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: Utilities Consumer Advocate (UCA)	**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 and b) There are other useful information and data that the AESO could provide in Long-term Outlook and consider for modeling purposes. First, the distribution-connected generations should be included for the forecast generation additions in the future. The distribution-connected generation, referred to as the Distributed Energy Resources (DER), is anticipated to grow fast in the future at the distribution level, and the AESO may need to include them to have a more accurate generation forecast. Having a precise estimation of the DERs additions location and the plausible types of new technologies that will develop in the distribution system will help AESO for planning at the transmission level as well. Second, the demand side management tools will

		create an opportunity for both transmission and distribution-connected consumers to have more demand response in the future. The AESO needs to include in its forecast what MW of demand response is available now and how much will be added to the system in the future. Having more demand response in the system will lead to less requirement for generation additions and less investment in transmission infrastructure. c) The UCA prefers the Excel version for the data file.
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?	a) Based on the Alberta Treasury Board and Finance Fiscal Plan published in February 2020, real gross domestic product (GDP) was forecasted to grow 2.5 percent in 2020 and remain stable until 2023. This growth was supposed to follow a period of weakness in 2019 when provincial economy activity declined due to the pipeline delays and a slowdown in the global economy. However, the forecast is being revised due to the Covid-19 pandemic and plunging oil prices. According to the Conference Board of Canada's June 2020 provincial outlook, Alberta's real GDP is forecasted to decline substantially by 6.8 percent in 2020 and not return to its 2014 high at least until 2023. In the short term, if COVID-19 outbreaks begin to flare up as the economy reopens, Alberta will likely reimpose strict lockdown measures and send the economy down more. In the medium to long-term, the growth in the GDP depends on how the small and medium-sized businesses will be recovered as they are at high risk of bankruptcy right now. The future

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

	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? 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?	price of oil is another critical factor that will determine whether the large oil and gas producers are able to back to their normal production and enhance the GDP. b and d) a 30 percent reduction in global oil demand and a price war between OPEC members have disrupted the balance between demand and supply and caused already a substantial decline in oil prices. This issue may cause oil and gas companies to struggle to return to their normal production at least for a few years. In order to cope with low prices that have at times fallen below the break-even point for operation, producers may be forced to cut their production. Considering that the global oil markets remain weak due to the demand destruction caused by the COVID-19 pandemic and the oil supply surplus it is anticipated that oil sands facilities may not be back to their normal operations until Western Canadian Select (WCS) prices recover from current levels. Although OPEC+ members are reaching an agreement to curtail production and end the price war, it will take time until the Crude storage around the world depletes as oil demand is much lower than it was before the pandemic. Based on the forecast of the Conference Board of Canada, oil and gas investment will fall by roughly 30 percent in Alberta in 2020. However, Trans Mountain Expansion (TMX) and KXL pipeline projects may provide an opportunity to Alberta to expand its production and attract higher investment in oil and gas

		sector by taking advantage of access to the greater market, linking them to Pacific markets and to the Gulf Coast, where heavy oil is in high demand. This may help business investment to rebound slowly during the next 5 years. In the gas market, the long-term forecasts show that the AECO, HenryHub, and Union Down prices are expected to continue to fluctuate over the next 10 years.
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 recently introduced a revised cap and trade system, the Technology Innovation and Emissions Reduction (TIER), which has been approved by the federal government. The TIER will be mandatory starting January 1, 2020, for emitters whose greenhouse gas (GHG) emissions exceed the 100 kilotonnes CO_2e annual threshold. The TIER will also include an "opt-in" provision for taxpayers who emit certain pre-determined minimum thresholds and/or face competitive and trade-exposed circumstances. It is anticipated that the current $30/t$CO_2e$ levy increase to $40/tCO2e in 2021 and $50/tCO2e in 2022. b) There are a number of developing provincial and federal policies that will impact the future of electricity demand and supply in Alberta. At the federal level, the regulation for the phase-out of conventional coal-fired generators and the emission performance standard for gas-fired units may change the generation mix in Alberta over the medium to long-term.

		In the provincial level, the carbon pricing and the required performance standard under the TIER might also change the generation mix in Alberta by creating more incentives for cleaner electricity generation. Also, the possibility of higher DERs penetration and emerging technologies into the distribution system is currently being evaluated on a broad aspect by the AUC and other stakeholders through the Distribution System Inquiry. Any significant policy directions resulted from this inquiry, including the policy framework, the future distribution system roadmap, and a new tariff design that encourages more self-generation, may significantly impact the level of load and mix of generations in Alberta. Moreover, some other initiatives and proceedings are currently in process in Alberta that may have an impact on the load growth and generation development in the future, including the AESO's DERs and energy storage roadmap, coordinated transmission and distribution planning and assigning distribution system operator, changes to the T-Reg, and review of the electricity framework.
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) The COVID-19 pandemic has had a significant effect on the level of electricity demand in Alberta during the last few months. Based on the AESO's demand data, the power consumption has declined substantially during the last few months compared to the same period in 2019. In response to the lower electricity demand, the price in the wholesale electricity market hit the floor price ($0/MWh) 19 times during the months of April and May after not dropping that low throughout 2019. In addition, the shape of

		demand curves indicated a change in electricity consumption patterns of consumers following the stay-at-home measures. The morning peak consumption was flattened, and the afternoon peak consumption was shifted to earlier in the day. The power consumption during the weekends was also decreased as malls and other outdoor activities were closed. In the short-term, if COVID-19 outbreaks begin to flare up as the measures lift, Alberta will likely reimpose strict lockdown again, and likely the demand will drop in response. Also, work-from-home was one of the unintended impacts of the lockdown during the last few months. It is possible that in the long-term, working remotely will be an option for people who have been successfully able to work from home during the pandemic. This may change the electricity consumption patterns in Alberta permanently. b) The COVID-19 pandemic might impact generation development and causing a delay in the new generation projects if the economy remains down for a longer period. This will be in response to lower electricity demand, particularly for large consumers (commercial and industrial), if they cannot back to their normal business in the near future. In addition to the effect of COVID-19, oil prices impact the Alberta's oil sands industry, as one of the main drivers of the load growth in Alberta, which may impact expansion plans. This could cause load growth to be flatter in the future and postpone the generation development projects.

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 and b) The economic growth, the expansion of oil sands production, emerging new industries such as cannabis facilities, cryptocurrency mining, data centers, and possible more electric vehicles adoption and charging station installations are the main drivers of the load growth in the future. However, considering the low forecasted GDP in Alberta due to COVID-19 pandemic and slowing down the oil sands production expansion as a result of low oil prices, it is anticipated that Alberta Internal Load (AIL) growth to be flatter at least for the near future. Emerging new industries and adoption of EVs may increase the load at the regional level in large cities such as Calgary and Edmonton. Still, these are also highly dependent on how Alberta's economy will recover in the future. On the other hand, it is expected that more penetration of behind the fence self-generation such as rooftop solar, energy storage, and emerging technologies in energy efficiency could reduce the AIL in the future, which may result in having a sustained negative system load growth. c) Based on the latest data from the AESO (June 2020), there is approximately 78.6 MW of micro-generation capacity installed in Alberta, with about 92% of that solar. The primary motivators for solar PV installations have generally been consumer-centric and linked to priority interests for renewability and energy independence. Solar costs are continuing to decline and improve in efficiency, making them more competitive with other generation sources. Considering the growth of the solar generation in the future, utilities may be able to defer the need for

		investments in transmission and distribution infrastructure by reducing the peak demand of the system. Energy storage technologies can draw energy from the network during periods of low demand and dispatch it optimally during periods of high demand. Similarly, storage can be used to accumulate over-production from renewable distributed generation, alleviating system constraints for improved reliability and power quality. Applications for energy storage are anticipated to advance rapidly with improvements in battery technologies and cost reductions achieved through materials development and large-scale production. For consumers, on-site storage can be used to shave demand peaks and flatten consumption profiles, reducing demand charges, and the all-in cost of energy. These reductions may contribute to a lower coincident peak on the transmission and distribution network during peak times, reducing the amount of utility infrastructure investment required to maintain adequate delivery capacity. Energy Efficiency (EE) is one of the most mature forms of DER available for reducing demand and consumption growth and related infrastructure expenditures. More than two decades of EE programming across North America has led to significant improvements in the energy performance of equipment used by consumers. Future efforts are anticipated to focus on consumer behavior and the energy performance of integrated energy systems such as residential buildings, commercial buildings, and commercial/industrial processes where

		considerable opportunities remain. The popularity, interest, and acceptance of EVs have grown year-over-year. This growth is largely attributed to the rapidly evolving technology improvements, price reductions, increased driving range capability, and the growing availability of electric charging infrastructure. In Canada, Alberta has the fourth-largest fleet of EVs behind Quebec, Ontario, and British Columbia. In 2018, there were 93,091 EVs on the road in Canada, which represents growth of 125% compared to 2017, with EV sales accounting for 2.2% of new vehicle sales market share. In the long-term, the EVs adoption will depend on various factors such as EV purchase prices in comparison with internal combustion engine (ICE) vehicle, fuel price, availability of charging infrastructures, and policy mechanisms available to support EV adoption including incentives and rebates. In short to medium-term, the load may increase at the regional level in response to more EV adoption. d) See response to item a.
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	a and b) Alberta has great potential for renewable technologies such as wind and solar to be developed by the power purchase agreements (PPAs). Considering large renewable resources available in Alberta combined with a deregulated electricity market in the province, the PPAs give corporations the ability to procure renewable energy directly from the developers. This may lead to expanding the corporate PPA market for renewable in Alberta as well.

	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?	c and d) no comment. e and f) see the response to question 7.

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?	There are other potential technology developments that should be considered in the future mix generation in Alberta, such as : - Efficiency: Utilize the advanced technologies that reduce the energy used for each unit of output is the cheapest and cleanest way to meet future electricity demand. - Geothermal: Alberta is particularly well-positioned to take advantage and develop a geothermal industry considering its existing oil and gas industry and significant accompanying technical expertise relevant to geothermal drilling. - Hydro: the Canadian Hydro Association estimated that Alberta still has more than 11,500 MW of remaining hydro potential, including both reservoir and run-of-the-river projects. - Biomass: Energy from agriculture and forest waste could become a sustainable source of fuel for generating electricity in Alberta's rural areas. - Aggregated distribution-connected generations, including the rooftop solars, energy storage, combined heat and power (CHP), etc. - Small Modular Reactors (SMR) - Ontario, New Brunswick and Saskatchewan signed a Memorandum of Understanding in December 2019 to work colaboratively on development and deployment of SMRs. Saskatchewan established a Nuclear Secretariat in June 2020 to develop and execute a plan for the deployment of SMRs in the 2030s. While use of SMRs would require policy changes in Alberta,

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

		the AESO should monitor its development in other jurisdictions.
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?	a) no comment. b) The power delivery cost, including the distribution and transmission rates, remains one of the main concerns of customers over the past decade. Considering the expected lower load growth in the future, combined with new technologies and business models that allow consumers to manage their power consumption differently through demand response, storage, and/or distributed generation, regulated utility business models may be severely disrupted and require shifts to facilitating bi-directional energy transactions through the grid, rather than one-way delivery of service.