the roles for all the potential market participants;
- viii. the regulatory approach to consider smart grid investments including the extent to which competitive markets can be relied upon to deliver the smart grid; and
- ix. other associated issues as required.

Participation:

The Commission will be using its Electronic Proceeding Submission (EPS) system for purposes of storing and making information available to the public. The inquiry has been assigned Application No. 1606102 and Proceeding ID No. 598.

The Commission considers that the following companies are essential participants in the inquiry and therefore directs them to participate:

- AltaLink Management Ltd.
- ATCO Electric Ltd.
- ENMAX Power Corporation
- EPCOR Distribution and Transmission Inc.
- FortisAlberta Inc.

In addition, this Notice will be served on other Alberta transmission facility and distribution system owners who may wish to participate in this inquiry, and may make a submission to the Commission regarding recovery of their participation costs as if they had been directed to participate (see (a) of the Cost Recovery provisions, below).

All other interested parties who wish to participate in the inquiry should file a Statement of Intent to Participate (SIP) no later than **3:00 p.m. on April 30, 2010** and include the name of the party or organization name, address, telephone number and email address (if available). If a party is represented by another party, the contact information for that representative should be included. If a submission is being made on behalf of a group, the contact person for the group and the details of the group members should be provided. All submissions should include the application number and proceeding ID number and be made through the Commission's Digital Data

Submission (DDS) system. Any parties who do not have access to the DDS system should contact AUC systemservices@auc.ab.ca for assistance in filing their submissions.

Process:

To address the issues outlined in the scope and objectives section above, the Commission has developed a number of questions (Appendix A) that can be found on the AUC website (www.auc.ab.ca) under the [E-Filing Services & Regulatory Document Search](#) and using the [Proceeding Search system](#) (ID 598) or by using the following URL:

https://www.auc.ab.ca/eub/dds/EPS_Query/ProceedingDetail.aspx?ProceedingID=598

Appendix A, a copy of Order-in-Council 93/2010, along with all documents submitted throughout the inquiry process will also be available for viewing through this link.

The following process schedule identifies and summarizes the inquiry process steps and timelines.

Process step	Deadline
Submission of statements of intent to participate (SIPs).	3:00 p.m., April 30, 2010
Submissions from participants responding to the Commission's questions.	3:00 p.m., June 11, 2010
Written reply to other parties' submissions.	3:00 p.m., June 30, 2010
AUC issues follow-up questions on parties' submissions.	3:00 p.m., August 3, 2010
Parties respond to AUC follow-up questions in writing.	3:00 p.m., August 31, 2010
Public proceedings (format to be announced) in several Alberta locations for participants and AUC panel to discuss and understand smart grid issues in greater detail.	Commencing in early September, 2010 and finishing by October 31, 2010
AUC prepares report of findings with pros and cons on various issues with target release date by December 25, 2010 (Nine months after release of O.C. 93/210).	December 25, 2010

Submissions:

Submissions by participants can address any question set out in Appendix A on which the participant has a position or recommendation. Respondents are requested to provide comments in a question and answer format using the Commission's questions as they have been posed. Submissions should be supported in detail by relevant facts, market and economic analysis and should include references to other jurisdictions if appropriate and may include expert opinion. The Commission should be provided with complete electronic copies of all materials referenced in the parties' submissions.

Parties are asked to file these submissions no later than **3:00 p.m. on June 11, 2010**. Parties will be permitted to reply to other parties' submissions in writing no later than **3:00 pm on June 30, 2010**. The Commission expects the cooperation of parties in order to permit it to fulfill its mandate in a timely manner.

In addition to the written submissions received, further public proceedings are contemplated in order to establish a thorough record of information. The Commission will make a determination regarding the format of these public proceedings after receipt of parties' responses to the Commission's questions.

Electronic copies of submissions are preferred and can be submitted directly using the AUC's EPS system. If parties do not have direct EPS access, submissions can be emailed to:

Email: filings@auc.ab.ca

Subject: Proceeding ID 598 or Application No. 1606102

The AUC encourages all parties to file their documents electronically; however, if necessary, paper copies of submissions can be mailed to:

Alberta Utilities Commission

Regulatory Policy Division

Re: Proceeding ID. 598; Application No. 1606102

Fifth Avenue Place, Fourth floor, 425 – 1 Street SW

Calgary, Alberta T2P 3L8

Freedom of Information and Protection of Privacy Act:

Subject to the *Freedom of Information and Protection of Privacy (FOIP) Act*, all documents filed for this inquiry must be placed on the public record. However, documents that contain personal information, as defined in the *FOIP Act*, will be placed on the AUC's public electronic system that is directly accessible only by registered parties who are participating in this inquiry. Persons who are not registered to participate will not have direct electronic access to documents containing personal information and personal information will not be disclosed to these persons if requested.

Please ensure that any document you file is free of information that you do not want to appear on a public record. If you do not want your document or part thereof placed on the record, you must apply to the AUC under section 13 of the *AUC Rules of Practice* for a confidentiality ruling **before** you file your document.

Cost recovery:

Parties may apply for recovery of costs of their participation in the Alberta Smart Grid Inquiry. Costs claims will be assessed using the following criteria:

- a) Parties who have been directed to participate in the inquiry by the AUC may apply for recovery of their costs.
- b) The Commission may award costs to a participant who has a substantial interest in the subject matter of the inquiry and who does not have the means to raise sufficient financial resources to enable the participant to present its interest adequately in the inquiry.
- c) Unless the Commission orders otherwise, the following types or classes of participants are **ineligible** to claim costs:

- (1) an out-of-province utility;
- (2) electric generators, including associations representing electric generators;
- (3) business, commercial, institutional, or industrial entities including associations of these entities;
- (4) municipalities including associations of municipalities; and
- (5) rural electrification associations including associations of rural electrification associations.

d) The Commission may require that payment of the costs awarded to an eligible participant be shared by one or more of the electric utilities directed to participate in the inquiry.

The Commission will not be requiring the submission of participant cost budgets but will assess any cost claims in accordance with the principles set out in AUC's [Rule 022](#)¹ and the *Scale of Costs* associated with that rule.

If you have any questions regarding this inquiry, please contact Fino Tiberi by email at fino.tiberi@auc.ab.ca or 403-592-4410.

Issued on April 20, 2010.

ALBERTA UTILITIES COMMISSION
Douglas A. Larder, Q.C., General Counsel

¹ AUC Rule 022 – Rules on Intervener Costs in Utility Rate Proceedings (Rule 022).