

## AESO Quarterly Stakeholder Report

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### Q1 2018

- Initiative Updates
- Financial Highlights

## Quarterly Stakeholder Report – First Quarter (January – March) 2018

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 2017-2018 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.

### I. Reporting on Business Plan Initiatives by Activity Group

Electric System Operations			
Business Initiative	Current Status	Next Milestone	Target
<b>Alberta Reliability Standards (ARS) Critical Infrastructure Protection (CIP)</b>	AESO became CIP compliant as of October 1, 2017	None	None
	AESO completed Western Electricity Coordinating Council (WECC) CIP audit of AESO compliance with standards in Q1 2018	None	None
	ARS CIP Standard CIP-014-AB-02 (Physical Security) drafting complete	Stakeholder consultation for proposed ARS CIP-014 and CIP-PLAN expected in 2018	CIP-014 standard expected to be filed with the Alberta Utilities Commission (AUC) in 2018
<b>Alberta Interconnected Electrical System (AIES) – enhancements (reliability and integration)</b>	SCC Expansion Project (implementation phase): Construction contract executed; site mobilization and construction started	Building structure completion expected in Q4 2018	Construction to be completed by Q3 2019

Electric System Development			
Business Initiative	Current Status	Next Milestone	Target
<b>Advance system and regional transmission projects identified in the LTP</b>	Facility Application (FA) filed for the Calgary Downtown Reinforcement Project by ENMAX on November 30, 2017	AUC decision on the Calgary Downtown Reinforcement Project is expected in Q2 2018	Ongoing
	The Provost to Edgerton and Nilrem to Vermillion (PENV) AUC decision on PENV NID filing was received on January 12, 2018. AUC requested to revise the NID submission. The revised NID was filed with the AUC on March 26, 2018. AUC categorized the PENV NID as a category 3 project	AUC decision on PENV project NID filing is expected in Q3 2018	Ongoing
	AUC categorized the AESO NID (filed Q4 2017) for the Rycroft Transmission Reinforcement NID, a component of the NW transmission plan as a category 2 project.	AUC decision on the Rycroft Transmission Reinforcement project is expected in Q2 2018	Ongoing
	AESO completed design and development of Chapel Rock-Castel Rock Ridge project requirements and consultation started in Q1 2018	AESO will continue public consultation throughout 2018	Ongoing

Electric System Development - continued			
Business Initiatives	Current Status	Next Milestone	Target
<b>Intertie Restoration</b>	AESO has completed design and development of intertie requirements and consultation started in Q1 2018	Regional Electricity Cooperation and Strategic Infrastructure Initiative (RECSI) project studies have been completed. AESO will continue public consultation throughout year 2018	RECSI study to be finalized and published in coordination with National Resources Canada (NRCAN) in Q2 2018
<b>Competitive Process (for transmission)</b>	The West Project is currently under construction. Alberta Powerline (APL) filed a tariff with the AUC which was approved January 23, 2018	None	Target in-service date for the West Project is 2019
	Based on the current economic environment, the AESO is deferring the launch date of the Fort McMurray East 500kV Transmission Project (East Project)	None	Reassessment of launch date of the East Project is ongoing

Electric System Development - continued			
Business Initiative	Current Status	Next Milestone	Target
<b>Tariff rate information and updates</b>	In Q3 2017, the AESO filed the Rider C, <i>Deferral Account Adjustment Rider</i> , amendment application for changes to Rider C and the deferral account reconciliation methodology on an interim refundable basis. This application was filed as part of the 2018 ISO tariff application. Approval was provided by the Alberta Utilities Commission (AUC) on an interim basis in Q4 2017 with a Q1 2018 implementation	Approval of Rider C and deferral account methodology on a final basis in 2018/19	<p>The AESO plans to file with the AUC the 2016 deferral account reconciliation application in 2018</p> <p>The AESO plans to file a 2017-2018 deferral account reconciliation application in Q2 2019 as the AESO requires time to make changes to the deferral account methodology in AESO's deferral reconciliation system (DRS)</p>
	In Q3 2017, the AESO filed the 2018 ISO tariff application (formerly referred to as the 2017 ISO Tariff Application)	The AUC suspended this proceeding to allow the AESO time to consult on the coincident metered demand rate design issue and distribution facility owner customer contribution issue. The AESO updated the AUC on March 29, 2018 to request an extension to April 30, 2018 to continue stakeholder consultation	Ongoing
	In Q3 2017, the AESO filed its Transmission Rate Projection (TRP) model with the 2018 ISO Tariff Application	With the 2017 Long-term Plan published, the AESO plans to update the Transmission Rate Projection (TRP) factsheet and file the updated TRP model with the AUC	An updated TRP model, to incorporate the next LTP results, will be published and filed with the AUC after the LTP is published, in Q2 2018
	In Q3 2017, the AESO filed the 2018 ISO tariff <u>update</u> application. Approval was provided by the Alberta Utilities Commission in Q4 2017 on a final basis	Updated rates, investment, and tariff information documents to be implemented for Q1 2018	Updated bill estimator information document to be posted to AESO website in Q2 2018

Customer Access Services			
Business Initiative	Current Status	Next Milestone	Target
<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
	5 customer energizations (including Connection, Contract and Behind-the-Fence projects) completed as of March 31, 2018	Ongoing	Ongoing
	5 customer connection Abbreviated Need Identification Documents (ANID)s filed with the AUC (none of which were Market Participant Choice projects) and no new Abbreviated Needs Approval Process (ANAP) customer connection projects were approved as of March 31, 2018	NID development and filings as per schedule	Ongoing

<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.

Market Development			
Business Initiative	Current Status	Next Milestone	Target
<b>Market system replacement and re-engineering (MSR) project</b>	Successfully completed medium-term sustainment measures for 2017	Not applicable	Not applicable
<b>Climate change program</b>	<p>AESO launched the first Renewable Electricity Program (REP) competition - REP Round 1 in Q1 2017. 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>The AESO opened REP Rounds 2 and 3 on March 29, 2018 with a Request for Expressions of Interest stage for each round.</p>	<p>Ongoing</p> <p>The AESO opened the REP Rounds 2 and 3, Request for Qualifications stage on April 27, 2018.</p>	<p>The target in-service date for REP Round 1 projects is Q4 2019.</p> <p>The AESO plans to award Renewable Electricity Support Agreements associated with REP Rounds 2 and 3 by the end of Q4 2018.</p>
<b>Capacity Market</b>	AESO consulting with stakeholders to develop Capacity Market Design	Development of second draft of AESO's Comprehensive Market Design (CMD) proposal by April 2018. Engagement with consolidated stakeholder working groups in May 2018.	Design complete by Q2 2018

## II. Financial Update – As of March 31, 2018

### Transmission Operating Costs (\$ million)

	2018 Actual	2018 Forecast	2017 Actual
Wires costs	439.8	430.8	420.6
Operating reserves	30.7	24.3	15.1
Transmission line losses	18.5	20.5	13.8
Other ancillary service costs	10.3	8.6	7.8
<b>Total Transmission Operating Costs</b>	<b>499.3</b>	<b>484.1</b>	<b>457.3</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.

The 2018 forecast is based on TFO tariffs approved or applied-for as of April 2017 primarily based on: i) a filing for a 2018 tariff; ii) a compliance filing for a 2017 tariff; or iii) AUC approvals for 2017 tariffs.

**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.

Year-to-date 2018 operating reserve costs are higher than forecast mainly due to a higher volumes, standby activations. The year-to-date March 2018 average pool price is \$35 per megawatt hour (MWh) compared to a forecast of \$35 per MWh and 2017 actual year-to-date March average pool price of \$22 per MWh.

**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.

Year-to-date 2018 transmission line loss costs are lower than forecast mainly due to volumes being 10 per cent lower than forecast.

**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.



## Other Ancillary Services Costs (\$ million)

	2018 Actual	2018 Forecast	2017 Actual
Load shed service for imports	7.4	4.8	5.0
Transmission must-run			
Contracted	0.8	0.8	0.8
Conscripted	0.1	0.5	0.0
Reliability services	0.7	0.7	0.7
Poplar Hill	0.7	0.7	0.7
Black start	0.5	1.1	0.5
Transmission constraint rebalancing	-	0.0	0.0
<b>Total Other Ancillary Services</b>	<b>10.3</b>	<b>8.6</b>	<b>7.8</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). LSSi costs are impacted by volume availability, contract prices and AIES system requirements for arming and tripping requirements.

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).

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 Poplar Hill generator provides voltage support (VARs) in addition to power (MW), to support the transmission system reliability in the Northwest part of the province.

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. Black start providers are required in specific areas of the AIES to ensure the entire system has adequate start-up power.

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.

### Other Industry Costs (\$ million)

	2018 Actual	2018 Forecast	2017 Actual
Alberta Utilities Commission (AUC) fee – Transmission	2.6	3.2	2.2
AUC fee – Energy Market	1.4	1.6	1.2
WECC/NWPP costs	0.5	0.6	0.3
Regulatory process costs	0.1	0.4	0.2
<b>Total Other Industry Costs</b>	<b>4.6</b>	<b>5.8</b>	<b>3.9</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) and Northwest Power Pool (NWPP) membership 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.

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

	2018 Actual	2018 Forecast	2017 Actual
Staff costs	18.3	18.0	16.7
Contract services and consultants	3.5	3.8	2.8
Facilities	1.8	1.9	1.8
Administration	1.0	1.0	1.0
Computer services and maintenance	2.6	2.7	2.4
Telecommunications	0.4	0.3	0.4
<b>Total General and Administrative Costs</b>	<b>27.7</b>	<b>27.8</b>	<b>25.2</b>

*Numbers may not add due to rounding*

### Interest and Amortization (\$ million)

	2018 Actual	2018 Forecast	2017 Actual
Amortization of intangible assets and depreciation of property, plant and equipment	6.2	5.0	5.0
Interest	0.4	0.4	0.2

## Capital Expenditure Update – As of March 31, 2018

<b>Capital Program (\$ million)</b>							
	<b>Total Project Approved</b>	<b>Prior Year(s) Actual</b>	<b>Spent in 2018</b>	<b>ETC in 2018</b>	<b>ETC Future Yr.(s)</b>	<b>Total Cost Est.</b>	<b>Variance Approved to Total Cost Est.</b>
<b>Key Capital Initiatives <sup>2</sup></b>							
IT/Cyber Security	1.8	0.5	0.4	0.6	-	1.5	0.2
MSR* Sustainment	3.0	2.9	0.2	-	-	3.1	(0.1)
Market Evolution	0.6	0.1	0.2	0.2	-	0.5	0.0
Reliability (other – non-EMS)	0.5	-	0.1	0.4	-	0.5	0.0
Facilities	1.4	1.3	0.0	-	-	1.3	0.1
<b>Other Capital Initiatives</b>	<b>6.0</b>	<b>1.1</b>	<b>1.1</b>	<b>3.2</b>	<b>0.1</b>	<b>5.6</b>	<b>0.4</b>
<b>Life Cycle Funding</b>	<b>1.6</b>	<b>-</b>	<b>1.0</b>	<b>0.6</b>	<b>-</b>	<b>1.6</b>	<b>0.1</b>
<b>Subtotal General Capital</b>	<b>15.1</b>	<b>5.9</b>	<b>3.1</b>	<b>5.2</b>	<b>0.1</b>	<b>14.3</b>	<b>0.8</b>
<b>Major Project Capital – SCC** Expansion – Implementation</b>	<b>21.9</b>	<b>1.8</b>	<b>0.4</b>	<b>13.6</b>	<b>5.8</b>	<b>21.6</b>	<b>0.3</b>
<b>Total Capital</b>	<b>37.0</b>	<b>7.7</b>	<b>3.5</b>	<b>18.8</b>	<b>5.9</b>	<b>35.9</b>	<b>1.1</b>

Note: Differences may exist due to rounding

\* Market Systems Replacement and Re-engineering

\*\*System Coordination Centre

### General Capital Program (\$ million)

Spent to March 31, 2018	3.1
Estimate to Complete (ETC) in 2018	5.2
<b>Subtotal</b>	<b>8.3</b>
AESO Board Decision Document – General Capital approved	18.4
2018 budget remaining	10.1

<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 the key capital programs (e.g., approved business case or change-orders).

Key Capital Initiatives		
<b>Reliability Program – Energy Management System (EMS)</b>	<b>Description</b>	The EMS is used by System Controllers in grid operations to monitor, control and optimize the performance of the power system. The EMS is comprised of two major components, the Application Suite and IT Infrastructure. Both components have reached end of life and will no longer be supported by their respective vendors. In order to ensure reliable grid operations, be Critical Infrastructure Protection (CIP) compliant and have supported hardware and software, it was deemed prudent to proceed with an upgrade to the AESO EMS.
	<b>2017 Progress</b>	The implementation phase of the EMS Upgrade project is a multi-year project which is proceeding to plan. The project was deployed into production in Q3 2017. Project completion in Q4 2017.  See Business Plans 2015-2017 Appendix F: Major Projects for more information.
	<b>2018 Plans and Progress</b>	Not applicable – complete. Sustainment and optimization phases following the completion of the implementation phase and related costs will form part of the AESO’s ongoing general capital program.
<b>Reliability Program - Other Components (non-EMS)</b>	<b>Description</b>	Grid management projects that are intended to enhance the efficiency and improve the ability to reliably run the Alberta Interconnected Electric System (AIES).
	<b>2017 Progress</b>	The primary focus for 2017 was the continued phased migration of Transmission Facility Owners (TFOs) and Independent Power Producer (IPP) to the new network for the Supervisory Control and Data Acquisition (SCADA)/Wide Area Network (WAN) communications service which became fully operational in Q4 2017 – Completed.
	<b>2018 Plans and Progress</b>	ISO Rule 304.3 (Wind Power Ramp Up Management) has been amended, primarily to include Solar aggregated generating facilities; effective September 1, 2018. The EMS and downstream applications must be modified and tested to ensure compliance.  Project on Schedule. Design and Development to be completed by end of May. Updates to existing systems will be deployed by end of August to align with ISO Rule 304.3 effective date of September 1, 2018.

Key Capital Initiatives		
<b>Alberta Reliability Standards Critical Infrastructure Protection (CIP) Implementation</b>	<b>Description</b>	Implementation of facility upgrades, changes to AESO sites and/or systems that are required to support CIP V5 implementation and compliance requirements.
	<b>2017 Progress</b>	Implemented CIP processes, security controls and system changes required to ensure compliance readiness including: implementation of various physical security system upgrades.
	<b>2018 Plans and Progress</b>	Institutionalizing the AESO sustainment program for compliance with CIP standards. Applying efficiencies and optimizations to the AESO's CIP process to ensure sustainability.
<b>IT / Cyber Security Advancements</b>	<b>Description</b>	Upgrade AESO systems and processes to reduce the risk of cyber security breaches and facilitate AESO compliance to CIP V5 requirements.
	<b>2017 Progress</b>	The first and second sets of enhancements to AESO's advanced threat management capabilities have been completed.
	<b>2018 Plans and Progress</b>	Continuing advancement of the multi-year Identity and Access Management (IAM) projects.  Continuing implementation of additional controls to prevent, detect, respond to, and recover from incidents.
<b>Market Systems Replacement and Reengineering (MSR) - Implementation (Sustainment)</b>	<b>Description</b>	The MSR Implementation program is based on a multi-year phased approach designed to address the operating requirements of the AESO's market systems.  Many of these systems have been stretched past their useful life and in many cases, have become increasingly difficult and costly to change and operate reliably.  Focus is to sustain current market system reliability and security through medium-term measures.
	<b>2017 Progress</b>	Successfully completed medium-term sustainment measures.
	<b>2018 Plans and Progress</b>	Not applicable - complete

Key Capital Initiatives		
<b>Market Evolution</b>	<b>Description</b>	<p>The identification, development and implementation of tools in support of market optimization and/or performance improvements. This includes system changes for wind and solar aggregated generating facility forecasting rules, and system changes to enable increased flexibility for Operating Reserve (OR) procurement.</p> <p>Also included are system changes to support an evolving market due to implementation of a capacity market and increased amounts of renewables.</p>
	<b>2017 Progress</b>	<p>OR procurement system changes business case completed. Based on business case review, no system changes are required, at this time.</p> <p>Business case for system changes for Wind and Solar Aggregated Generating Facility Forecasting rules completed and approved.</p>
	<b>2018 Plans and Progress</b>	<p>Implement system changes supporting the Wind and Solar Aggregated Generating Facility Forecasting Rules effective date of new rule requirements.</p> <p>Develop business case for tools to support capacity delivery (settlement, performance measurement) and energy market changes for first capacity delivery period.</p> <p>Reliability model to support development of capacity market demand curve implemented. High level design for capacity market auction tools in development.</p>
<b>Facilities</b>	<b>Description</b>	Implement physical access control (security) improvements at the System Coordination Centre (SCC) to enhance security and safety for personnel. Supports SCC Expansion initiative.
	<b>2017 Progress</b>	Project completed
	<b>2018 Plans and Progress</b>	Not applicable - complete
<b>Key Initiatives</b>		<p><b>2017 Budget \$6.4 million</b></p> <p><b>2018 Budget \$4.5 million</b></p>