QUEST's Submission

AUC's Distribution System Inquiry

1.0 QUEST

About QUEST

QUEST is a national non-government organization that works to accelerate the adoption of efficient and integrated community-scale energy systems in Canada by informing, inspiring, and connecting decision-makers. The organization commissions research, communicates best practices, convenes government, utility, and private-sector leaders, and works directly with local authorities to implement on-the-ground solutions. QUEST recognizes communities that have embraced these principles by referring to them as Smart Energy Communities.

QUEST is currently working with ten municipalities from various sizes in the province to help them become Smart Energy Communities. QUEST also works with multiple community stakeholders through its two regional working groups.

About the Smart Energy Community approach

A Smart Energy Community seamlessly integrates local, renewable, and conventional energy sources to efficiently, cleanly, and affordably meet its energy needs. It is a coveted, highly livable place to live, work, learn, and play.

QUEST's approach of Smart Energy Communities understands the importance of:

- Energy transition and climate policy built on a foundation of sound energy policy
- Driving technological change while avoiding technological determinism
- Maximizing the value of all our assets, both existing and new
- Emphasizing institutional innovation
- Reducing policy uncertainty through alignment and sense of community
- Restoring public trust and confidence in decision making institutions

Albertan communities - the municipalities, utilities, and key stakeholders with an interest in energy in a specific geographic region - best understand opportunities at the local level. The SEC approach is an integrated, systemic approach looking at a set of both policy and technical principles tailored at local context. It is a participatory, collaborative, and inclusive approach that depends on extensive stakeholder engagement.

Smart Energy Communities contribute constructively to a sustainable energy future, better position Canada in international discussions and encourage constructive debate. SECs have the potential to decrease polarization on climate and energy. By more visibly advancing SECs – something that is well in

train across the country despite the general public unawareness – Canada can contribute constructively to a much more sustainable energy future, bring the country together, and perhaps, lower the temperature of the debate and better position Canada in international discussions.

1.0 QUEST's answer to AUC's questions

(i) What principles should guide the regulatory framework governing the distribution system?

QUEST suggests considering the two following key principles to guide the regulatory framework governing the distribution system:

1. Principle of flexibility and agility: using Regulatory Sandboxes.

Recommendation #1. QUEST recommends that AUC adopts Regulatory Sandboxes as a tool to increase the regulator's flexibility and agility in finding quick and collaborative regulatory solutions to uncertainties created by the transformation of Alberta's energy systems and to unforeseen technical, regulatory, economic, and financial barriers. More specifically, Regulatory Sandboxes can be used to review and update the existing performance-based regulation (PBR) by considering additional performance goals related to the deployment of Distributed Energy Resources (DERs) and the adaptation to increasing climate hazards.

Rationale for recommendation #1.

- As identified in Module 1, rapid technological changes are creating uncertainties in energy markets and are transforming the governance and structure of the province's energy system. Customers are developing more dynamic relationships with the grid; distribution utilities' business models are evolving, and incumbent generators' assets are challenged.
- To cope with the uncertainties created by these profound infrastructural and economic transformations, the regulator needs to be reactive, nimble, and flexible to quickly adapt existing regulations and address unforeseen regulatory, economic, and technical challenges and barriers.
- When well-designed, Innovation Sandboxes are increasingly considered as an efficient tool for energy regulators to be agile and flexible. Sandboxes are places for early, collaborative testing and idea-sharing related to regulatory options for emerging technologies. Sandboxes provide a safe space for testing technical, business, and practice innovations with low social and economic risk and develop collective solutions. They enable the co-creation of common frameworks among multiple stakeholders, and significantly reduce costs and lost revenue. As a result, they have the potential to accelerate the adoption of new technologies and practices[1] since successful solutions and regulations can then smoothly scale-up to the entire system.
- In several countries, regulators have devised Regulatory Sandboxes "to create a participatory experimentation environment for exploring revision of energy regulation and policy and overcome legal obstacles" for energy transition and/or the diffusion of innovation. A main characteristic of these sandboxes is that "they allow for a two-way regulatory dialogue between

[1] According to Report from Canada's Economic Strategy Tables: Clean Technology, 2018.

an experimenter [or a group of experimenters} and a regulator to innovate regulation and enable new socio-technical arrangements".[2]

- The Ontario Energy Board is the first jurisdiction in Canada to have introduced a regulatory sandbox and is now accepting applications. However, while the Ontario program provides a space for technology innovation within the existing regulatory requirements, they do not provide opportunity to change regulation, whereas regulatory sandboxes also provide mechanisms to evolve regulations. **Annex 1** presents an overview of Existing Energy Regulatory Sandboxes around the world.
- Regulatory Sandboxes and their collaborative nature can be designed to achieve different goals and purposes. Regulatory Sandboxes can be used:
    - To address key challenges associated with the transformation of Alberta's energy systems, such as **preventing the risk of a "utility death spiral" and stranded assets.** As the deployment of DERs accelerates, the backbone architecture of distribution and transmission infrastructure (both electric and gas) risk being marginalised and result in loss revenues, leaving customers relying solely on the main grid vulnerable. This may also create geographical disparity among Albertans around reliability, connection costs, and quality of service more generally. Regulatory Sandboxes can be used to test new business models, investment and financial mechanisms, and tariffs schemes;
    - To **reduce administrative and legal barriers** to the deployment of new technologies
    - To **integrate new (and non-conventional) players into the energy markets** by testing and scoping exemptions;
    - To address potential regulation **gaps or shortcomings** that may arise with testing and integrating battery storage, EVs and other DERs.
    - To **adapt Alberta's energy system to the increasing intensity and frequency of extreme weather events** due to climate change by testing financial mechanisms to repair damaged infrastructure, adapt existing infrastructure, develop new emergency procedures, and define new standards and rules to harden existing and new energy infrastructure.
- The PBR does not allow for regulatory change, it only reduces the regulatory burden for utilities. In this sense, Regulatory Sandboxes go a step further, and they can be used to adapt existing regulations, including PBRs.
    - In 2012, AUC adopted a PBR approach to rate regulation for electric and gas distribution utilities in Alberta to replace the traditional cost of service rate regulation[3]. Performance-based regulation is designed to mimic competition, encourage efficiency by providing incentives for the utility to reduce costs, while safeguarding reliability, and in so doing to keep utility rates lower than they might otherwise have been for customers.
    - At that time of the design of the PBR system, the maturity of DERs and their deployment in the province was relatively low and "the Commission opted for an approach to set the X factor [which introduces incentives on utility earnings], based on the average rate of productivity growth in the industry."[4]

[2] van derWaal et al, 2020, Participatory Experimentation with Energy Law: Digging in a 'Regulatory Sandbox' for Local Energy Initiatives in the Netherlands in Energies 2020, 13, 458; doi:10.3390/en13020458.

[3] Alberta Utilities Commission (2012) "Rate Regulation Initiative: Distribution Performance-Based Regulation." Decision 2012-237. Sept.

[4] Idem, paragraph 280.

- Recent studies[5] indicate that well-designed PBR can be used to prevent the utility death spiral while encouraging diffusion of DERs. PBR may also have the potential to encourage greenhouse gas emission reductions as well as encourage proactive measures to adapt energy infrastructure to the increasing extreme weather events resulting from climate change.
- The use of Regulatory Sandboxes approach can help the regulator to update the existing PBR system. It can help define new performance goals through a thorough engagement process and can enable the regulator to test new X factors, before incorporating them in the PBR system and regulation.

2. Principles of alignment between local priorities and regulatory framework

Recommendation #2. QUEST recommends that the AUC continues to recognize municipalities as specific energy players in the Alberta energy landscape and develop principles that enable them to become Smart Energy Communities through better access to information, better engagement, and more enabling regulation. This principle means that the AUC could consider designing specific engagement and consultation processes for municipalities, municipal organisations and organisations working with municipal organisations; developing resources targeted at municipal governments; reviewing the regulatory challenges and barriers municipal organisations are facing.

Rationale for recommendation #2.

- Informed by its on-the-ground work in the province,[6] QUEST noted a disconnect between local priorities and regulatory decisions in three areas:
    1. **Regulatory powers competing with AUC's decision.** Historically regulators were the gatekeeper to energy system initiatives but that is changing as DERs come to mainstream giving local governments the power to approve or reject projects – as EPCOR recently experienced it in Edmonton when the City put on hold one of the utility's major solar projects.[7]
    2. **Mismatch between ambition to transform local energy systems and capacity to do so.** Many municipalities, large and small, are interested in developing Community Energy Plans and Resilience Plans in order to reduce their greenhouse gas emissions, adapt their energy infrastructure to the increased intensity and frequency of extreme weather events, and stimulate economic growth.[8] At the same time, QUEST also noted that small Albertan municipalities have limited human and financial resources to develop Smart Energy Communities initiatives and projects. Given this context, existing regulations limit the capacity of municipalities to develop community energy initiatives such as DERs

[5] Littell, D. et al, 2017, Next-Generation Performance-Based Regulation: Emphasizing Utility Performance to Unleash Power Sector Innovation, Technical Report, NREL/TP-6A50-68512, September 2017; Lowry, M. and Wolf, T. 2016, Performance-based regulation in a high distributed energy resources future, Berkeley Lab, Report No. 3 January 2016 LBNL-1004130

[6] QUEST is currently working with ten municipalities from various sizes in the province to help them become Smart Energy Communities. QUEST also works with multiple community stakeholders through its two regional working groups and workshops.

[7] Scott Johnston, *Solar panel project in Edmonton's river valley put on hold*, Global News, June 19, 2019, https://globalnews.ca/news/5410244/edmonton-river-valley-solar-panel-project-epcor/

[8] 25 municipalities in Alberta have joined the Federation of Canadian Municipalities (FCM)'s Partners for Climate Protection program and are actively developing and/or implementing Community Energy Plans and/or Adaptation Plans.
https://fcm.ca/en/programs/partners-climate-protection

projects. Existing regulations require intense legal and technical expertise, as well as administrative and financial resources that are not always available to municipalities.

These findings seem congruent with the very contributions from municipalities made during the AUC's inquiry so far.

- "As identified in the City of Edmonton's January 3, 2019 Statement of Intent (Proceeding24116, Exhibit #24116-X0027), the scope of the inquiry should consider how potential changes to the electrical grid and rate design could either positively or negatively impact climate change and resiliency, the City of Edmonton's Energy Transition Plan, and the feasibility for implementing future City initiatives [...]. Opportunities to address other emerging issues, such as how "aggregated sites" are defined and their resulting implications is also desirable. City of Edmonton, Written submissions with comments on the scope and process of the proceeding, Jan 17, 2019
- "In the municipal setting the transition can be managed to support Provincial Climate Leadership policies to the benefit of all resident owners of the distribution system whether they are consumers or prosumers. The Towns of Cardston and Ponoka have been proactive in terms of investigating service delivery models that leverage evolving technology to achieve integration efficiencies and emission reductions. Our conclusion is that the most efficient and cost effective distribution systems in the future will be small, integrated and inclusive." Alberta Municipal Power System, Jan 17, 2019, Written submissions with comments on the scope and process of the proceeding,

3. **A need to build bridges between utilities and municipalities.** During its work on energy resilience, QUEST noted that there is a need for better collaboration between municipalities and their energy utilities. Municipalities working with QUEST were interested in obtaining more information about their local energy systems in relation to climate change, including the type of vulnerabilities their energy systems were exposed to, what was being done to strengthen them, and how to prepare for prolonged outages. Participating municipalities also understand the need to collaborate closely with energy utilities to successfully develop community energy plans and implement local resilient energy projects such as distributed generation. We also hear that more formalized agreements between energy utilities and municipalities are required in order to align planning documents and assets management.[9] The regulator through its consultation and convening roles could facilitate a regulatory dialogue between municipalities and utilities to prevent the aforementioned issue.

(v) What functionality of and information from the regulated utilities should be made available to new entrants for purposes of interconnection, physical co-location of facilities, unbundling and/or equal access, whether by tariffs or other means? On what terms should such functionality and information be made available?

[9] QUEST, 2020, Building Community Resilience: Key Considerations and Lessons Learned from Twelve Canadian Communities

3. Make data relevant to Smart Energy Communities initiative accessible, real-time and user-friendly

Recommendation #3. The regulated utilities, including distribution and transmission utilities, should provide accessible, real-time, user-friendly and free data and information to facilitate Smart Energy Community initiatives to municipalities, such as but not limited to, a GIS map indicating grid hosting capacity, making available the technical requirements to connect resources to feeders or sections of the grid, as well as estimates of connection costs. As much as practically possible given their differing physical systems, regulated utilities should be consistent in their review timelines, technical requirements, and costs to connect energy resources. Regulated utilities should also make available the actions and plans they develop and implement to adapt their energy infrastructure to increasing climate hazards.

Rationale for recommendation #3.

- As previously mentioned, many Albertan municipalities are currently developing or implementing Climate Mitigation and/or Adaptation Plans. A low-hanging fruit strategy for municipalities to make their energy systems more resilient and reduce emissions is to consider local energy generation projects, such as distributed and micro generation projects. This implies developing Community Energy Plans (CEP). A CEP includes a mapping of local energy resources, hosting capacity, buildings and facilities mapping. Based on QUEST experience, municipalities may want to find partners utilities or to conduct them on their own.
- At the same time, municipalities have limited human, financial and technical resources and expertise. Accessing real-time and user-friendly data from regulated utilities to map their distribution grid in terms of hosting capacity, technical requirements to connect, and costs are key to identify and implement projects quickly and efficiently, while minimizing administrative workload and procedures to request information to utilities.
- Fortis Alberta has already developed a publicly available interactive map that illustrates hosting capacity for FortisAlberta's distribution circuits.[10] While incomplete, many municipalities in Fortis Alberta's serviced area valued this map as a first great step to inform their CEP.
- By making more data available regarding grid hosting capacity, technical requirements to connect, as well as connection costs, utilities would be able to facilitate the development of resources in areas that could add value to the grid and customers, and minimize the time and resources required to review applications by customers in areas that might not be suitable for energy project development.

(x) What follow-up proceedings are required, and how should they be prioritized, to consider and implement the findings arising from the inquiry?

- Reference to Sandbox again, and more specifically reuse some part of the Sandbox proposal around the 3 workshops to identify common principles and policy and regulatory changes.

[10] https://www.fortisalberta.com/customer-service/get-connected/generation/hosting-capacity-map

APPENDIX 1 - OVERVIEW OF EXISTING ENERGY REGULATORY SANDBOXES

Australia[11]

Sandbox Name
Regulatory sandbox arrangements to support proof-of-concept trials in the Australian national electricity market

Host/Lead Organization
Australian Energy Market Commission (AEMC)

Status
Some sandbox elements could be implemented in 2019, others pending decision of Energy Ministers

Experimentation Scope
- Smart electricity grid
- Integrated approach/sector coupling
- Energy Storage
- New business models
- Flexibility services for grid stability
- Behind the meter
- Others: Scope of proposed trials determined by trial proponents. Potentially all of the above could be proposed to feature in trials.

Strengths
N/A

Weaknesses
N/A

Findings to be applied to Canadian Sandboxes
Though Australia does not yet have a formal sandbox program, findings from sandbox development discussions as well as trials that are underway of completed within the current regulatory arrangements are as follows:
- Provision of advice from the Australian Energy Regulator (AER) must be incorporated into the program. Proponents must be able to access the AER to have specific questions on the application of the law or rules answered and/or must be provided guidance on the elements of the energy framework specific to their proposed trial. Clear and robust process for providing advice and guidance should be developed in advance of launching the sandbox.
- Current participants undergoing trials have considered them limited due to the current regulatory framework. The Australian Energy Market Commission concurs that current arrangements for facilitating proof-of-concept trials can be improved through the introduction of regulatory sandbox arrangements.

[11] AEMC, *Regulatory sandbox arrangements*, Interim Advice, 7 March 2019.

- Australia is considering whether or not the sandbox arrangements should be extended to the regulatory framework for gas. As Canada has varying energy mixes across jurisdictions, all sources of energy supply will need to be considered.

Germany[12]

Sandbox Name
Smart Energy Showcases - Digital Agenda for the Energy Transition (SINTEG)

Host/Lead Organization
German Federal Ministry for Economic Affairs and Energy

Status
Active, with the time period for the entire initiative from 2017-2020

Experimentation Scope
- Smart electricity grid only
- Integrated approach/sector coupling
- Energy Storage
- Flexibility services for grid stability

Strengths
- Public and private funds are provided.
- Have already adapted the rule set for regulatory bodies to allow more room for experimenting.

Weaknesses
- The time period is restrictive.
- Only members in the SINTEG Ordinance can participate.
- The focus is not on solutions that are legally not allowed, but on solutions that are economically not viable.
- Only ran in 5 “economic areas”

Findings to be applied to Canadian Sandboxes
- Provide funding to trial participants to help ensure success.

Italy[13] [14]

Sandbox Name
Regulatory experiments to promote innovation in the power system in Italy

Host/Lead Organization
Italian Energy Regulator

[12] International Smart Grid Action Network, *Innovative Regulatory Approaches with Experimental Sandboxes*, Casebook, May 2019.

[13] UCL Energy Institute, *Regulatory Sandboxes in the Energy Sector*, Webinar, June 27, 2019.

[14] L. Lo Schiavo, Bonafede D., Celaschi S., Colzi F., *-Regulatory issues in the development of electro-mobility services: lessons learned from the Italian experience*, 1st e-mobility Power System Integration Symposium, Berlin 23 Oct. 2017.

Status

Active, with the time period for the entire initiative from 2010-2019

Experimentation Scope

First phase: regulatory experiments at zone level

- Smart electricity grids (series of experiments about Smart functionalities for MV networks)
- Electric Mobility (series of experiments about different business models for EV recharge)
- Energy Storage at Utility-scale and Dynamic Thermal Rating to cope with HV lines congestions due to excess of wind generation

Second phase: regulatory experiments at system level

- Open protocol for interoperable In-Home Devices connected to new smart meters
- Flexibility services and Demand

Strengths

- Outcomes of project made fully public to enable external evaluation and dissemination of best practices
- The demonstration phase is designed around a competitive process.
- The program has launched new and original cooperation among regulatory authorities, especially with the Telecom Regulatory Authority (AGCOM), which is exploring the benefits of Internet of Things and Machine-to-Machine communication services.
- Competitive process for participants.
- Regulators consulted other organizations and the public on legal changes.

Weaknesses

- In experiments mostly devoted to the user side, one challenge has been to identify good regulatory instruments that can support ―prosumers‖ and DG owners to become more active network users.
- Storage projects were only aimed at a specific network service (i.e. avoiding curtailment of wind-sourced generation units).
- The multi-vendor requirement for electric vehicle charging stations proved to be too complex. Localization of charging points confirmed to be the most crucial decision.
- Predefined regulatory exemptions.

Findings to be applied to Canadian Sandboxes

- Ensure results are public to enable external evaluation and dissemination of best practices.
- Implementation path shall be consistent with the regulatory policy of both non-discrimination among market players and neutrality towards different technologies.
- Incentives can be used only for network operators, who are in turn obliged to fully disseminate results, while for market players a non-distortive approach implies that exemptions cannot be granted only to a few parties but have to be ensured to all interested market parties.
- Ensure host organizations and partners are adequately staffed to undertake a program as they are extremely time-intensive.
- Consult other stakeholders and the public before implementing changes.

The Netherlands[15]

Sandbox Name
Experimental projects in the Dutch energy legislation

Host/Lead Organizations
Ministry of Economic Affairs & Climate Policy and the Netherlands Enterprise Agency (RVO.nl)

Status
This programme was open from 2015-2018 and resulted in 17 approvals for experiments. In 2019 a new legislation for a new programme is expected to be launched that will be open to all market players (e.g. suppliers, system operators, new players like aggregators, energy communities) and not only for electricity but also for natural gas.

Experimentation Scope
- Electricity supply
- Production and distribution in local communities
- The Smart electricity grid only
- Integrated approach/sector coupling
- Energy Storage
- New Flexibility services for grid stability in a house or a residential area

Strengths
- Policy instruments redesigned via public consultation.
- Have already adapted the rule set for regulatory bodies to allow more room for experimenting.

Weaknesses
- No funding provided
- Many of the initiatives did not qualify for participation due to requirements deemed too stringent, namely:
    - A minimum of 80 % of the participants needs to be household consumers. Experts voiced that a higher percentage of companies would improve the business case.
    - Production units with a maximum capacity of over 5 MW could not participate: This condition excluded solar and wind parks.
    - All participants need to be connected to the same low or middle voltage net. This requirement blocks upscaling possibilities outside the region.
    - Only small consumerscan participate, not large consumers. Experts voiced that large consumers/ companies can be of added value because they often have a different consumption pattern than household consumers and this can support locally balancing demand and supply.
    - The derogation is given for 10 years. The Degree is unclear about who will own the network after the end of the experiment, and this is experienced as a (financial) risk.
- Trial period of 10 years may be too long.
- Pre-determines which laws can be derogated from.

[15] International Smart Grid Action Network, *Innovative Regulatory Approaches with Experimental Sandboxes,* Casebook, May 2019.

Findings to be applied to Canadian Sandboxes

- It takes time before an experiment is operational. In the case of a project network it has to be incorporated in an early stage of development of the project.
- Especially with big experiments it is difficult to develop a good business case. Also due to the limited scale of the projects. A lot of issues have to be solved by the corporative association/ waiver holder like contracts with the DSOs and all (administrative) requirements to act as an energy supplier, electricity producer and local grid operator.
- Motivating consumers as participants is challenging.
- With experiments there are a lot of uncertainties for the investors and it is a rather complex and new process to implement.
- It is difficult to find many projects suitable for an experiment. Most developers and communities want to spend their limited time in the development of the (new) buildings and the energy supply is often a minor issue. Most experiments are on a limited scale.
- Increase of the scale and exemption possibilities of the scheme can increase the impact and attract new stakeholders like system operators, energy companies, local governments and partnerships.

The United Kingdom[16]

Sandbox Name
Innovation Link

Host/Lead Organization
Office of Gas and Electricity Markets (Ofgem)

Status
Active, launched December 2016

Experimentation Scope

- Smart electricity grid only
- Integrated approach/sector coupling
- Energy Storage
- Flexibility services for grid stability
- Behind the meter
- Others: Scope of proposed trials determined on a case by case basis. Trial plan are often jointly developed by applicants and OFGEM to help them understand what is possible. Potentially all of the above could be proposed to feature in trials.

Strengths

- The Innovation Link does not offer funding for trials.
- Reports made public (except for sensitive information).
- 1-year transition period after 2-year trial where participants can ask for modification to the rules so that solutions can be ready to launch.
- Economic development and emissions reduction focus.

[16] UCL Energy Institute, *Regulatory Sandboxes in the Energy Sector*, Webinar, June 27, 2019.

Weaknesses

- Though the Innovation Link does not offer funding for trials, however, applicants may apply for public funding from other schemes.
- Trial length may be too short (2 years).
- Can only participate if you have a license to generate, distribute or supply energy.
- Can only ask for derivations for laws enforced by Ofgem.

Findings to be applied to Canadian Sandboxes

- Holistically review regulatory barriers that impede innovation beyond the energy regulations (i.e.: financial, etc.).
- 2 years likely isn't long enough for trials, even with the 1-year transition period.
- Create advisory service to filter those that actually need to go through the sandbox process vs those that don't because they can do what they'd like within current regulatory framework.
- Ensure funding deadlines are in-line with major funder deadlines.
- Make results public to reduce risk of unfair competition.
- Staff advisory service and sandbox management teams adequately.
- Ensure innovations are beyond lab ready so that they are ready to be trialed immediately after acceptance to take advantage of the entire trial period.