

The purpose of this section of the quarterly report is to provide stakeholders with an update on the Alberta Electric System Operator's (AESO) progress on the initiatives outlined in its 2019 Business Plan and Budget (Business Plan). The reader of this report should reference the Business Plan published on the AESO's website for additional information to fully understand the various progress updates provided.

### Reporting on Business Plan Initiatives by Activity Group

Electric System Operations			
<i>Business Initiative</i>	<i>Current Status</i>	<i>Next Milestone</i>	<i>Target</i>
<b>SCC Expansion Project</b>	SCC Expansion Project (implementation phase) Construction completed and building operational in Q4 2019	None	None
<b>EMS Sustainment</b>	Continuing to evolve and sustain our EMS system by identifying implementation options, process changes and system impact assessment	EMS Core advancement completed as per 2020 project phase schedule	Advance EMS Core according to planned schedule, utilizing key features and functionality while maintaining system performance, security and compliance  Design and implementation plan for the EMS application upgrade to advance the application layer of EMS to support reliability and operation of the electric system
<b>Western Interconnection (WI) Reliability Coordination (RC) Initiative</b>	Finalized coordination activities with western RCs related to the changes to the RC structure in the WI.  Applicable RC-related reliability standards were approved by the AUC.  RC Agreements with neighboring RCs were executed, and procedures and models were updated to reflect the RC changes.	None	Completed as of Q4 2019

Electric System Operations			
<i>Business Initiative</i>	<i>Current Status</i>	<i>Next Milestone</i>	<i>Target</i>
<b>Intertie Restoration</b>	AESO has completed design and development of intertie requirements and public notifications were held in October 2018 and June 2019	The filing date for the Needs Identification Document (NID) is to be confirmed	Ongoing
<b>Competitive Process (for transmission)</b>	The Fort McMurray West Project was energized in Q1 2019	None	None
	Based on the current economic environment, the AESO has deferred the launch date of the Fort McMurray East 500kV Transmission Project (East Project)	None	Reassessment of launch date of the East Project is ongoing
<b>Tariff: General Tariff Application (GTA)</b>	In Q3 2017, the AESO filed the 2018 GTA (formerly referred to as the 2017 ISO Tariff Application) with the Alberta Utilities Commission (AUC). The AESO filed a revised 2018 GTA application in August 2018.	The AESO filed the 2018 GTA compliance filing in January 2020	Expected AUC approval for the 2018 GTA compliance filing in Q2 or Q3 2020
	In Q4 2018, the AESO filed the 2019 ISO tariff <u>update</u> application. Approval was provided by the AUC in Q4 2018 on a final basis with a Q1 2019 implementation	The AESO filed the 2020 tariff <u>update</u> in January 2020 to be effective on a final or interim basis April 1, 2020	AUC approval for the 2020 tariff <u>update</u> in Q1 on a final basis with a Q2 2020 implementation
<b>Tariff: Review of bulk and regional transmission rate design</b>	In Q2 2018, the AESO proposed to the AUC a consultation process to review bulk and regional transmission rate design. The AUC approved the AESO's proposal to begin the consultation process. AESO initiated the consultation process in Q3 2018	Ongoing	The AESO expects to finish the consultation process for the bulk and regional transmission tariff design in 12-18 months concluding with an application to the AUC for any proposed changes in Q3 2020

<b>Market Development</b>			
<i>Business Initiative</i>	<i>Current Status</i>	<i>Next Milestone</i>	<i>Target</i>
<p><b>Capacity market technical design</b></p> <p><b>Tariff cost allocation for capacity market</b></p> <p><b>Capacity procurement process</b></p> <p><b>IT systems and solutions for market evolution</b></p>	<p>On July 24, 2019, the Government of Alberta announced that Alberta will not transition to a capacity market and will continue with an energy-only market. Therefore, the AESO is not proceeding further with capacity market implementation activities</p>	None	None
<p><b>Renewable Electricity Program (REP) - Rounds 1, 2, 3</b></p>	<p>AESO launched the first Renewable Electricity Program (REP) competition - REP Round 1 in Q1 2017</p> <p>In Q4 2017, the AESO announced REP Round 1 successfully delivered nearly 600 MW of wind generation at a weighted average bid price of \$37/MWh</p> <p>In Q4 2018, the AESO announced REP Round 2 successfully delivered 363 MW of wind generation at a weighted average bid price of \$38.69/MWh. The AESO also announced REP Round 3 successfully delivered 400 MW of wind generation at a weighted average bid price of \$40.14/MWh</p>	<p>Ongoing</p> <p>Ongoing</p>	<p>The target in-service date for REP Round 1 projects was Q4 2019</p> <p>The target in-service dates for REP Round 2 and 3 projects is in Q2 2021</p>

<b>Customer Access Services</b>			
<i><b>Business Initiative</b></i>	<i><b>Current Status</b></i>	<i><b>Next Milestone</b></i>	<i><b>Target</b></i>
<b>Advance customer connection projects within the connection queue<sup>1</sup></b>	AESO facilitating the advancement of approved System Access Service Requests for customer connection projects	Support customer projects facilitating the in-service date (ISD)	Ongoing support of customer FAs, certifications and FA hearings
	52 customer energizations (including Connection, Contract and Behind-the-Fence projects) completed as of December 31, 2019	Ongoing	Ongoing
	5 customer connection Abbreviated Need Identification Documents (ANID)s filed with the AUC (2 of which were Market Participant Choice projects) and no new Abbreviated Needs Approval Process (ANAP) customer connection projects were approved as of December 31, 2019	NID development and filings as per schedule	Ongoing

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<sup>1</sup> See [www.aeso.ca](http://www.aeso.ca) > Grid > Connecting to the grid > Connection project list - for a complete list of projects in the connection queue and the current status.

## Financial Update – As of December 31, 2019

Transmission Operating Costs (\$ million)			
	2019	2019	2018
	Actual	Forecast	Actual
Wires costs	1,976.1	1,834.6	1,724.8
Operating reserves	187.1	126.1	236.0
Transmission line losses	109.2	270.6	96.7
Other ancillary service costs	25.8	43.2	41.9
<b>Total Transmission Operating Costs</b>	<b>2,298.2</b>	<b>2,274.5</b>	<b>2,099.4</b>

*Numbers may not add due to rounding*

**Wires costs** – Wires costs represent the amounts paid primarily to transmission facility owners (TFOs) in accordance with their Alberta Utilities Commission (AUC)-approved tariffs and are not controllable costs of the AESO.

Wires costs in 2019 are \$1,976.1 million, which is \$251.3 million or 14.6 per cent higher than the 2018 costs of \$1,724.8 million due to higher regulated rates charged by the TFOs for the current year and completion of the Fort McMurray West 50kV Transmission Project, which was energized on March 28, 2019.

**Operating reserves** – Operating reserves are generating capacity or load that is held in reserve and made available to the System Controller to manage the transmission system supply-demand balance in real time. Operating reserves are procured through an online, day-ahead exchange, where offer prices are indexed to the pool price. While the prices of operating reserves procured through the online exchange are indexed to the pool price, changes to the average pool price do not result in proportional changes to the operating reserve costs; the pool price for each hour has a significant impact on the operating reserve costs for that hour.

Operating reserve costs in 2019 are \$187.1 million, which is \$48.9 million or 20.7 per cent lower than the 2018 costs of \$236.0 million. The cost of operating reserves is impacted by actual volumes, hourly pool prices and operating reserve prices. The average hourly pool price is \$55 per megawatt hour (MWh) in 2019 compared to \$50 per MWh in 2018, representing an increase of 10.0 per cent. Operating reserve volumes financially settled in 2019 are 7,874 gigawatt hours (GWh) compared to 8,056 GWh in 2018, representing a 2.3 per cent decrease. The cost variance is mainly attributable to lower volumes and changes in offer behavior. Lower volumes resulted from reduced imports in 2019.

**Transmission line losses** – Transmission line losses represent the volume of energy that is lost as a result of electrical resistance on the transmission lines. Volumes associated with line losses are determined through the energy market settlement process as the difference between generation and import volumes, less consumption and export volumes.

The hourly volumes of line losses vary based on load and export levels, generation (baseload, peaking units and imports) available to serve load, weather conditions, and changes in the transmission topology. System maintenance schedules, unexpected failures, dispatch decisions on the Alberta Interconnected

Electric System (AIES), and short-term system measures (such as demand response) may also affect the volume of losses. The value of line losses is calculated based on the hourly pool price.

The cost of transmission line losses in 2019 is \$109.2 million, which is \$12.5 million or 12.9 per cent higher than the 2018 cost of \$96.7 million due to the impact of a 10.0 per cent higher average pool price in 2019. Line loss volumes financially settled in 2019 are 1,874 GWh compared to 1,838 GWh in 2018, representing a 2.0 per cent increase. Line loss volumes did not change materially from 2018 as there were no significant changes in generation dispatches due to stability in the flow of electricity on the transmission system.

**Other ancillary services costs** – The AESO procures other ancillary services for the secure and reliable operation of the AIES. These services are procured through a competitive procurement process where possible, or in instances where such procurement processes may not be feasible, through bilateral negotiations.

<b>Other Ancillary Services Costs (\$ million)</b>			
	<b>2019</b>	<b>2019</b>	<b>2018</b>
	<b>Actual</b>	<b>Forecast</b>	<b>Actual</b>
Load shed service for imports	16.1	32.8	30.9
Transmission must-run			
Contracted	3.0	3.2	3.1
Conscripted	0.3	0.2	0.4
Reliability services	2.9	2.9	2.9
Poplar Hill	0.9	1.7	2.4
Black start	2.3	2.3	2.2
Transmission constraint rebalancing	0.3	0.1	0.0
<b>Total Other Ancillary Services</b>	<b>25.8</b>	<b>43.2</b>	<b>41.9</b>

*Numbers may not add due to rounding*

Load shed service for imports (LSSi) is interruptible load that can be armed to trip, either automatically or manually, on the loss of the Alberta-British Columbia intertie to allow for increased import available transfer capability (ATC). The 2019 costs for LSSi are \$16.1 million, which is \$14.8 million or 47.9 per cent lower than the 2018 costs of \$30.9 million. LSSi costs are impacted by volume availability, contract prices and AIES requirements for arming and tripping. In 2019, lower LSSi arming costs are the result of lower import volumes than anticipated. The lower import volumes result from lower import incentive driven by lower demand and limited coal outages.

Transmission must-run (TMR) occurs when generation is required to mitigate the overloading of transmission lines associated with line outages, system conditions in real time or the loss of generation in an area. In circumstances when this service is required for an unforeseeable event and there is no contracted TMR, non-contracted generators may be dispatched to provide this service (referred to as conscripted TMR). Contracted TMR costs in 2019 are \$3.0 million, which is \$0.1 million or 3.2 per cent lower than the 2018 costs of \$3.1 million. Conscripted TMR costs in 2019 are \$0.3 million, which is \$0.1 million or 25 per cent lower than the 2018 costs of \$0.4 million.

Reliability services are provided through an agreement with Powerex Corp. for grid restoration balancing support in the event of an Alberta blackout and emergency energy in the event of supply shortfall. The agreement came into effect on April 1, 2015.

The Poplar Hill generator provides voltage support (VARs) in addition to power (MW), to support transmission system reliability in the province. The contract with Poplar Hill was terminated in July of 2019.

Black start services are provided by generators that are able to restart their generation facility with no outside source of power. In the event of a system-wide black-out, black start services are used to re-energize the transmission system and provide start-up power to generators who cannot self-start.

Transmission constraint rebalancing costs are incurred when the transmission system is unable to deliver electricity from a generator to a given electricity-consuming area without contravening reliability requirements. When this occurs, a market participant downstream of a constraint may be dispatched for purposes of transmission constraint rebalancing under the Independent System Operator (ISO) Rules and would receive a transmission constraint rebalancing payment for energy provided for that purpose. Transmission constraint rebalancing came into effect on November 26, 2015. There was \$0.3 million in transmission constraint rebalancing costs in 2019 and no significant events in 2018.

<b>Other Industry Costs (\$ million)</b>			
	<b>2019</b>	<b>2019</b>	<b>2018</b>
	<b>Actual</b>	<b>Budget</b>	<b>Actual</b>
Alberta Utilities Commission (AUC) fee – Transmission	11.5	12.2	11.7
AUC fee – Energy Market	7.9	6.5	6.3
WECC/NWPP/NERC costs	2.2	2.4	2.1
Regulatory process costs	6.1	2.8	3.8
<b>Total Other Industry Costs</b>	<b>27.7</b>	<b>23.8</b>	<b>23.9</b>

*Numbers may not add due to rounding*

Other industry costs represent fees or costs paid based on regulatory requirements or membership fees for industry organizations, which are not under the direct control of the AESO. These costs relate to the annual administration fee for the AUC, the AESO's share of Western Electricity Coordinating Council (WECC), Northwest Power Pool (NWPP) and North American Electric Reliability Corporation membership (NERC) fees and regulatory process costs. Regulatory process costs are associated with the AESO's involvement in an AUC proceeding to hear objections and complaints to ISO Rules or a regulatory application and costs incurred to respond to specific agency-related directions or recommendations that are beyond the routine operations of the AESO; this does not include application preparation costs.

Other industry costs in 2019 are \$27.7 million, which is \$3.8 million or 15.9 per cent higher than 2018 costs of \$23.9 million. The increase is mainly attributable to increased regulatory process costs in 2019, including proceeding costs related to the AUC's review and approval of new rules to launch the capacity market and the ISO General Tariff. The increase is also attributable to increased cost awards, primarily related to the Capacity Market proceedings.

### General and Administrative Costs (\$ million)

	2019 Actual	2019 Budget	2018 Actual
Staff costs	77.7	72.8	74.3
Contract services and consultants	5.5	11.5	12.1
Facilities	3.9	4.1	7.6
Administration	4.3	4.5	4.4
Computer services and maintenance	11.5	11.5	11.2
Telecommunications	1.5	1.5	1.5
<b>Total General and Administrative Costs</b>	<b>104.4</b>	<b>106.0</b>	<b>111.1</b>

*Numbers may not add due to rounding*

In 2019, staff costs are \$77.7 million, which is \$3.4 million or 4.6 per cent higher than the 2018 costs of \$74.3 million. The increase is associated with the conversion of consultants to staff positions through an initiative to retain knowledge and specialized talent within the AESO and to reduce overall costs as staff compensation is lower than the consulting related costs.

Contract services and consultants have decreased from the 2019 Budget and 2018 actuals due to the conversions to staff, as well as the July 24, 2019 announcement by the Government of Alberta that Alberta will not transition to a capacity market.

Facilities costs have decreased from 2018 due to the adoption of International Financial Reporting Standard 16 - *Leases*, which reclassifies the costs of various facility leases to amortization of right-of-use assets and interest expense.

### Interest and Amortization (\$ million)

	2019 Actual	2019 Budget	2018 Actual
<b>Amortization of right-of-use assets, intangible assets and depreciation of property, plant and equipment</b>	38.8	21.2	26.1
<b>Interest</b>	5.4	3.6	1.4



In 2019, amortization of intangible assets and depreciation of right-of-use assets and PP&E collectively total \$38.8 million, which is \$12.7 million or 48.8 per cent higher than the 2018 amortization of \$26.1 million. The increase is primarily due to the write-off of \$10.7 million in capacity market assets that no longer hold future value for the AESO following the July 24, 2019 announcement by the Government of Alberta that Alberta will not transition to a capacity market and will continue with an energy-only market, as well as the effect of IFRS 16 - *Leases*.

Interest costs in 2019 are \$5.4 million, which is \$4.0 million or 283.2 per cent higher than the 2018 costs of \$1.4 million. The average borrowing requirements increased throughout the year in relation to changes in deferred revenue. Deferral account balances increased from a cumulative cash shortfall (receivable) of \$38.4 million at December 31, 2018 to a cash shortfall (receivable) of \$50.5 million at December 31, 2019. In addition, receivables of \$154.1 million related to the deferral account reconciliation application for the 2017 and 2018 year were outstanding at December 31, 2019. The AESO had filed an application with the AUC requesting interim settlement of this balance on September 27, 2019. Following responses from impacted parties to the notice of application issued by the AUC, the AUC ruled against the AESO's request for immediate interim settlement and approved settlement of this balance effective January 1, 2020.

## Capital Expenditure Update – As of December 31, 2019

Capital Program (\$ million)							
	Total Project Approved	Prior Year(s) Actual	Spent in 2019 to date	ETC in 2019	ETC Future Yr.(s)	Total Cost Est.	Variance Approved to Total Cost Est.
<b>Key Capital Initiatives <sup>2</sup></b>							
Capacity Market	30.7	0.8	9.1	-	-	10.0	20.7
EMS Sustainment	20.7	2.1	5.3	-	5.2	12.6	8.0
CIP	0.7	-	0.2	-	0.2	0.4	0.3
Cyber and Physical Security Advancements	1.4	-	1.0	-	-	1.0	0.4
Interties	0.2	0.2	0.0	-	-	0.2	0.0
Market Evolution - Other	2.6	0.2	1.7	-	0.6	2.5	0.1
<b>Other Capital Initiatives</b>	9.6	1.6	3.7	-	4.2	9.6	0.1
<b>Life Cycle Funding</b>	11.7	0.0	7.7	-	3.3	11.0	0.7
<b>Subtotal General Capital</b>	77.6	4.9	28.9	-	13.5	47.3	30.3
<b>Major Project Capital – SCC** Expansion – Implementation</b>	21.9	9.9	11.5	-	-	21.4	0.5
<b>Total Capital</b>	99.5	14.8	40.3	-	13.5	68.6	30.9

*Note: Differences may exist due to rounding*

*\* Market Systems Replacement and Re-engineering*

*\*\*System Coordination Centre Expansion*

General Capital Program (\$ million)	
Spent to December 31, 2019	28.9
Estimate to Complete (ETC) in 2019	-
Subtotal	28.9
General Capital approved	32.9
2019 budget remaining	4.0

<sup>2</sup> Section Appendix I - Notes which provide a summary of financial variances or changes to the (key) capital initiatives

**Appendix I - Notes**

The following appendix provides further detail on major project progress for key capital programs (e.g., approved business case or change-orders).

Key Capital Initiatives		
<b>Energy Management System (EMS) Sustainment</b>	Description	The EMS is used by System Controllers in grid operations to monitor, control and optimize the performance of the power system. Upgrades relating to the sustainment and optimization requirements of the EMS evergreen strategy includes vendor software upgrades and improved analysis and reporting capabilities
	2019 Progress	Advanced EMS Core according to planned schedule, utilizing key features and functionality while maintaining system performance, security and compliance.
<b>Capacity Market</b>	Description	IT systems and solutions for market evolution. The development and implementation of tools to accommodate an evolving market due to the implementation of a capacity market.
	2019 Progress	On July 24, 2019, the Government of Alberta announced that Alberta will not transition to a capacity market and will continue with an energy-only market. Therefore, the AESO is not proceeding further with capacity market implementation activities.

Key Capital Initiatives		
<b>Alberta Reliability Standards and Critical Infrastructure Protection (CIP) Implementation</b>	Description	Implementation of facility upgrades, changes to AESO sites and/or systems that are required to support CIP V5 implementation and compliance requirements
	2019 Progress	Implemented technology and process changes to reduce compliance risk and improve efficiencies
<b>Cyber and Physical Security Advancements</b>	Description	Upgrade AESO systems and processes to reduce the risk of cyber security breaches and facilitate AESO compliance to CIP V5 requirements
	2019 Progress	Continued advancement of the multi-year Identity and Access Management (IAM) projects  Continued implementation of additional controls to prevent, detect, respond to, and recover from incidents  Focused on cyber security though implementing best practices for passwords, increasing staff awareness and assessing the expansion of personal risk assessment procedures
<b>Market Evolution Other</b>	Description	The identification, development and implementation of tools in support of market optimization and/or performance improvements. As well as system changes to support increased amount of renewables. Includes system changes for wind and solar aggregated generating facility forecasting rules, REP settlement and system changes to enable increased flexibility for Operating Reserve (OR) procurement
	2019 Progress	Projects have been initiated to implement energy storage technology into various systems  Implemented system changes to accommodate REP settlement
<b>Key Initiatives</b>		2019 Budget \$28.5 million 2019 Actual \$17.4 million