Mowat ENERGY
MOWAT'S ENERGY POLICY RESEARCH HUB

Appendix A: Purpose and Scope of the RFP

This Appendix provides a context for a critical analysis of the elements that need to be considered and assessed in optimizing the evolution of the Ontario Energy sector to a more flexible environment that allows for the optimal inclusion of new technology, such as distributed energy resources (DER). This Appendix will also describe in more details the research deliverables expected.

The *Ontario Energy Sector Background Paper* provides a fairly detailed description of the regulatory environment that exists in Ontario today. This Request for Proposals is predicated on a desire for a principle-based analysis of that system and an understanding of the factors that should be taken into account in the evolution of that system to a modern energy system, one which optimally accommodates and incorporates distributed energy resources.

We also need to understand which technologies are most likely to be most impactful, when and in what order.

To the extent possible the critical analysis we seek should be principle-based and objective. It is worthwhile, however, that you have some appreciation of the current environment in Ontario. There are some system characteristics that Ontario has identified, to date, as being important and abiding values.

One of these system characteristics is the desire that the system be efficient and effective, that is, that it will deliver energy with a high degree of reliability to customers at a principle-based cost. Ontario has identified the importance of having an energy system that is appropriately leavened with as much competition-based pricing for as many system attributes and assets as can be reasonably accommodated. Ontario has committed itself to a low carbon economy. To date, Ontario has adopted an energy system that enables utilities to effectively serve all of their customers confidently and with a reasonable expectation of return on investment.

As noted above, what we seek from you is a critical analysis of the options that exist to facilitate the transition from the state that is described in the background paper to a more flexible, reliable, clean and affordable energy system that can accommodate innovation. This could or would include the optimized accommodation of DER.

At one pole of this analysis is a consideration of the principles and options associated with the existing environment as described in the background paper and the minimal necessary steps to begin the process of integrating distributed energy resources in Ontario.

At the other pole is a fully realized flexible, decentralized energy system, offering a range of options to customers predicated on a fully competitive model.

There are four key portfolios in the research project. Bidders are invited to submit proposals on a portfolio by portfolio basis. However, Bidders may submit proposals for more than one Portfolio, and preference may be given to Bidders who submit proposals for more than one some or all of the Portfolios. Deliverables will be research papers that focus on one, some, or all of the four portfolios.

1. The New Energy Customer
2. Meeting Energy Demand behind the Meter
3. Grid Modernization and the Utility of the Future
4. The Future of Centralized Supply.

The research papers are expected to discuss emerging technologies as well as economic, social and market trends that will affect Ontario's energy sector in the future. To provide further context, one of the intended uses of the portfolio research is to develop a comprehensive assessment of different plausible Ontario energy futures. The overall context is to examine the following key questions:

- Under what conditions will consumers seek to broadly adopt alternatives to centralized grid-centred supply?
- What is the likelihood of the emergence of these conditions? (Macroeconomic analysis)
- What are the tools at government's and sector's disposal to influence these conditions (accelerate / decelerate)? (Policy impact analysis)
- How will adoption affect the role, development, operation, and governance of the transmission and distribution systems?

We expect the research to examine results of technological, regulatory and policy innovation in the future, with a view to 2050, focusing on three "scenarios":

- The Business As Usual scenario
- Focus on short-term cost-effectiveness scenario
- Focus on innovation scenario

The research will look at how these factors affect the following actors:

- Customers (residential, commercial and industrial)
- Utilities and merchant generators
- Investors
- Governments and regulators
- Possible new market entrants and potential new innovative entrants.

In addition, in the energy system, the research will consider:

- Energy supply, demand patterns and energy prices
- Energy sources, fuel type and shifts (e.g., electrification of sectors)

- Reliability
- Sustainability, including considerations for Ontario's GHG targets

As well as the following macroeconomic effects

- Innovation
- Job market
- Potential export opportunities for innovative energy technologies

Below are key questions and subjects of interest for each portfolio. Your analysis will necessarily be informed by a comprehensive appreciation of these elements. There are redundancies in the questions, and some will be of more, or less importance as you develop your analysis. They are not exhaustive, and we expect that there will be ongoing dialogue between yourself and Mowat as you develop your analysis. We also expect that the Interim Reports which are called for in the Request for Proposals will provide opportunities for course correction and refinement of the research outcome.

The studies will avoid a normative assessment of whether government should employ its policy tools to encourage or discourage any particular future, but will define the scope of the government's ability to influence the trends and the subsequent impacts of utilizing that ability.

Key Portfolios

1. The New Energy Consumer

Consumers are changing their behaviours as a result of technology and economics. Understanding how their behavior is changing, and why, is crucial for understanding the future.

Behaviour

- How and why are consumers' behaviours changing?
- What elements dictate behaviours? Economic? Technology?
- What are the demographics of consumers who are the "New Energy Consumer"?
- How can consumer behaviours be captured to provide additional value to the sector? (Eg behavioural economics)

Smart homes and the "Internet of Things"

- What models exist to compensate residents for investing in "smart homes" or other behind the meter DER? What are the strengths and weaknesses of the respective models?
- What new technologies might be applicable to the new energy consumer (eg, heat pumps, fuel switching)

Societal value

- How do we translate "societal values", such as low-income assistance and low carbon, into market values? Can this be done, or will market distortions such as subsidies still be required?

2. Meeting Energy Demand behind the Meter

The rise of distributed energy resources could allow many customers – residential and commercial – to meet some or all of their energy demand from behind the meter. This would impact distribution and transmission grid and market operations. Please emphasize the technical, economic and social factors driving adoption.

Reliability and grid backup

- What models exist for compensating DER users for backup power from the grid? What are the strengths and weaknesses of the respective models?
- What models exist to regulate and fund reliability enhancements behind the meter? What are the strengths and weaknesses of the respective models?
- What is the price sensitivity to consumers investing in these resources?
- How is behind the meter generation integrated into the existing system? (Or is it?)

DER

- What technologies, and innovations, will be the most crucial here? (Eg, costs in solar or batteries; BIPV, fuel cells, microturbines, small CHP)
- To what extent is it necessary for utilities/system operators to know of the "dispatch" of DER assets behind the meter? What models are available to ensure adequate knowledge? What are the strengths and weaknesses of the respective models?
- What are the obligations of customers who have DER assets behind the meter with respect to ensuring that the utility has fully adequate knowledge of the "dispatch" of such DER assets?
- What models exist to value and distribute costs and benefits associated with DER, including the services DER can provide to the grid? What are the strengths and weaknesses of the respective models?

3. Grid Modernization and the Utility of the Future

The energy grid will need to adapt if it is too support rather than hinder any energy transition. In addition, to compete with new service providers entering the market to meet the demands of the new energy consumer, utilities will need to offer new services to enable reliable, integrated, and innovative opportunities, potentially requiring different regulatory and service delivery models.

Technology:

- What is the role of new grid technological innovations, such as in grid control, virtual power plants and overall smart grid management?
- How do microgrids fit into the utility of the future?

Generation compensation:

- What is the role of location-specific DERs for the operation of the grid? Will utilities have an interest in either owning location-specific DERs or influencing their placement?

Distribution tariffs

- What are the considerations regarding diminishing returns from overly complex DER rates.

Competition

- What models exist for the competitive participation of utilities and other market participants in the ownership of DERs? What are the strengths and weaknesses of the respective models?
- What are the strengths and weaknesses of other international models associated with the advent or accommodation of DER?

Cybersecurity and data

- Will cybersecurity affect the sector's development? How can security and data sharing co-exist?

Ontario specific issues

- Utilities are monopolies, and in Ontario they are primarily publicly owned. What possibilities are there for competition, just with affiliates and third-party companies?
- How are potentially stranded assets dealt with? As many potential stranded assets are owned by publicly owned companies, would that change how they should or could be dealt with?

4. The Future of Centralized Supply.

Centralized supply will continue to be the most cost-effective form of generation in the foreseeable future. Yet the primacy of centralized supply in the system could be reduced with the rise of new technologies.

Centralized supply

- What role does large centralized supply in a scenario that has large increase in distributed generation?
- Given that much centralized generation has been paid for/contracted, what is the best way to ensure that consumers benefit from centralized supply, and the assets do not become stranded?
- Ontario has surplus low-carbon baseload from nuclear and hydro. What is the best way to integrate those into the future energy system?
- Are there technological solutions to centralized supply, such as grid-level storage, new nuclear technologies? What role could carbon capture and hydrogen play?

Process of transition

- What are the potential benefits or drawbacks associated with the integration of electricity and gas sector planning? What is the role of community/regional planning?
- What principles should be considered in a potential transition from a wires-only to a system platform distribution system?
- What are the regulatory and business models repercussions of moving to a more decentralized system?
- What are the advantages and disadvantages associated with encouraging all customers connected to the grid?

Scenarios

- How could this transition develop? Why type of scenarios (up to 2050) should the province be considering?

Ontario specific issues

- How are potentially stranded assets dealt with? As many potential stranded assets are owned by publicly owned companies, would that change how they should or could be dealt with?
- How can DER integrate with a centralized system operation?