

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 Q4 2022	Next Steps
<i>Market Sustainability and Evolution – Business Initiative</i>		
<p>Initial proposal</p> <ul style="list-style-type: none"> In progress Merged Market Sustainability & Evolution I & II and Operating Reserve (OR) Market Competitiveness Enhancement from 2021 Budget Review Process (BRP) <p>Anticipated completion</p> <ul style="list-style-type: none"> 2022 (dependent on findings) Implementation will follow if determined to be required <p>Objective</p> <ul style="list-style-type: none"> 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 <p>Interdependencies</p> <ul style="list-style-type: none"> Technology Integration 	<p>Update</p> <p>The AESO received and published stakeholder comments on the Final Draft Energy Storage ISO Rule Amendments that were published on Nov. 22, 2022. Based on stakeholder feedback, the AESO decided to host an additional stakeholder session on Feb 2, 2023</p> <p>The AESO received and published stakeholder comments for additional feedback from session 3 on the OR Market Competitiveness Review. Comments will be taken into consideration in further development of the OR Market Competitiveness Review</p> <p>Published AESO replies to stakeholder comments on proposed Mothball Rule Amendments and the Final Mothball Rule Amendments on Dec. 21, 2022. Preparing rule change application. Continued planning for implementation of internal processes and system changes</p>	<p>Design, Implementation</p> <p>Conduct Feb. 2, 2023, stakeholder session on the energy storage rule amendments. The AESO written responses on the Final Draft Energy Storage ISO Rule Amendments to be published March 2023, along with another draft of the Final Draft Energy Storage ISO rule Amendments. Application to be filed with the Commission in Q2 2023</p> <p>Progress planning for implementation of energy storage changes, including Adjustment to Load on the Margin</p> <p>Final design consultation on OR Market Competitiveness Review in Q1 2023, including engaging Stakeholders in a further process on offer transparency. Rule drafting to follow</p> <p>Application to be filed with the Commission on the Final Mothball Rule Amendments in March 2023. Continue planning for implementation</p>

Business Initiative	Update Q4 2022	Next Steps
<i>Settlement Audit – Business Initiative</i>		
<p>Initial proposal</p> <ul style="list-style-type: none"> In progress <p>Anticipated completion</p> <ul style="list-style-type: none"> 2022 Settlement Audits will become part of ongoing base business, performed regularly with the frequency to be determined <p>Objective</p> <ul style="list-style-type: none"> Perform an audit of the AESO’s financial settlement processes <p>Interdependencies</p> <ul style="list-style-type: none"> No interdependencies 	<p>Update</p> <p>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</p> <p>Auditors conducted six-month Settlement Audit testing over Q2 and Q3 (started Apr. 1, 2022)</p> <p>Completion of Settlement Audit and report in Q4 2022</p>	<p>Implementation</p> <p>AESO will share a post-audit report with stakeholders upon request, subject to non-disclosure agreement</p>
<i>Red Tape Reduction – Mandated, Top-Priority Business Initiative</i>		
<p>Initial proposal</p> <ul style="list-style-type: none"> Mandated in 2020 Anticipated completion March 31, 2023 Red tape will become part of ongoing base business <p>Objective</p> <ul style="list-style-type: none"> 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 <p>Interdependencies</p> <ul style="list-style-type: none"> Tariff Modernization Technology Integration 	<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 25 per cent at Q4 2022</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. The AESO will complete its work to meet the GoA’s red tape target reduction of one-third by March 31, 2023</p>
<i>Optimizing the Grid – Top-Priority Business Initiative</i>		
<p>Initial proposal</p> <ul style="list-style-type: none"> In progress <p>Anticipated completion</p> <ul style="list-style-type: none"> 2023 	<p>Update</p> <p>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</p>	<p>Design, Implementation</p> <p>Continue to use congestion analysis for the timing of PENV and CRPC. Developing dynamic line rating (DLR) implementation plan</p>

Business Initiative	Update Q4 2022	Next Steps
<ul style="list-style-type: none"> Optimizing the Grid will continue to be part of ongoing base business <p>Objective</p> <ul style="list-style-type: none"> Optimize use of existing grid and minimize need or extend timing out for new infrastructure while ensuring reliability and market access <p>Interdependencies</p> <ul style="list-style-type: none"> Distribution Coordination Technology Integration Market Sustainability & Evolution 	<p>Cost saving for deferring system projects such as Provos to Edgerton and Nilrem to Vermilion Transmission Development (PENV) two-year deferral; and Chapel Rock-to-Pincher Creek Transmission Development (CRPC). Central East Transfer-out Transmission Development (CETO) was initiated after carrying out the reaffirmation studies. The results depicted that CETO should be triggered</p> <p>The power flow control pilot project was successfully completed in Q3. The objective of this pilot project was to test the proof of concept for the power flow control device</p>	<p>Seek enhanced flexibility to further optimize the network by engaging in the Ministry of Energy's Bulk System Planning engagement</p>

Tariff Modernization – Top-Priority Business Initiative

Initial proposal	Update	Design, Implementation
<ul style="list-style-type: none"> In progress <p>Anticipated completion</p> <ul style="list-style-type: none"> 2023 Will be followed by the implementation of Tariff Modernization and any potential related Business Initiatives <p>Objective</p> <ul style="list-style-type: none"> Modernize ISO tariff price signals and simplify the ISO tariff to be more accessible, clear and agile <p>Interdependencies</p> <ul style="list-style-type: none"> Red Tape Reduction Distribution Coordination Technology Integration 	<p>The Commission denied the AESO's Bulk and Regional Rate Design and Modernization Demand Opportunity Service (DOS) Rate Design Application in Proceeding 26911. Guidance and directions to the AESO were provided in the decision</p> <p>The AESO is advancing work on the Adjusted Metering Practice (AMP) and intends to file a further application regarding the AMP in the first half of 2023, following stakeholder engagement. A Notice to Stakeholders was released by the AESO on Dec. 9, 2022</p> <p>The AESO is progressing a 2022 Tariff Modernization application which is intended to make administrative and non-structural changes to the ISO tariff, to revise Generator Unit Owner's Contribution (GUOC) requirements to ensure consistent treatment for generation projects, to modernize the compensation formula for the provision of conscripted Transmission Must Run (TMR) service, and to implement a PILON waiver provision in accordance with AUC Decision 26911-D01-2022. Draft changes and background on the changes were released for consultation. Based on feedback, adjustments were made to the scope of the filing</p>	<p>Reviewing the decision to Proceeding 26911 to assess and plan next steps</p> <p>Follow up on the next steps identified for AMP</p> <p>Participate in AUC Proceeding 27864, regarding the 2022 Tariff Modernization application</p>

Business Initiative	Update Q4 2022	Next Steps
<i>Distribution Coordination – Top-Priority Business Initiative</i>		
<p>Initial proposal</p> <ul style="list-style-type: none"> In progress <p>Anticipated completion</p> <ul style="list-style-type: none"> 2024 Distribution Coordination will continue to be part of ongoing base business <p>Objective</p> <ul style="list-style-type: none"> Ensure coordination across the distribution and transmission system as the transformation evolves, focused on optimizing the transmission system while ensuring reliability and market access <p>Interdependencies</p> <ul style="list-style-type: none"> Technology Integration Optimizing the Grid Tariff Modernization General Tariff Application Market Sustainability & Evolution 	<p>Update</p> <p>Published Anti-islanding Screening and Study Guideline in Q3 2022</p> <p>Published DER Commissioning and Testing Recommendations in Q3 2022</p> <p>Distribution Facility Owners (DFOs) completed adoption of the DER Ride-through Performance Recommendations (frequency and voltage ride-through performance requirements), including for Distributed Energy Resource (DER) projects less than 150 kW</p> <p>AESO confirmed as participant in AUC proceeding for DFO performance-based regulation in Q3 2022</p> <p>Implemented connection process improvements for DFO reliability and capability projects in Q4 2022</p> <p>Published updated 2023 Plan for DER Roadmap integration activities</p>	<p>Design, Implementation</p> <p>Engage in policy/regulatory-related initiatives to share the AESO's principles and perspectives as they relate to mandate implications, including AUC proceeding underway for DFO performance-based regulation</p> <p>Remove unnecessary DER market access limitations; the AESO is proposing to reduce operating reserve minimum asset capability requirements, aligned with ongoing Operating Reserve Market Review engagement</p>
<i>Technology Integration – Top Priority Business Initiative</i>		
<p>Initial proposal</p> <ul style="list-style-type: none"> In progress <p>Anticipated completion</p> <ul style="list-style-type: none"> 2024 Technology Integration will continue to be part of ongoing base business <p>Objectives</p> <ul style="list-style-type: none"> 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 	<p>Update</p> <p>Published the AESO's first Technology Forward report focused on the electricity value chain and future implications to the Electricity Value Chain</p> <p>Continued engagement (?) in the Ministry of Energy's Energy Storage policy development</p> <p>Posted the modified ISO rules to integrate ES with the grid.</p> <p>Issued a Request for Information (RFI) for Solutions to Mitigate the Instantaneous Impacts of Sudden Supply Loss in Q3, Received stakeholder responses to the RFI in Q4</p>	<p>Design, Implementation</p> <p>Implement any ES-related policy changes</p> <p>Publish supply technology research report</p> <p>Continue implementation for Adjustment for Load on the Margin (ALM)</p> <p>Progress <i>Distributed Energy Resources Roadmap</i>, including the remaining technical review areas</p>

Business Initiative	Update Q4 2022	Next Steps
<p>Interdependencies</p> <ul style="list-style-type: none"> • Tariff Modernization • Market Sustainability & Evolution • Optimizing the Grid • Distribution Coordination • Red Tape Reduction 		
<p><i>Grid Resiliency – Top Priority Business Initiative – New for 2022</i></p>		
<p>Initial proposal</p> <ul style="list-style-type: none"> • New initiative for 2022 <p>Anticipated</p> <ul style="list-style-type: none"> • 2022/2023 <p>Objectives</p> <ul style="list-style-type: none"> • Enhance system frequency response • Ensure extreme event preparedness across gas/electric interdependencies • Identify additional reliability needs as supply transforms • Assess need for climate adaptation plans • Enhance cyber-security capabilities <p>Interdependencies</p> <ul style="list-style-type: none"> • Market Sustainability & Evolution • Technology Integration 	<p>Update</p> <p>Improving system frequency response following a disturbance; implemented Automatic Generation Control (AGC) blocking on specific generators; working with specific generators regarding plant level controller coordination; working with specific DERs to revise frequency ride-through settings</p> <p>Continue to work on the Reliability Requirements Roadmap to identify reliability challenges as the grid transforms and come up with action plans and timelines; scheduled for publication Q1 2023</p> <p>Identify gas/electric interdependencies. The AESO and NGTL are operationally coordinated and have a risk matrix and protocols in place to deal with events</p>	<p>Design</p> <p>2022 will focus on these initiatives, by priority:</p> <ul style="list-style-type: none"> • 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 climate change implications on grid resilience
<p><i>Alberta Reliability Standard (ARS) Development & Monitoring – Business Initiative – New for 2022</i></p>		
<p>Initial proposal</p> <ul style="list-style-type: none"> • New initiative for 2022 (Initiative added based on stakeholder feedback received during 2022 BRP consultation) <p>Anticipated completion</p> <ul style="list-style-type: none"> • 2023 • Will become part of ongoing base business <p>Objectives</p> <ul style="list-style-type: none"> • Review and enhance the development and compliance 	<p>Update</p> <p>RoadMap</p> <p>Final RoadMap provided at the Nov. 21, 2022, stakeholder session</p> <p>RoadMap Implementation</p> <ul style="list-style-type: none"> • Risk-based methodology completed and applied to the development phase of ARS Lifecycle • Development of risk-based approach for CMP phase of ARS Lifecycle initiated • Hosted RSDG in Oct. 2022 to present the results of risk assessment to reliability standards and draft Work plan 	<p>Design, Implementation</p> <p>2022 Workplan and Milestones</p> <ul style="list-style-type: none"> • Finalize risk-based approach to ARS Lifecycle with input from stakeholders • Finalize risk-based CMP with input from stakeholders • Finalize ARS process improvements including RFI Process • Finalize internal governance • Complete CIP-013 Pilot and leverage lessons learned

Business Initiative	Update Q4 2022	Next Steps
<ul style="list-style-type: none"> monitoring and audit processes for ARS requirements Align the internal governance with the changes driven by the outcomes (processes, accountabilities) <p>Interdependencies</p> <ul style="list-style-type: none"> Grid Resiliency Technology Integration 	<ul style="list-style-type: none"> Hosted Stakeholder session in November to provide updates on roadmap streams Internal structure and governance under review Finalized ARS Roadmap CIP-013 Pilot in development 	<ul style="list-style-type: none"> Initiate operationalization of Roadmap deliverables in 2023 and carry over into 2024

Financial Update – As of December 31, 2022

Transmission Operating Costs (\$ million)

	2022 Actual	2022 Forecast	2021 Actual
Wires costs	1,933.8	1,896.7	1,713.6
Operating reserves	494.1	169.3	333.7
Transmission line losses	332.7	143.3	201.8
Other ancillary service costs	41.2	40.8	47.5
Total Transmission Operating Costs	2,801.8	2,250.1	2,296.6

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 AUC-approved tariffs and are not controllable costs of the AESO.

Wires costs in 2022 are \$1,933.8 million, which is \$220.2 million or 12.9 per cent higher than the 2021 costs of \$1,713.6 million due to an increase in 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 \$494.1 million, which is \$160.4 million or 48.1 per cent higher than the 2021 costs of \$333.7 million. The cost of operating reserves is impacted by actual volumes, hourly pool prices and operating reserve prices. The average hourly pool price is \$162 per megawatt hour (MWh) in 2022 compared to \$102 per MWh for the same period in 2021, representing an increase of 58.8 per cent. This increase in pool price is primarily due to an increase in natural gas prices. Operating reserve volumes financially settled in 2022 are 6,859 gigawatt hours (GWh) compared to 6,934 GWh in 2021, representing a 1.1 per cent decrease. The overall increase in operating reserve costs year over year is the result of the increase in the average hourly pool price, which has more than offset the impact of the decrease in volumes.

Transmission line losses – Transmission line losses represent the volume of energy that is lost as a result of electrical resistance on the transmission system. 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 \$332.7 million, which is \$130.9 million or 64.9 per cent higher than the 2021 cost of \$201.8 million due to the impact of a 58.8 per cent higher average pool price in 2022, as well as an increase in volumes. Line loss volumes financially settled in 2022 are 2,016 GWh compared to 1,880 GWh in 2021, representing a 7.2 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	30.0	29.4	31.4
Fast frequency response	0.7	-	-
Transmission must-run			
Contracted	1.2	-	-
Conscripted	2.1	5.0	8.1
Reliability services	2.9	2.9	2.9
Black start	2.5	2.5	2.4
Transmission constraint rebalancing	1.8	1.0	2.7
Total Other Ancillary Services	41.2	40.8	47.5

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 \$30.0 million, which is \$1.4 million or 4.5 per cent lower than the 2021 costs of \$31.4 million. In 2021, LSSi arming costs were impacted by two significant disturbance events due to the tripping of the interties with British Columbia and Montana; there were no such events in 2022.

Fast frequency response (FFR) is a fast-acting transmission reliability service that facilitates the arrest of, and recovery from, frequency decay caused by events such as the sudden loss of imports from the interties with British Columbia and Montana. This is a service adapted for new technology, such as energy storage. Two one-year pilot contracts were awarded and began providing FFR services in March 2022.

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). Contracted TMR costs in 2022 are \$1.2 million, compared to nil in 2021, as a new contract was put into place in July 2022. Conscripted TMR costs in 2022 are \$2.1 million, which is \$6.0 million or 74.1 per cent lower than the 2021 costs of \$8.1 million, which is primarily a reflection of the new TMR contract put into place, reducing the need for conscripted TMR services in the northwest region of Alberta.

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.

Black start services are provided by generators that can 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 that 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. Transmission constraint rebalancing costs in 2022 are \$1.8 million, which is \$0.9 million or 33.3 per cent lower than the 2021 costs of \$2.7 million, reflecting a reduction in the frequency and magnitude of rebalancing events. In 2021, there were significant events requiring constrained down generation during islanded operations as well as constraints on generation due to transmission line upgrades and limits.

Other Industry Costs (\$ million)			
	2022 Actual	2022 Budget	2021 Actual
AUC fees – Transmission	8.9	10.3	9.7
AUC fees – Energy Market	6.8	7.8	7.3
WECC/NWPP/NERC costs	2.4	2.5	2.3
Regulatory process costs	6.5	3.5	2.3
Total Other Industry Costs	24.7	24.1	21.6

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 AUC proceedings 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 \$24.7 million, which is \$3.1 million or 14.4 per cent higher than 2021 costs of \$21.6 million. The increase is attributable to increased regulatory process costs primarily related to the Bulk & Regional tariff proceeding in 2022, which more than offset the decrease in AUC fees.

General and Administrative Costs (\$ million)

	2022 Actual	2022 Budget	2021 Actual
Staff costs	75.7	71.0	68.3
Contract services and consultants	2.3	4.5	4.1
Facilities	4.7	5.0	4.1
Administration	3.5	5.0	3.3
Computer services and maintenance	10.4	10.9	10.6
Telecommunications	1.3	1.4	1.4
Total General and Administrative Costs	97.9	97.8	91.8

Numbers may not add due to rounding

General and administrative costs are \$97.9 million which is \$6.1 million or 6.6 per cent higher than the 2021 costs of \$91.8 million, primarily due to increases in staff costs, contract services and consulting and facilities.

In 2022, staff costs are \$75.7 million, which is \$7.4 million or 10.8 per cent higher than the 2021 costs of \$68.3 million. The increase year-over-year is primarily due to the impact of market adjustments following the Government of Alberta's lifting of the Salary Restraint Regulation in July 2022; the implementation of a defined contribution Pension Plan and a defined benefit Retiree Benefits Plan that were put into place in July 2022, resulting in increased benefits costs as well as the initial recognition of actuarial estimates for past service costs; and the timing of vacation accruals.

In 2022, contract services and consultants are \$2.3 million, which is \$1.8 million or 43.9 per cent lower than the 2021 costs of \$4.1 million. The decrease is due to the timing of and changes to activities and initiatives requiring external legal and consulting resources.

In 2022, facilities costs are \$4.7 million, which is \$0.6 million or 14.6 per cent higher than the 2021 costs of \$4.1 million, primarily due to increases in utilities and operating costs as employees returned to the AESO's workplace facilities more frequently than over the past two years during the pandemic.

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	24.1	24.6	28.1
Borrowing costs	0.6	2.8	47.1

In 2022, amortization of intangible assets and depreciation of right-of-use assets and property, plant and equipment (PP&E) collectively total \$24.1 million, which is \$4.0 million or 14.2 per cent lower than the 2021 amortization of \$28.1 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 \$0.6 million, which is \$46.5 million or 98.7 per cent lower than the 2021 costs of \$47.1 million. The decrease is primarily due to the 2021 interest expense of \$45.8 million related to the Module C line losses resettlement, for which offsetting interest income was recorded. Excluding this, borrowing costs of \$0.6 million in 2022 are \$0.7 million or 53.8 per cent lower than the 2021 costs of \$1.3 million as no debt financing was required during the year.

Capital Expenditure Update – As of December 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	1.9	0.6	1.4	-	-	1.9	0.1
Cyber Security and Critical Infrastructure Protection (CIP)	1.5	0.0	1.7	-	-	1.7	(0.2)
Energy Management System (EMS) Sustainment	15.4	1.2	8.1	-	5.1	14.4	1.0
Market Sustainment & Evolution	1.4	-	0.1	-	1.2	1.3	0.1
Optimizing the Grid	1.4	0.1	0.1	-	1.1	1.3	0.1
Technology Integration	0.4	0.0	0.3	-	0.0	0.3	0.1
Other Capital Initiatives	14.2	2.5	6.9	-	0.9	10.3	3.8
Life Cycle Funding	6.2	1.5	4.6	-	-	6.2	0.1
General / Total Capital	42.5	6.0	23.2	-	8.2	37.5	5.0

Numbers may not add due to rounding

General Capital Program (\$ million)	
Spent to December 31, 2022	23.2
General Capital Approved	25.3
Variance	2.1

Appendix I - Notes

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

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 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 include 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 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)
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 DER integration
Key Initiatives	2022 Budget	\$11.2 million