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:	Heartland Generation Ltd.		**Phone:** [redacted]
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. Heartland Generation Ltd. (HGL) finds the load forecast and the underlying assumptions to be helpful in making commercial decisions. Further, HGL believes that the AESO is in best position to provide this information given its access to the complete data set. b. HGL finds the data file to be useful, specifically the information on load, generation by capacity type, etc. Additionally, seeing the AESO's view of the marketplace as a whole and in the future is insightful. c. HGL prefers the excel file format.

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 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	Answering these questions could require sharing commercially sensitive information; as such, it should not be disclosed in a public forum.

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

	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? d. 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?	
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. Alberta's Technology Innovation and Emissions Reduction (TIER) Regulation has only been deemed equivalent to the federal Output-Based Pricing System (OBPS) for 2020. The Alberta system will require review each year to be deemed equivalent. If the system is not deemed equivalent to the federal system, it would be replaced by a ratcheting down of the OBPS allowance for new gas turbines from 0.37 T/MWh to zero by 2030. This would create a difference from the TIER system, which applies 0.37 T/MWh to all generators. The federal carbon price will be reviewed in 2022. The 2% inflation applied thereafter does not seem adequate given that the historic price increase has

		been approximately $10/Tonne per year for the first 3 years of the program. b. Other than policy on carbon pricing, the AESO should consider the federal Clean Fuel Standards (CFS). These regulations are still being drafted but indications from the consultation process suggest that the CFS may introduce considerable cost to high carbon intensity fuels. The Government of Canada announced commitments to • continue to implement the Pan-Canadian Framework on Clean Growth and Climate Change, • strengthen existing measures and introduce new GHG reducing measures to exceed Canada's 2030 emissions reduction goal, and • begin work so that Canada can achieve net-zero emissions by 2050. The plan to achieve net-zero emissions by 2050 will set legally-binding, five-year emissions reduction milestones based on the advice of experts and consultations with Canadian stakeholders.
4.	**Impact of the COVID-19 pandemic**	Answering this question could require sharing commercially sensitive information; as such, it should

	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?	not be disclosed in a public forum. At a high level, HGL believes that it may be too early for companies to form an expectation regarding the full impact of the COVID-19 global pandemic. The AESO should consider analyzing other jurisdictions that have since re-opened for possible indications. It is commendable that the AESO has published "An Update on the Impact of COVID-19 and Low Oil Prices on Alberta's Power System" on June 30, 2020. These updates and analyses are useful to facilitate stakeholder engagement on evolving issues like the COVID-19 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	a. – b. In HGL's opinion, the AESO is best suited to make these assumptions after consulting with industrial/commercial loads and conducting related analyses. c. – d. HGL believes the AESO would be able to gain an insight to potential load impacts through reviewing both internal ISO research as well as publicly available information such as the AUC small scale generation applications. The AESO's reports like the "Micro- and Small Distributed Generation Reporting" have been helpful to HGL when assessing the impact of similar emerging trends.

	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)?	
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?	a – e. Answering these questions could require sharing commercially sensitive information; as such, it should not be disclosed in a public forum. f. Regulatory certainty will play a key role in determining future generation development. There are key developments regarding Alberta's regulatory agencies and electricity policies that are expected in

	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?	the near term that will impact investor confidence and subsequent construction decisions.
7.	**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?	HGL has found Brattle's Report – AESO Cost of New Entry Analysis[2] – to be helpful in assessing the costs of generation technologies and the likelihood of development. Alberta will likely see retrofitting opportunities for its aging hydrocarbon fleets. These readily available improvements will act as a stop-gap measure to aid in long-term renewable energy growth. There will continue to be emission regulation and air policy risks for hydrocarbon, which will impact future hydrocarbon improvements, however these projects will help transition the grid. Further, there is the potential for small modular nuclear generation. In HGL's opinion the time horizon

[2] Accessed at https://www.aeso.ca/assets/Uploads/CONE-Study-2018-09-04.pdf

		<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></table>	for this kind of development is greater than 10 years away, if at all.
8.	**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?		HGL generally believes that technological innovation will be the biggest cause of disruption to the Alberta electricity industry. Technological change is all-encompassing and difficult to predict, but the pace of change in electricity generation is increasing and already causing disruption. The emergence of electric vehicles and associated charging/storage technologies, the affordability of distributed generation, and the emergence of energy storage are all examples of some of the known technology innovation in the electricity industry. The changing financing landscape will also have a direct impat on the electricity industry. For example: increased availability for green bond financing, limited

		financing availability for coal or other carbon intensive projects, federal government PPAs, federal REC procurement, and foreign investment capital for renewable technologies. In the short to mid-term, the Alberta Intertie Restoration project could distort the Alberta market, as it would further enable a BC crown corporation to participate in our competitive market and siphon much needed rents for capital cost recovery away from firm-capacity Alberta generators.