Quarterly Stakeholder Report
First Quarter (January – March 2022)

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 *2022 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

Business Initiative	Update Q1 2022	Next Steps
Market Sustainability and Evolution – Business Initiative		
Initial proposal • In progress • Merged Market Sustainability & Evolution I & II and Operating Reserve (OR) Market Competitiveness Enhancement from 2021 BRP **Anticipated completion** • 2022 (dependent on findings) • Implementation will follow, if determined to be required **Objective** • To maintain the long-term sustainability and competitiveness of the energy-only market structure and to enable the integration of new technologies with a long-term view of potential market changes needed to facilitate continued resource adequacy and increased flexibility with an ever-increasing variable system **Interdependencies** • Technology Integration	**Update** Draft proposed amendments to ISO Rules and definitions to enable energy storage, including those for energy storage market requirements and Adjustment to Load on Margin (ALM), issued for stakeholder comment on May 9, 2022 Provided draft recommendations for Group 1 design element at Operating Reserve (OR) Market Review stakeholder session 2 on April 7, 2022. Assessing stakeholder feedback (posted on AESO website May 16, 2022) April 21, 2022, the Mothball Outage Reporting Rule Amendment Design Document, outlining the recommendation in relation to transmission access, subsequent outages, and maximum mothball duration as well as implementation consideration, issued for stakeholder comment (posted on AESO website May 16, 2022) Finalizing the AESO 2022 System Flexibility Assessment Report regarding the system's ability to respond to net demand variability and maintain system reliability under certain assumed Outlook scenarios (Reference Case and Clean Tech Scenario) through to 2031	**Design, Implementation** Continue the rule development process for energy storage rule amendments. Initiate planning for implementation of ALM changes in coordination with energy storage implementation Assess Group 2 design elements and stakeholder feedback from OR Market Review stakeholder session 2 to inform design recommendations and next steps. Plan to hold stakeholder session 3 in Q3 2022 Progress rule development process on the proposed changes to ISO rule Section 306.7 Mothball Outage Reporting and continue planning for implementation when appropriate. Issue the 2022 System Flexibility Assessment Report in Q2 2022

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Business Initiative	Update Q1 2022	Next Steps
Settlement Audit – Business Initiative		
Initial proposal • In progress **Anticipated completion** • 2022 • Settlement Audits will become part of ongoing base business, performed regularly with the frequency to be determined **Objective** • Perform an audit of the AESO's financial settlement processes **Interdependencies** • No interdependencies	**Update** Audit deferred to early 2022 due to COVID-19 and other priorities; however, readiness component is still in progress In the replies to stakeholder comments from the Aug. 26, 2021 BRP Session 1, the AESO provided some additional information and a diagram that is a conceptual overview of the AESO's settlement operations and the related control framework that will be considered in the Settlement Audit Readiness complete and audit underway	**Implementation** Auditors conduct 6-month Settlement Audit testing over Q2 and Q3 (starting Apr. 1, 2022) Preparation and completion of Settlement Audit report Q4 2022 Upon completion, share a post-audit report with stakeholders upon request, subject to non-disclosure agreement
Red Tape Reduction – Mandated, Top Priority Business Initiative		
Initial proposal • Mandated in 2020 **Anticipated completion** • March 31, 2023 • Red tape will become part of ongoing base business **Objective** • To be in compliance with the Government of Alberta's (GoA) Red Tape Reduction (RTR) Initiative, the AESO is committed to reducing regulatory requirements by one-third by March 31, 2023 **Interdependencies** • Tariff Modernization • Technology Integration	**Update** 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 Implementation of the workplan has resulted in a reduction of requirements by 25% at Q1 2022	**Implementation** 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

Optimizing the Grid – Top Priority Business Initiative

Initial proposal	Update	Design, Implementation
• In progress **Anticipated completion** • 2023 • Optimizing the Grid will continue to be part of ongoing base business **Objective** • Optimize use of existing grid and minimize need or extend timing out for new infrastructure while ensuring reliability and market access **Interdependencies** • Distribution Coordination • Technology Integration • Market Sustainability & Evolution	Congestion analysis is integrated into system planning processes and used to identify the timing of the planned transmission projects and maximize use of existing infrastructure Q1 2022 launched substation level transmission capability maps Completed *2022 Long-term Transmission Plan* (LTP), focused on risk-based scenarios and optimizing existing network, published to the AESO website Jan. 31, 2022 Cost saving for deferring system projects such as PENV (Provost to Edgerton and Nilrem to Vermilion Transmission Development) 2-year deferral; CETO (Central East Transfer-out Transmission Development) through using re-affirmation studies and CRPC (Chapel Rock-to-Pincher Creek Transmission Development)	Next CETO re-affirmation study in Q4 2022 Continue to use congestion analysis for the timing of PENV Developing dynamic line rating (DLR) implementation plan Initiate flow control pilot project implementation for Q3/Q4 2022 Seek enhanced flexibility to further optimize the network by engaging in the Department of Energy's Bulk System Planning engagement

Tariff Modernization – Top Priority Business Initiative

Initial proposal	Update	Design, Implementation
• In progress **Anticipated completion** • 2023 • Will be followed by the implementation of Tariff Modernization and any potential related Business Initiatives **Objective** • Modernize ISO tariff price signals and simplify the ISO	The Bulk and Regional Rate Design and Modernization Demand Opportunity Service (DOS) Rate Design Application is under review by the Commission in Proceeding 26911 The Adjusted Metering Practice Implementation Plan and proposed amendments to Section 502.10 of the ISO Rules, Revenue Metering System Technical and Operating Requirements application is under review by the Commission in Proceeding 27047	Continue participation in the AUC proceeding on Bulk and Regional Rate Design and Modernization Demand Opportunity Service (DOS) Rate Design Application, including oral hearing in June, and arguments in July to September 2022 Initiate planning for implementation as appropriate Await decision from AUC Proceeding 27047. Subject to the actual AUC approval date, effective dates of certain provisions in proposed amended Section 520.10

tariff to be more accessible, clear and agile **Interdependencies** • Red Tape Reduction • Distribution Coordination • Technology Integration	Final argument and reply argument were filed on April 29 and May 4, 2022, respectively Released *2022-2023 ISO Tariff-Related Initiatives Plan* to provide an updated overview of the tariff-related initiatives that the AESO intends to progress in 2022 to Q2 2023 to provide stakeholders with a consolidated comprehensive view for their information and planning purposes	may have to be adjusted accordingly. Progress initiatives listed in *2022-2023 ISO Tariff-Related Initiatives Plan*, considering feedback provided by stakeholders
Distribution Coordination – Top Priority Business Initiative		
Initial proposal • In progress **Anticipated completion** • 2024 • Distribution Coordination will continue to be part of ongoing base business **Objective** • Ensure coordination across the distribution and transmission system as the transformation evolves, focused on optimizing the transmission system while ensuring reliability and market access **Interdependencies** • Technology Integration • Optimizing the Grid • Tariff Modernization • General Tariff Application • Market Sustainability & Evolution	**Update** Launched DER locational static data portal Q1 2021 published DER frequency and voltage ride-through performance requirements technical paper Q1 2022 DER effective grounding technical paper Published and implementing the AESO's *Decision-Making Framework* for responding to DFO system access service request	**Design, Implementation** Working with DFOs to adopt frequency and voltage ride-through performance requirements into DFO interconnection documents Working with DFOs to understand engineering practices with respect to effective grounding Plan to publish anti-islanding guideline in Q2 2022 Pursue connection process improvements for DFO reliability and capability projects Engage in policy/regulatory related initiatives to share the AESO's principles and perspectives as it relates to mandate implications Remove unnecessary DER market access limitations; AESO proposing to reduce operating reserve minimum asset capability requirements, aligned with ongoing operating Reserve Market Review engagement

Technology Integration – Top Priority Business Initiative

Initial proposal	Update	Design, Implementation
• In progress **Anticipated completion** • 2024 • Technology Integration will continue to be part of ongoing base business **Objectives** • Enable timely planned integration of new technologies onto the grid and into our markets • Enable proactive awareness of future new technologies and the potential impacts to reliability, markets and tariffs **Interdependencies** • Tariff Modernization • Market Sustainability & Evolution • Optimizing the Grid • Distribution Coordination • Red Tape Reduction	Published the AESO's first *Technology Forward* report focused on the electricity value chain and future implications to the Electricity Value Chain Held the first AESO Technology Summit on Dec.1, 2021 Engaged in Department of Energy's Energy Storage policy development Posted Energy Storage (ES) proposed rule amendments May 9, 2022 Held the Energy Storage Industry Learnings Forum (ESILF) session November 9, 2021	Implement any ES-related policy changes Publish supply technology research report Continue implementation for Adjustment for Load on the Margin (ALM) Progress distributed energy resource (DER) roadmap, including the remaining technical review areas

Grid Resiliency – Top Priority Business Initiative – New for 2022

Initial proposal	Update	Design, Implementation
• New initiative for 2022 **Anticipated completion** • 2022/2023 **Objectives** • Enhance system frequency response • Ensure extreme event preparedness across gas/electric interdependencies • Identify additional reliability needs as supply transforms	Improving system frequency response following a disturbance; implemented AGC blocking on specific generators; working with specific generators regarding plant level controllers coordination; working with specific DERs to revise frequency ride-through settings Identify gas/electric interdependencies. The AESO and NGTL are operationally coordinated and have a risk matrix and protocols in place to deal with events	2022 will focus on these initiatives, by priority: • Implement system frequency response improvements including rule changes if necessary • Assess future reliability needs to ensure resilience as grid transforms towards decarbonization, followed in 2023+ with any needed market-based approaches on how to deliver those requirements

• Assess need for climate adaptation plans • Enhance cyber-security capabilities **Interdependencies** • Market Sustainability & Evolution • Technology Integration		• Assess climate change implications on grid resilience
ARS Development & Monitoring – Business Initiative – New for 2022		
Initial proposal • New initiative for 2022 (Initiative added based on stakeholder feedback received during 2022 BRP consultation) **Anticipated completion** • 2023 • Will become part of ongoing base business **Objectives** • Review the development and compliance monitoring and audit processes for ARS requirements **Interdependencies** • Grid Resiliency • Technology Integration	**Update** **Development of Roadmap** Stakeholder feedback on existing ARS program requested in December 2021 Summary of stakeholder feedback (including identification of themes of feedback) received in January 2022 prepared and shared with stakeholders ARS Enhancement Program Roadmap developed in response to feedback Stakeholder session hosted May 11, 2022, to present the ARS Program Enhancement Roadmap	**Design, Implementation** **2022 Workplan and Milestones** • Initiate development of a risk framework and assessment methodology • Work with stakeholders to finalize risk framework • Establish process to collaborate with stakeholders and keep them apprised of roadmap progress on a regular basis • Reset and increase stakeholder interactions through the Alberta Reliability Council (ARC), Reliability Standards Discussion Group (RSDG), Technical Working Groups (TWG) and Compliance Monitoring Program CMP) Roadmap work likely to extend through 2023

Financial Update – As of March 31, 2022

Transmission Operating Costs ($ million)	2022 Actual	2022 Forecast	2021 Actual
Wires costs	444.5	474.2	475.1
Operating reserves	59.1	44.4	101.8
Transmission line losses	45.4	37.3	47.7
Other ancillary service costs	11.3	10.2	17.4
Total Transmission Operating Costs	**560.3**	**566.1**	**642.0**

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 2022 are $444.5 million, which is $30.6 million or 6.4 per cent lower than the 2021 costs of $475.1 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 2022 are $59.1 million, which is $42.7 million or 41.9 per cent lower than the 2021 costs of $101.8 million. The cost of operating reserves is impacted by actual volumes, hourly pool prices and operating reserve prices. The average hourly pool price is $90 per megawatt hour (MWh) in 2022 compared to $95 per MWh for the same period in 2021, representing a decrease of 5.3 per cent. This decrease is largely attributable to extremely cold weather conditions in February 2021, which 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 2022 are 1,658 gigawatt hours (GWh) compared to 1,972 GWh in 2021, representing a 15.9 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 2022 is $45.4 million, which is $2.3 million or 4.8 per cent lower than the 2021 cost of $47.7 million due to the impact of a 5.3 per cent lower average pool price in 2022, outweighing an increase in volumes. Line loss volumes financially settled in 2022 are 519 GWh compared to 476 GWh in 2021, representing a 9.0 per cent increase.

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)

	2022 Actual	2022 Forecast	2021 Actual
Load shed service for imports	8.0	7.4	11.6
Transmission must-run - Conscripted	1.9	1.3	3.5
Reliability services	0.7	0.7	0.7
Black Start	0.6	0.6	0.6
Transmission constraint rebalancing	0.0	0.2	1.1
Total Other Ancillary Services	**11.3**	**10.2**	**17.5**

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 2022 costs for LSSi are $8.0 million, which is $3.6 million or 31.0 per cent lower than the 2021 costs of $11.6 million primarily due to decreased 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. 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 2022 costs for Conscripted TMR are $1.9 million, which is $1.6 million or 45.7 per cent lower than the 2021 costs of $3.5 million due to decreased 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 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.

The 2022 costs for transmission constraint rebalancing are $0.0 million, which is $1.1 million lower than the 2021 costs of $1.1 million due to significant transmission constraint rebalancing events in January and February 2021.

Other Industry Costs ($ million)

	2022 Actual	2022 Budget	2021 Actual
Alberta Utilities Commission (AUC) fee – Transmission	1.2	2.6	2.0
AUC fee – Energy Market	1.0	2.0	1.4
WECC/NWPP/NERC costs	0.6	0.6	0.6
Regulatory process costs	1.3	0.9	0.6
Total Other Industry Costs	**4.1**	**6.0**	**4.6**

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 and non-compliance penalties. 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 2022 are $4.1 million, which is $0.5 million or 10.9 per cent lower than 2021 costs of $4.6 million. The decrease is mainly attributable to reduced AUC fees for 2022, which more than offset the increase in regulatory process costs related to the Bulk & Regional Tariff proceeding in 2022.

General and Administrative Costs ($ million)			
	2022 Actual	2022 Budget	2021 Actual
Staff costs	19.4	18.2	17.5
Contract services and consultants	0.6	1.1	1.1
Facilities	1.0	1.2	1.0
Administration	0.8	1.3	0.8
Computer services and maintenance	2.6	2.8	2.6
Telecommunications	0.3	0.4	0.3
Total General and Administrative Costs	**24.7**	**24.8**	**23.3**

Numbers may not add due to rounding

In 2022, staff costs are $19.4 million, which is $1.9 million or 10.9 per cent higher than the 2021 costs of $17.5 million. The increase is primarily due to vacation accruals recorded in 2022.

In 2022, contract services and consultants are $0.6 million, which is $0.5 million or 45.5 per cent lower than the 2021 costs of $1.1 million. The decrease is due to the timing of activities and initiatives requiring consulting services.

Amortization and Depreciation and Borrowing Costs ($ million)			
	2022 Actual	2022 Budget	2021 Actual
Amortization of right-of-use assets, intangible assets and depreciation of property, plant and equipment	**6.8**	**7.1**	**8.0**
Borrowing costs	**0.2**	**0.6**	**44.9**

In 2022, amortization of intangible assets and depreciation of right-of-use assets and PP&E collectively total $6.8 million, which is $1.2 million or 15.0 per cent lower than the 2021 amortization of $8.0 million. The decrease is primarily due to the change to the asset base being amortized and depreciated year-over-year.

Borrowing costs in 2022 are $0.2 million, which is $44.7 million or 99.6 per cent lower than the 2021 costs of $44.9 million. The decrease is primarily due to the 2021 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 were $0.4 million, which is $0.2 million or 50.0 per cent higher than the 2022 costs of $0.2 million due to borrowing requirements in 2021.

Capital Expenditure Update – As of March 31, 2022

Capital Program ($ million)	Total Project Approved	Prior Year(s) Actual	Spent in 2022 to-date	ETC in 2022	ETC Future Yr.(s)	Total Cost Est.	Variance Approved to Total Cost Est.
Key Capital Initiatives							
Business System Modernization	1.7	0.6	0.3	0.8	-	1.7	0.0
Cyber Security and Critical Infrastructure Protection (CIP)	1.4	0.0	0.2	1.2	-	1.4	0.0
EMS Sustainment	13.9	1.2	2.1	6.1	4.4	13.9	-
Market Sustainment & Evolution	2.4	-	-	0.5	1.9	2.4	-
Optimizing the Grid	1.6	0.2	0.1	0.1	1.1	1.5	0.1
Technology Integration	0.4	0.0	0.0	0.3	0.0	0.4	0.0
Other Capital Initiatives	13.5	2.4	1.5	6.6	1.9	12.4	1.1
Life Cycle Funding	6.1	1.5	1.0	3.4	0.2	6.2	-0.1
General / Total Capital	**41.1**	**6.0**	**5.2**	**19.1**	**9.5**	**39.8**	**1.2**

Numbers may not add due to rounding

General Capital Program ($ million)	
Spent to March 31, 2022	**5.2**
General Capital Approved	**25.3**
Remaining Budget	**20.1**

Appendix I - Notes

The following tables provide information on the AESO's capital for 2022.

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
	2022 Plan	Continued implementation and expansion 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 the 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
	2022 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 includes vendor software upgrades and improved analysis and reporting capabilities
	2022 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
Market Sustainability and Evolution	**Description**	Implement system changes required to maintain the long-term sustainability and competitiveness of the energy-only market structure
	2022 Plan	Includes the system changes required to implement the Adjustment for Load on the Margin (ALM)

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
	2022 Plan	Includes projects related to energy storage long-term solution implementation and distributed energy resource (DER) integration
Key Initiatives	**2022 Budget**	**$11.2 million**