

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 2021 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

Externally focused initiatives – stakeholder-participation related

Business Initiative	Update Q1 2021	Next Steps
<i>Mandated – Top Priority Business Initiatives</i>		
<p>Red Tape Reduction</p> <p>Objective:</p> <p>To be in compliance with the Government of Alberta (GoA) Red Tape Reduction Initiative, the AESO is committed to reducing regulatory requirements by one-third by 2023</p> <p>Interdependencies:</p> <ul style="list-style-type: none"> • Tariff Modernization • Technology Integration • Distribution Coordination 	<p>Update</p> <p>A workplan was prepared in 2020 re: the sequence of documents to be reworked or removed in order to reduce regulatory requirements as per the GoA's schedule</p> <p>Implementation of the workplan has resulted in a reduction of requirements by 21.9% or 6,655 in Q1 2021 (Baseline – Current Count is 30,323-23,668 YTD)</p>	<p>Implementation</p> <p>Continue to advance the workplan with a reduction in requirements via AESO initiated changes to non-authoritative documents in addition to changes that will need to be filed with the Alberta Utilities Commission (AUC) for approval</p>
<p>General Tariff Application (GTA)</p> <p>Objective:</p> <p>Implement approved tariff provisions from 2018 GTA into Connection Process and AESO business</p> <p>File a 2021 tariff rates update in Q4 2020 for a January 1, 2021 effective date</p> <p>Interdependencies:</p> <ul style="list-style-type: none"> • Technology Integration • Distribution Coordination 	<p>Update</p> <p>AUC approval for the compliance filing relating to substation fraction equal to one (SSF=1) and Adjusted Metering Practice (AMP)</p>	<p>Implementation</p> <p>Implement SSF=1 into construction contribution decisions</p> <p>Develop an AMP implementation plan with revisions to the metering rule for filing with AUC</p>

Business Initiative	Update Q1 2021	Next Steps
<i>Top Priority Business Initiatives</i>		
<p>Tariff Modernization</p> <p>Background: In Q2 2018, the AESO proposed to the AUC that a consultation process be initiated to review bulk and regional transmission rate design; the AUC approved the proposal, and the AESO initiated the consultation process in Q3 2018</p> <p>Objective: To simplify the ISO tariff to be more accessible, clear and agile</p> <p>Interdependencies:</p> <ul style="list-style-type: none"> • Red Tape Reduction • Distribution Coordination • Technology Integration 	<p>Update</p> <p>Stakeholder engagement continued on Bulk and Regional Tariff Design. In order to better address stakeholder feedback, respond to issues raised by AUC staff, and other considerations, the AESO filed a submission with the AUC to extend the filing date of the Bulk and Regional Tariff from June 30, 2021 to October 15, 2021, or within eight weeks of the AESO's last stakeholder session, whichever is later</p>	<p>Design, Implementation</p> <p>Continue to work on the Bulk and Regional Tariff application to pursue a filing by the date as stated, including Demand Opportunity Service (DOS) Modernization and a proposal for mitigating rate impacts for significantly impacted loads to support a minimally disruptive transition</p>
<p>Optimizing the Grid</p> <p>Objective: Optimize use of existing grid and minimize need or extend timing out for new infrastructure while ensuring reliability and market access</p> <p>Interdependencies:</p> <ul style="list-style-type: none"> • Distribution Coordination • Technology Integration • OR Market Competitiveness Enhancement 	<p>Update</p> <p>Currently setting up congestion analysis models that will be used to identify the timing of the planned transmission projects as well as help in maximizing the use of the existing infrastructure. Also investigating the use of flow control devices to come up with low cost solutions on the grid to enhance reliability.</p> <p>Transmission models are being set up for the preparation of 2022 Long-term Transmission Plan. Planning studies started for the near-term horizon.</p> <p>Provided an update to market participants on the status of the investigation and findings so far</p>	<p>Design, Implementation</p> <p>Continue to enhance methods to maximize the use of existing transmission infrastructure, increase the certainty for the timing of new infrastructure, and seek lower-cost end solutions</p> <p>Review technical standards and rules to identify additional flexibility to reduce costs</p> <p>Create and publish planning region/substation level capability maps</p>

Business Initiative	Update Q1 2021	Next Steps
	of the June 7th, 2020 tie-line outage event.	
<p>Distribution Coordination</p> <p>Objective:</p> <p>Ensure coordination across the distribution and transmission system as the transformation evolves, focused on optimizing transmission system while ensuring reliability and market access</p> <p>Interdependencies:</p> <ul style="list-style-type: none"> • Red Tape Reduction • Technology Integration • Optimizing the Grid • Tariff Modernization • OR Market Competitiveness Enhancement • GTA 	<p>Update</p> <p>Distributed Energy Resources (DER) data portal launched for the collection of locational static data on May 10, 2021</p> <p>AESO published a technical paper regarding DER frequency and voltage ride-through performance requirements. The paper was published to the AESO website on March 30, 2021; working with DFOs to adopt AESO recommendations within their DER interconnection requirements</p>	<p>Design, Implementation</p> <p>Continue to implement AESO DER Roadmap technical connection requirements. Coordinate with any AUC DER/Distribution Roadmap development</p> <p>Continue to facilitate DER integration and access to AESO electricity markets by updating any ISO rules (if needed) to remove unnecessary market access limitations while ensuring a fair, efficient and openly competitive (FEOC) market</p> <p>Apply Transmission / Distribution Coordinated Planning Framework on future DFO-driven transmission projects</p> <p>Continue to engage in policy/regulatory related initiatives to share the AESO's principles and perspectives as it relates to mandate implications</p>
<p>Technology Integration</p> <p>Objective:</p> <p>Enable timely planned integration of new technologies onto the grid and into our markets</p> <p>Enable proactive awareness of future new technologies and the potential impacts to reliability, markets and tariffs</p> <p>Interdependencies:</p> <ul style="list-style-type: none"> • Tariff Modernization 	<p>Update</p> <p>The AESO is initiating writing of Technology Forward document</p> <p>Energy Storage (ES) rule identification and addressing tariff treatment is underway</p> <p>An Energy Storage Information Learning Forum (ESILF) stakeholder session was held March 19, 2021</p> <p>The AESO is working on plans for an Industry Technology Summit for Q4 2021</p>	<p>Design, Implementation</p> <p>Continue to progress technology integration by implementing internal change plans, engage externally by publishing the AESO's first "Technology Forward" focused on the electricity value chain and potential future implications to the AESO mandate</p> <p>Continue to progress ES Roadmap by addressing tariff treatment for energy storage within the ISO tariff, identifying any ISO rule changes needed to further enable integration of ES</p>

Business Initiative	Update Q1 2021	Next Steps
<ul style="list-style-type: none"> OR Market Competitiveness Enhancement Optimizing the Grid Distribution Coordination Red Tape Reduction Market Sustainability and Evolution, I and II GTA 		<p>and filing changes, as required. Continue to share learnings and seek feedback via ESILF changes needed to further enable integration of ES and filing changes, as required.</p> <p>Continue to share learnings and seek feedback via ESILF</p>
Business Initiatives		
<p>Settlement Audit</p> <p>Objective:</p> <p>Perform an audit of the AESO's financial settlement processes</p> <p>Interdependencies:</p> <ul style="list-style-type: none"> No interdependencies 	<p>Update</p> <p>Audit deferred to early 2022 due to COVID-19 and other priorities; however, readiness component is still in progress</p>	<p>Implementation</p> <p>Audit planned for early 2022</p>
<p>Operating Reserve (OR) Market Competitiveness Enhancement</p> <p>Objective:</p> <p>Assess ancillary service products to enable technology agnostic participation, where appropriate</p> <p>Assess alternate minor design changes in the OR market that would increase competition in active and standby markets with a focus on the regulating market</p> <p>Interdependencies:</p> <ul style="list-style-type: none"> Technology Integration Optimizing the Grid Distribution Coordination 	<p>Update</p> <p>Internal analysis work has started and is expected to be completed by Q2 2021</p>	<p>Design, Implementation</p> <p>Review competitiveness in the operating reserve market. Potential changes will be identified that could enhance competition in the OR market, including but not limited to the design of the market, methods to improve OR market participation and a review of technical and operating requirements</p> <p>Any identified changes will be carefully assessed as to whether they are required and the appropriate timing or pace of the change. Information on the evaluation of the need for change and required timing will be provided through stakeholder engagement</p>

Business Initiative	Update Q1 2021	Next Steps
<p>Market Sustainability and Evolution II</p> <p>Objective:</p> <p>To maintain system reliability and ensure the AESO is facilitating a FEOC market for an evolving electrical system while also providing certainty and stability to the market structure.</p> <p>Includes: Ramp Table, Dispatch Tolerance and Mothball</p> <p>Interdependencies:</p> <ul style="list-style-type: none"> • Technology Integration • Market Sustainability and Evolution I 	<p>Update</p> <p>Based on results from conducted analyses on the need for these changes, it was decided that Ramp Table and Dispatch Tolerance are to be deferred</p> <p>Mothball rule change process has started and is continuing. Two stakeholder sessions have been held (Dec 1, 2020 and April 29, 2021).</p>	<p>Design, Implementation</p> <p>Continue to monitor system flexibility needs and may initiate necessary changes if needed</p> <p>Continue the rule change process on Mothball rule changes</p>
<p>Market Sustainability and Evolution I</p> <p>Objective:</p> <p>Make informed decisions or recommendations regarding structural changes to support market sustainability</p> <p>Interdependencies:</p> <ul style="list-style-type: none"> • Technology Integration • Market Sustainability and Evolution II 	<p>Update</p> <p>Consultation on Sub-hourly Settlement (SHS) was concluded and it was decided that SHS will not be pursued at this time</p> <p>Consultation on Adjustment for Load on the Margin (ALM) has started and a stakeholder session was conducted on April 13, 2021</p>	<p>Design, Implementation</p> <p>Continue to consult on ALM and pursue rule changes, if necessary, as part of the energy storage rule amendments</p>

Financial Update – As of March 31, 2021

Transmission Operating Costs (\$ million)

	2021 Actual	2021 Forecast	2020 Actual
Wires costs	475.1	483.5	479.0
Operating reserves	101.8	66.8	72.7
Transmission line losses	47.7	38.9	34.1
Other ancillary service costs	17.4	9.6	6.2
Total Transmission Operating Costs	642.0	598.7	592.0

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 2021 are \$475.1 million, which is \$3.9 million or 0.8 per cent lower than the 2020 costs of \$479.0 million due to lower regulated rates charged by the TFOs for the current year.

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 2021 are \$101.8 million, which is \$29.1 million or 40.0 per cent higher than the 2020 costs of \$72.7 million. The cost of operating reserves is impacted by actual volumes, hourly pool prices and operating reserve prices. The average hourly pool price is \$95 per megawatt hour (MWh) in 2021 compared to \$67 per MWh for the same period in 2020, representing an increase of 41.8 per cent. This increase is largely attributable to extremely cold weather conditions in February 2021. The cold temperatures resulted in higher load, variability of coal outages, and higher differentials between Mid-C price and Alberta pool price, which created imports incentives, increased standby activation volumes and rates. Operating reserve volumes financially settled in 2021 are 1,972 gigawatt hours (GWh) compared to 2,085 GWh in 2020, representing a 5.4 per cent decrease.

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 2021 is \$47.7 million, which is \$13.6 million or 39.9 per cent higher than the 2020 cost of \$34.1 million due to the impact of a 41.8 per cent higher average pool price in 2021, outweighing a decrease in volumes. Line loss volumes financially settled in 2021 are 476 GWh compared to 512 GWh in 2020, representing a 7.0 per cent decrease.

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)

	2021 Actual	2021 Forecast	2020 Actual
Load shed service for imports	11.6	8.1	4.1
Transmission must-run			
Contracted	0.0	0.0	0.8
Conscripted	3.5	0.1	0.1
Reliability services	0.7	0.7	0.7
Black start	0.6	0.6	0.6
Transmission constraint rebalancing	1.1	0.0	0.0
Total Other Ancillary Services	17.5	9.6	6.3

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 requirements for arming and tripping. The 2021 costs for LSSi are \$11.6 million, which is \$7.5 million or 182.9 per cent higher than the 2020 costs of \$4.1 million due to increased active arming costs.

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.

The AESO had previously contracted with a generator in Northwest Alberta to provide TMR services which cost \$0.8 million. This contract terminated in September 2020 and no new contracts were procured for 2021. In circumstances when TMR services are 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). The 2021 costs for Conscripted TMR are \$3.5 million, which is \$3.4 million or 3400.0 per cent higher than the 2020 costs of \$0.1 million due to increased unforeseen TMR events.

Reliability services are procured for grid restoration balancing support in the event of an Alberta blackout and emergency energy in the event of supply shortfall.

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 blackout, 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.

The 2021 costs for transmission constraint rebalancing are \$1.1 million, which is \$1.1 million higher than the 2020 costs of \$0.0 million due to significant transmission constraint rebalancing events in January and February 2021.

Other Industry Costs (\$ million)

	2021 Actual	2021 Budget	2020 Actual
Alberta Utilities Commission (AUC) fee – Transmission	2.0	2.8	2.5
AUC fee – Energy Market	1.4	1.6	1.6
WECC/NWPP/NERC costs	0.6	0.5	0.6
Regulatory process costs	0.6	0.3	0.3
Total Other Industry Costs	4.6	5.3	5.0

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 (NERC) 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.

Other industry costs in 2021 are \$4.6 million, which is \$0.4 million or 8.0 per cent lower than 2020 costs of \$5.0 million. The decrease is mainly attributable to reduced AUC fees for 2021.

General and Administrative Costs (\$ million)

	2021 Actual	2021 Budget	2020 Actual
Staff costs	17.5	17.0	17.6
Contract services and consultants	1.1	1.3	0.8
Facilities	1.0	1.1	1.0
Administration	0.8	1.2	1.0
Computer services and maintenance	2.6	2.8	2.6
Telecommunications	0.3	0.4	0.3
Total General and Administrative Costs	23.3	23.9	23.4

Numbers may not add due to rounding

In 2021, staff costs are \$17.5 million, which is \$0.1 million or 0.6 per cent lower than the 2020 costs of \$17.6 million, which is not considered a significant variance.

In 2021, contract services and consultants are \$1.1 million, which is \$0.3 million or 37.5 per cent higher than the 2020 costs of \$0.8 million. The increase is due to the timing of activities and initiatives requiring consulting services.

In 2021, administration costs are \$0.8 million, which is \$0.2 million or 20.0 per cent lower than the 2020 costs of \$1.0 million. The decrease is due to Covid-related impacts on administration costs.

Interest and Amortization (\$ million)

	2021 Actual	2021 Budget	2020 Actual
Amortization of right-of-use assets, intangible assets and depreciation of property, plant and equipment	8.0	6.5	7.2
Interest	44.9	0.9	1.4

In 2021, amortization of intangible assets and depreciation of right-of-use assets and PP&E collectively total \$8.0 million, which is \$0.8 million or 11.1 per cent higher than the 2020 amortization of \$7.2 million. The increase is primarily due to the change to the asset base being amortized and depreciated year-over year.

Interest costs in 2021 are \$44.9 million, which is \$43.5 million or 3,107.1 per cent higher than 2020 costs of \$1.4 million. The increase is primarily due to interest expense of \$44.5 million related to the Module C

line losses resettlement, for which offsetting interest income was recorded. Excluding this, interest costs in 2021 are \$0.4 million, which is \$1.0 million or 71.4 per cent lower than 2020 costs of \$1.4 million due to reduced borrowing requirements in 2021.

Capital Expenditure Update – As of March 31, 2021

Capital Program (\$ million)							
	Total Project Approved	Prior Year(s) Actual	Spent in 2021 to date	ETC in 2021	ETC Future Yr.(s)	Total Cost Est.	Variance Approved to Total Cost Est.
Key Capital Initiatives							
Business System Modernization	1.6	0.6	0.2	0.8	-	1.5	0.0
Cyber Security and Critical Infrastructure Protection (CIP)	1.4	0.2	0.1	0.9	-	1.1	0.2
EMS Sustainment	16.5	10.9	0.9	3.0	-	14.9	1.6
OR Market Competitiveness Enhancement	0.1	-	-	0.1	-	0.1	-
Optimizing the Grid	1.0	0.1	0.0	0.6	0.4	1.2	(0.2)
Other Capital Initiatives	21.7	7.8	3.2	9.2	0.1	20.3	1.4
Life Cycle Funding	5.2	0.5	0.9	3.4	0.2	5.0	0.2
General / Total Capital	47.4	20.1	5.3	18.0	0.7	44.1	3.3

Numbers may not add due to rounding

General Capital Program (\$ million)	
Spent to March 31, 2021	5.3
Estimate to Complete (ETC) in 2021	18.0
Subtotal	23.3
General Capital approved	25.3
2021 budget remaining (variance)	2.0

Appendix I - Notes

The following tables provide information on the AESO’s capital progress for 2021.

Key Capital Initiatives

These are the most critical capital projects over the planning period that the AESO believes must be completed within the identified timeframe.

Key Capital Initiatives		
Business System Modernization	Description	Includes providing a single, secure, standardized user experience for external stakeholders exchanging data with various departments across the AESO. This includes sharing data & information, receiving data and information with market participants, government agencies and the public.
	2021 Plan	Complete implementation of an external facing portal to provide a single platform to exchange data for ARS External Compliance Monitoring (ECM), FOIP requests and DER static data from DFOs. Initiate other opportunities for data exchange with external market participants.
Cyber Security and Critical Infrastructure Protection (CIP)	Description	Build on the existing cyber security foundation to protect the AESO from ever-expanding cyber threats. Deliver improvements in the way that cyber security threats and vulnerabilities are identified, providing better visibility of security events, improved responses and coordinated recovery.
	2021 Plan	Implementation of various cyber security and CIP-related projects.
EMS Sustainment	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 include vendor software upgrades and improved analysis and reporting capabilities.
	2021 Plan	Continue the capital investment via the “Grid Reliability Support” program to sustain and enhance the EMS, in order to support renewables integration and maintain the reliable operation of the Alberta grid and market. Deliver a sustainable long-term EMS required to monitor and control the grid at the lowest possible cost, while generating maximum value from the investment.

Key Capital Initiatives		
Technology Integration	Description	Related capital to help ensure coordination across the distribution and transmission system as the transformation evolves, focused on optimizing the transmission system while ensuring reliability and market access.
	2021 Plan	Includes projects related to energy storage long-term solution implementation and DER integration.
Optimizing the Grid	Description	Optimize use of existing grid and minimize need or extend timing out for new infrastructure while ensuring reliability and market access.
	2021 Plan	Includes online transient stability analysis (TSA) which is currently done offline due to the processing and time requirements. Online TSA would allow for real time analysis to occur and have the results fed back to the System Controllers.
Key Initiatives	2021 Budget	\$9.9 million