Stakeholder Comment Matrix – June, 2020

2021 Long-term Outlook Stakeholder Feedback

Period of Comment:	June 4, 2020	through July 6, 2020	**Contact:** [redacted]
Comments From:	Lionstooth Energy		**Phone:**
Date:	2020/07/06		**Email:** [redacted]

Instructions:

1. Please fill out the section above as indicated.
2. Please respond to the questions below and provide your specific comments. Email your completed comment matrix to forecast@aeso.ca by **July 6, 2020**

The AESO is seeking comments from Stakeholders with regard to the following matters:

	Questions	Stakeholder Comments
1.	**Long-term Outlook** a. What information do you find most useful within the Long-term Outlook? Is there additional information you would like to see? b. Do you use the Long-term Outlook data file? Which information within the Long-term Outlook data file is most useful to you? What additional data would you like to see within the data file? c. What delivery format of the data file would you find most useful? (Excel file, web query and download, interactive web based data visualization tool, other)	**A.** Lionstooth finds most components of the LTO useful. As the LTO ultimately impacts Tx system planning, the reference case, scenarios, and supporting analysis are all valuable. Lionstooth would like to see more information on DERs as defined in the AESO's DER Roadmap (any energy resource that is connected to and can supply energy to the Dx system) which includes not only rooftop solar, but also DCG. **B.** Yes. Lionstooth uses the LTO data file. Most information contained in the file is valuable and Lionstooth would appreciate seeing more / additional data aligned with future LTO analysis. **C.** Excel is sufficient.
2.	**Macroeconomic variables** a. The economic outlook could range from a V-shape recovery by Q2 2021 to a longer-term recovery by 2023, with some permanent load loss in the commercial	**A.** No comment. **B.** No comment.

	and industrial sectors going forward. What is your view on the Alberta GDP over the medium- (next 5 years) and long-term (5+ years)? b. Oil sector production capacity is expected to increase in 2023 with the completion of pipeline projects (e.g., Keystone XL, etc.). I. The 2019 CAPP Crude Oil Forecast released in June 2019[1] had oilsands forecast growth from 3.2MM bbls/d in 2020 to 3.6MM bbls/d in 2025 and then 3.9MM bbls/d in 2030. a. What is your view on oil production in Alberta over these time periods given the market changes over the last year? What is your view post 2030? b. Do you expect new oil production developments to be in situ or mining, or a combination of both? c. Do you expect domestic condensate growth, required for transport, to meet the incremental oilsands growth? Will domestic condensate displace imported condensate? II. What is your view on further oil sector investments over the same timeframe? III. What kind of oil price or other environment would allow for further cogeneration development in the oilsands and/or petrochemical sectors? c. Current forward gas prices are in the $2.25/GJ range. Post 5 years, do you see gas prices remaining at this level, decreasing, or increasing beyond inflation?	**C.** No comment.
3.	**Policy** a. What are your expectations of carbon prices in the future? Do you expect any change from a $30/t rising to $50/t, inflated by 2% thereafter? b. Other than policy on carbon pricing, what coming policies or policy scenarios do you see impacting load growth and generation development?	**A.** No comment. **B.** No comment.
4.	**Impact of the COVID-19 pandemic** a. What is your expectation on behaviour changes (e.g., work-from-home practices, online shopping, etc.) and the way Albertans consume electricity going forward? b. How are near-term costs and future generation projects being impacted by covid-19? Do you anticipate long term impacts to generation development?	**A.** Lionstooth won't speculate on future load behaviour changes, but notes that the AESO has been producing very interesting analysis on the impact of the COVID-19 pandemic on loads, including individual impacts to AIL, BTF industrial load, and System Load. We find this analysis and ad-hoc reporting valuable. We would support continuation of this

[1] Canadian Association of Petroleum Producers https://www.capp.ca/resources/crude-oil-forecast/

		type of analysis and integration of these findings into future LTOs and other AESO studies (i.e. Annual Market Statistics). **B.** Lionstooth anticipates both positive and negative impacts to generation development as a result of the COVID-19 pandemic. On the positive side, surplus equipment and resources have come available that could provide improved CAPEX / OPEX positions for generation development. On the negative side, decreases in longer-term demand expectations as well as more challenging financial times will result in project delays or cancellations. These negative pressures have a greater impact on mega-projects and we have already seen a few cancelled during the pandemic.
5.	**Load growth and modifiers** a. Where do you think load growth will be concentrated –at the System Load (all metered demand) level, or at the Alberta Internal Load (system load plus load served by on-site generating units) level? b. Under what conditions could Alberta see sustained negative system load growth? c. In the 2019 Long-term Outlook, the AESO had a number of economic and technological advances that are expected to impact the load growth in the province (see section 4 of the 2019 LTO and "New Load Modifiers" tab of the 2019 LTO data file). What is your view on load growth and the impact of the following modifiers within the next 5 years, from 5 to 10 years, and after 10 years for: i. Distributed energy resources: 1. Rooftop solar PV 2. Electric vehicles and charging stations 3. Gas generation 4. Wind generation 5. Energy storage 6. Energy efficiency d. What is your view on load growth and the impact of other emerging industries, sectors or technologies (e.g., bitcoin and cryptocurrency mining, cannabis facilities, petrochemical facilities, data centers, others)?	**A.** No comment. **B.** There is potential for individual customer demand destruction in the form of business / operation closures but also as a result of sustained high devliered electricity costs which will force certain customers to invest in onsite generation and self-supply, with the potential to defect from the grid entirely. While the larger pressure on demand, at the moment, is recovery from the COVID-19 pandemic, as customers return to more normal business operations and look to recoup recent losses, high delivered electricity costs will likely be an area of focus for many. The AESO's recently published Delivered Cost of Electricity report provide interesting insights in this regard. **C.** Lionstooth has always struggled with DERs being incorporated into the LTO as "New Load Modifiers." The "modifiers" listed in this question are not load, they are generation or energy sources that can supply electricity to the Dx system (i.e. EVs). While we recognize the AESO does not have the best visibility of all DERs at the moment, combining DERs with load further confuses flows on the Dx system and does not provide the individual component analysis (i.e. load vs. generation behaviours) that will ultimately improve Tx system planning.

		We strongly recommend the forthcoming LTO separates DERs from load. The AESO's DER Roadmap has nicely highlighted the value that DERs (ranging from rooftop solar to DCG) can bring to the AIES and the importance of integrating DERs into system modeling to allow for effective Tx planning. **D.** No comment, other than these are actual "New Load Modifiers" unlike the DERs listed in Question C, which are in fact generators or new sources of electric supply (i.e. EVs).
6.	**Generation Technologies** a. What renewable technologies are likely to be developed by PPA's? b. What is the potential size of the corporate PPA market for renewables, being funded fully or in part, in Alberta? c. What challenges do you foresee in implementing PPA's for renewable development in Alberta? d. Recent public announcements indicate all existing coal-fired units will utilize natural gas in the near term. How do you see the operation of the converted units changing compared to operations as a coal-fired unit? e. Outside of existing generation technology in Alberta, what technology will show up in Alberta next? f. What are the challenges surrounding generation development in Alberta and what are the major factors that will determine what gets built?	**A.** No comment. **B.** No comment. **C.** No comment. **D.** No comment. **E.** In terms of truly new technology to Alberta, the potential for EV energy supply back to the Dx system is something already being explored in other North American jurisdictions (i.e. California). **F.** Market design and rule certainty is the biggest challenge surrounding generation development in Alberta. Following the confirmation that our market would remain energy-only and not transition to a capacity market, there was direction for a measured and thoughtful pace to change. However, there have been a number of significant decisions, proceedings, consultations, and engagements that have resulted from a lack of measured and thoughtful change that have placed many generation developments at risk, specifically those planning to connect to the Dx system. It is Lionstooth's hope that over the coming months, some of these issues begin to see resolution and a clear path forward established.

<table>
<tr>
<td>7.</td>
<td>Future technologies
The following table contains generation technologies and specifications on potential future generation development. Do you believe that these are representative of potential future Alberta generation projects? Would you like to share views on additional technologies and specifications that are not included within the table?

<table>
<tr><th>Facility Type</th><th>Overnight Capital Cost ($/kW)</th><th>Fixed O&M ($ / kW-year)</th><th>Variable O&M ($/MWh)</th><th>Generator Capacity (MW)</th><th>Heat Rate (GJ/MWh)</th></tr>
<tr><td>Combined-Cycle Natural Gas</td><td>1,667</td><td>$49.71</td><td>$2.49</td><td>479</td><td>7.03</td></tr>
<tr><td>Simple-Cycle Natural Gas – Aeroderivative</td><td>1,159</td><td>$52.83</td><td>$4.24</td><td>46.5</td><td>9.68</td></tr>
<tr><td>Solar Photovoltaic – 2021-2025</td><td>1,643</td><td>$31.85</td><td>Credit: grid intensity x carbon price</td><td>50</td><td>N/A</td></tr>
<tr><td>Solar Photovoltaic – 2026-2030</td><td>1,388</td><td>$31.85</td><td>Credit: grid intensity x carbon price</td><td>50</td><td>N/A</td></tr>
<tr><td>Wind Generation - 2021-2025</td><td>1,586</td><td>$32.50</td><td>Credit: grid intensity x carbon price</td><td>50</td><td>N/A</td></tr>
<tr><td>Wind Generation - 2026-2030</td><td>1,105</td><td>$29.25</td><td>Credit: grid intensity x carbon price</td><td>50</td><td>N/A</td></tr>
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</td>
<td>No.

Lionstooth is of the view, supported by the AESO's Project List, that there will be a significant increase in the amount of Dx connected generation in the future. DER technologies, ranging from rooftop solar to dispatchable gas-fired DCG and intermittent renewable DCGs, are missing from the table.</td>
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<td>8.</td>
<td>Other
a. Is there any information that you would like to share, which would contribute to the Long-term Outlook development (ie. Developing trends)?
b. What do you think is likely to disrupt Alberta's electricity industry in the next 20 years and in what way?</td>
<td>A. The remainder of 2020 will include further discussion and engagement on DERs, as the AUC's Distribution System Inquiry comes to a close and the AESO consults on the DER Roadmap. In order for effective Tx planning, there is an immediate need to better incorporate, model, and plan for existing and future DERs to allow for their value and benefits to the entires wires system to be realized.

B. Lionstooth's future vision of our electricity market includes increased adoption of DERs as customers are defining what kind of services they want. This includes electricity consumption and supply becoming increasingly more democratized and personalized. Consistently more and smaller generation will serve individual customers, with energy flowing customer to customer, Dx feeder to Dx</td>
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		feeder, and then to the Tx system. Policy and tariff design, as well as integrated grid planning, will need to focus on what best enables customers to meet their needs and protect those same customers from growth in assets and infrastructure that no longer serves customers' needs.