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: Canadian Renewable Energy Association	**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
a.	**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. The Canadian Renewable Energy Association would like to see further information regarding the deployment of energy storage and distributed energy resources in Alberta includined in the 2021 Long Term Outlook. As well, it would be beneficial to see more detail regarding the development of models used to determine the levelized cost of energy for renewable energy facilities. We acknowledge that the AESO has been engaging with the sector on these issues, but it would be worthwhile to see where the planning team ended up in defining and calculating LCOE at the time of publication. Furthermore, now that climate policies at both the Federal and Provincial level, additional information about grid intensity and the impacts of carbon pricing would be informative. It may be possible to include these details through the development of climate-related scenarios. b. Members of the Canadian Renewable Energy Association

		make use of the data file. More information about the inputs into the modelling of levelized costs of various technologies would be helpful to our members, as would further detail about the emissions of the different technologies that are being analysed. c. We support the delivery of this information through the current information. An interactive data visualization tool would also provide some additional context.
b.	**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	

[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?	

c.	**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. Our expectations for the carbon price align with the AESO's expectations. However, we request confirmation of the 2% increase prior to its inclusion in the LTO, as we have been unable to find that reference. b. The Federal Government's Greening Government policy will have a minor impact on load growth and generation development. This policy will procure 200,000 – 280,000 MWh per year renewable electricity, in addition to 240,000 – 360,000 MWh per year in RECs to offset Federal electricity emissions. We expect that this will result in minor impact on generation overall. The AUC's ongoing consultation on Power Plant Self-Supply and Export may also have an impact on generation development scenarios. In 2019, the AUC ruled that the "current statutory scheme limits self-supply and export." However, should the Commission decide, following this consultation, to recommend that Alberta Energy permit self-supply and export, it would be expected to have an impact on overall demand, peak loads, integration of renewable resources, line losses and transmission and distribution builds. The treatment of energy storage facilities in the Bulk and Regional Tariff design will have a critical impact on the deployment of those facilities wishing to connect to the transmission system. Furthermore, a review and update of the *Transmission Regulation,* which may include an update on the treatment of energy storage as a tool for transmission deferral, may have an impact on the deployment of this technology in Alberta. Similarly, it may have an impact on future renewable energy development, should the changes result in less congestion in central east and southern Alberta. We note that the trend of distributed energy resources (DERs) growth, driven by the technology cost competitiveness noted in the AESO's recent Delivered Cost of Electricity Report, may continue to result in changing

		load/demand patterns. Currently, there are many interrelated engagements that will shape how Alberta responds to the DER evolution at the utility and microgen scale. The AESO's ongoing "Participant-Related Costs for DFOs (Substation Fraction) and DFO Cost Flow-Through" consultation work was intended to provide the clarity and investor confidence around how system upgrade costs will be allocated in the near term. However, it seems unlikely that there will be sufficient investor confidence to move forward with new DCG deployment until there is a clear determination from the AUC on how system upgrade costs will be allocated. Furthermore, any eventual policy changes that come out of the next phase of the AUC's Distribution System Inquiry and any new tariff treatment as AESO works through the Bulk and Regional Tariff (such as 12 CP) will need to be monitored as both of these will have effects on DER development, which in turn may influence the overall outlook.
d.	**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?	b. Beyond the impact of COVID-19 on demand in Alberta, as outlined by the AESO in "Impact of COVID-19 and Low Oil Prices on Alberta's Power System", our members have also seen pressures due to supply chain and import constraints, as well as constraints that are the result of getting workers across the border. That is, with some specialized technicians, who are required to cross provincial and international borders, there may be impacts from self-isolation requirements. Note that while these requirements are not required for those who cross into Alberta, there may be requirements in regions where staff is working, prior to coming to Alberta. While these restrictions seem to be winding down as provinces end their States of Public Health Emergencies (or equivalent) and begin to wind down related measures, there remains some uncertainty regarding the likelihood and timespan of possible future waves of the pandemic.

e.	**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)?	***c. Rooftop solar PV*** We take the term "Rooftop" solar PV to here refer to behind-the-meter (BTM) solar in general, which would also include many small-scale ground-mounted installations in Alberta, notably on farms and at larger industrial sites but also some residential properties. With the closure of Energy Efficiency Alberta's Residential and Commercial Solar Program (RCSP) to new applicants in 2019, there has been a marked downturn in new deployment of BTM solar, a decline that has been exacerbated by widespread economic uncertainty resulting from COVID-19. Whereas under the RCSP approximately 1,500 BTM solar projects (17 MW total) were installed over the two-year run of the program, we anticipate approximately 50% less solar will be installed during the 2020/21 fiscal year. Assuming that longstanding solar PV capital cost decrease trends continue and that the province's Net Metering framework is maintained, we estimate that over the next 5 to 10 years there will be at approximately 50 MW of additional BTM solar installed in Alberta.
f.	**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	a. Corporate power purchase agreements are likely to be a key revenue generator for the development of wind projects, solar projects, and hybrid projects, which may include wind-storage, solar-storage and wind-solar-storage pairings. To get a sense of the growing enthusiasm around this market, In the US, almost 200 major companies and 130 cities have made the commitment to be 100% renewable. As a result,

	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?	the US saw around 8.5 GW of corporate PPA deals in 2019, up from 6.5 GW in 2028. Even in Alberta, we have already seen several of these arrangements in the last year, including a 177 MW wind energy project and a 74MW solar project, both of which are providing energy to an industrial customer. We also note that both the Government of Canada and the City of Edmonton are expected to released RFPs in the coming months, to meet their own electricity demand for the next 20 to 25 years. b. It should be noted that the Business Renewables Centre Canada, located in Calgary, currently has over 40 members. These 40 members are divided between buyers, who are investigating opportunities to purchase power from IPPs, and IPP members, who are looking to sell this power. BRC Canada's has set a goal to "help corporations and institutions procure 2000 MW of renewable energy by 2025." This goal provides a reasonable estimate of market expectations for the next five years. c. One challenge facing the PPA markets in Alberta is the current administration of the Alberta Offset Protocol for Wind. The Protocol currently provides for 8 years of offset credit generation, while allowing two five year extensions. While these extensions have historically been granted, the risk of rejection may be reflected in the terms of financing agreements. That is, the cost of financing a renewable energy project may be artificially inflated, because the presumed risks exposure of the project does not reflect the number of years in which generators can actually generate credits. ***d. NA*** ***e.*** It is expected that energy storage will see significant levels of development and investment once the Tariff and other rules surrounding deployment and operations are sorted out.

g.

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?

Facility Type	Overnight Capital Cost ($/kW)	Fixed O&M ($ / kW-year)	Variable O&M ($/MWh)	Generator Capacity (MW)	Heat Rate (GJ/MWh)
Combined-Cycle Natural Gas	1,667	$49.71	$2.49	479	7.03
Simple-Cycle Natural Gas – Aeroderivative	1,159	$52.83	$4.24	46.5	9.68
Solar Photovoltaic – 2021-2025	1,643	$31.85	Credit: grid intensity x carbon price	50	N/A
Solar Photovoltaic – 2026-2030	1,388	$31.85	Credit: grid intensity x carbon price	50	N/A
Wind Generation - 2021-2025	1,586	$32.50	Credit: grid intensity x carbon price	50	N/A
Wind Generation - 2026-2030	1,105	$29.25	Credit: grid intensity x carbon price	50	N/A

According to recent analysis in the renewable energy sector, our industry continues to experience significant and ongoing technological improvements, leading to consistent reductions in pricing. While we are unable to provide verification of the AESO's cost estimate for future technology at this time, we wish to provide contest for the following trends:

At a utility scale, Lazard has observed the levelized costs of wind dropping by 70% since 2009, along with an 89% drop in solar (source: https://www.lazard.com/media/451086/lazards-levelized-cost-of-energy-version-130-vf.pdf). Following this trend, Bloomberg New Energy Finance expects a further 34% drop in solar, 36% drop in wind and 64% drop in storage LCOEs by 2030 (source: https://bnef.turtl.co/story/neo2019).

It is noteworthy that these projected costs, which are developed using conservative modelling, are often outperformed by real world deployment. As such, we recommend that the AESO consider the development of a scenario reflecting renewable costs that are lower than those in the base case. This scenario may perhaps be more enlightening than a scenario developed with a certain renewable targets in mind.

Likewise, residential solar costs are outpacing predictions. We are rapidly approaching a scenario where, according to the Cost of Delivered Energy report, we may soon see a broad trend where it is more cost effective for a customer to install solar onsite than to purchase from the grid. Such is the rate of cost reductions that it may be worthwhile for the AESO to also prepare a "High DER Penetration" scenario.

Members of the Canadian Renewable Energy Association request that Energy Storage projects be added to this table. Additionally, it may be worthwhile for the AESO to consider specifications for hybrid projects that include wind and solar, wind and storage, solar and storage, or wind, solar and storage included at one site.

h.	**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?	a. Given the importance of this document in communicating the investibility of the Alberta energy market, CanREA members request a statement of clarity from the AESO that this modelling is the result current energy only market rules, and that it is not expected that energy only market rules will be changing in the coming years. b. Among the potential disruptors that could impact the electricity sector over the next twenty years, we would include the following opportunities: - Increased opportunities for self-supply and export, which will increase interest in DERs. - Increasing opportunities for corporate power purchase agreements, due to falling costs of wind, solar and storage technology, along with a predictable schedule of carbon prices through TIER. - Reduced costs and increased deployment of storage, as an energy market participant, as a wires deferral or even both.