

ALBERTA ELECTRIC SYSTEM OPERATOR

2022

YEAR IN REVIEW



NOTE FROM

The President and Chief Executive Officer

The start of 2022 was memorable for our system coordinators, as they adeptly managed tight supply conditions while extreme temperatures drove record-setting demand in Alberta. The commitment and hard work consistently demonstrated by our operations team was mirrored across the organization over the past year as the AESO undertook critical work associated with the long-term sustainability of Alberta's electricity system.

Our employees successfully progressed and delivered many important initiatives. Of particular significance was the *AESO Net-Zero Emissions Pathways Report*, the first in-depth analysis of the potential implications of a net-zero future to focus specifically on electricity in Alberta. It outlines the potential supply and demand combinations that may enable Alberta to reach a net-zero electricity system by 2035, while also considering potential implications to reliability, the market, and supply and transmission costs.

The AESO leveraged the net-zero analysis and incorporated it into a Reliability Requirements Roadmap, which identifies reliability requirements needed to support the current and future supply transformation, including options and action plans to ensure the safe, reliable and economic operation of our electricity system. While the roadmap wasn't scheduled to be formally published until Q1 2023, the AESO proactively commenced a variety of actions to address the highest priority grid reliability challenges that have already begun to emerge as a direct result of Alberta's rapidly changing supply mix and generator fleet composition.

With a clear understanding of the reliability implications of the transformation defined in the report, as we look to the future, we will focus on implementing and executing

on reliability enhancements, and looking at the long-term market implications of the transformation, all while working hand-in-hand with stakeholders and government to ensure a well-supported transition process.

Another accomplishment of note is the successful collaboration between AESO and stakeholders to rebuild a connection process that will be fit-for-purpose. We also initiated work to rebuild an engagement and collaboration process that will effectively support the evolution of the tariff.

I would also like to acknowledge the efficient operation of the sophisticated systems upon which our energy market and power system are based, and the expertise and capability of our IT personnel and system controllers responsible for their 24/7 operation.

Building on our successes in 2022, I look forward to continuing to work with our stakeholders to successfully manage the profound changes we're experiencing today and seeing on the horizon.

Sincerely,

Michael Law
President & Chief Executive Officer



WINTER
(NEW ALL-TIME)
PEAK DEMAND

12,193 MW

ASSESSMENT, ENGAGEMENT AND ALIGNMENT KEY TO ENABLING TRANSFORMATION

OUR PURPOSE

Providing leadership to power Alberta today and into the future

The Alberta Electric System Operator (AESO) is committed to playing a leadership role in enabling the transformation of the province's electricity sector.

At the start of 2022, the AESO's workforce transitioned from the remote environment necessitated by pandemic protocols to a new hybrid environment. The tools, technology and resources introduced to facilitate remote work allowed employees to be even more productive over the past year.

The return to post-COVID conditions was signalled by a resumption of activity and industrial growth across the province, reflected in an increase of average Alberta Internal Load (AIL) by 1.6 per cent over 2021 values. The AESO was well-positioned to support the province's ongoing economic recovery.

Over the past year, we have undertaken critical work associated with the long-term sustainability of Alberta's electricity system, including conducting detailed technical analysis, simulations, modelling

and projections that considered new technologies, changing supply mix, carbon policy, broad electrification and a societal desire for cleaner forms of energy. The AESO's work on Net-Zero Pathways and the Reliability Roadmap in conjunction with stakeholder engagement and input, ensured we maintained our leadership role in enabling the transformation across the electricity value chain that we're already seeing now, and on the horizon.

This *Year in Review* provides a snapshot of how the AESO delivered on our mandate in 2022 by focusing on three strategic areas—delivering value through grid optimization, enabling transformation and energizing people and culture—and continuously improving and strengthening our core business functions.



250 participants in the
Alberta wholesale electricity
market transacted approximately
\$19.9 billion of energy

PROVINCIAL ELECTRICITY DEMAND

86,572 GWh

▲ 1.6% increase from 2021





Delivering Value through Grid Optimization

The AESO is committed to managing cost and ensuring our transmission system delivers value to Albertans. Key to this commitment is our strategic focus on optimizing the use of our existing grid while minimizing or deferring the need for new infrastructure where appropriate.

The Provost-to-Edgerton and Nilrem-to-Vermilion and Chapel Rock-to-Pincher Creek transmission developments were deferred, while congestion forecasts and reaffirmation studies determined that December 2022 was the appropriate time to trigger construction on the Central East Transfer-out project.

The AESO continued to leverage technology to optimize the grid. Testing on a SmartWires pilot project was completed in 2022, with the innovative

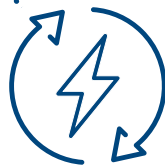
technology—employed for the first time in Alberta—scheduled for deployment in 2023. We also continue to explore the opportunity to dynamically change transmission limits and increase power flow using measurements through Dynamic Thermal Line Ratings, with an aim to implement where feasible in 2023.

The AESO worked extensively with stakeholders throughout 2022 to develop and refine the connection process in response to a growing volume and complexity of projects. The goals of these changes are to reduce red tape, enable shorter project execution timelines, align project execution with AESO capacity, and provide greater efficiency and schedule certainty. The AESO plans to transition to the new connection process in Q3 2023.



276 Projects

▲ 6% increase from 2021



31,138 MW

▲ 28% increase from 2021

In 2022 the **Alberta Reliability Standards Roadmap** was published and the work plan advanced



Enabling Transformation



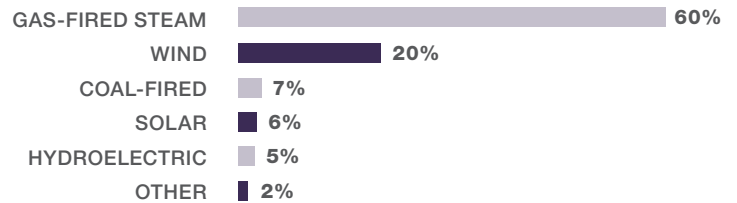
Transformation of the grid is well underway, with electrification of load driven by corporate decarbonization and data centre digitization, a significant increase in renewable generation projects, and a supply mix that is transitioning to gas, wind and solar.

In 2022, the AESO progressed development of a Reliability Requirements Roadmap to identify reliability and operational challenges resulting from Alberta's rapidly changing supply mix and generation fleet composition. Advanced engineering analysis was conducted across critical reliability domains, and action plans were identified.

Another key deliverable was the *Net-Zero Emissions Pathways Report*, the AESO's first report examining the potential pathways and implications related to achieving a zero-emissions electricity system in Alberta.

The AESO continued implementation of Energy Storage and Distributed Energy Resources Roadmaps including the filing, regulatory process and implementation of the rules package developed in 2021. Energy storage rules work was completed in 2022 and will be filed in early 2023.

INSTALLED YEAR-END CAPACITY BY FUEL SOURCE



1,751 MW of renewable **generation capacity was added** to the AESO's supply by year-end, consisting of 1,349 MW of wind and 402 MW of solar



Energizing People & Culture

The AESO has access to credible, accurate and real-time electricity information, and our talent pool is unmatched, with the single largest source of transmission planning expertise in Alberta. In 2022, the AESO reassessed and progressed learning programs to broaden knowledge and acumen across multiple disciplines.

The AESO identified opportunities and augmented development programs through a comprehensive assessment of workforce capability, enhancing the AESO's reputation as an employer of choice.

Our investment in learning and development and our culture of trust, agility, innovation and inclusivity allow the AESO to continue to attract and retain the expert knowledge required to enable the transformation of the industry.

In 2022, the AESO's Inclusion, Equity & Diversity Council developed a Land Acknowledgement and promoted its use among employees as a meaningful way to respect Indigenous Peoples as traditional stewards of the land where we live and work.

Strengthening Today's Core Business

The AESO continues to operate a well-functioning, fair, efficient and openly competitive wholesale market, balancing investor need for clarity and stability of price signals with the need to evolve and progress in response to the transformation of Alberta's electricity system and beyond. Over the past year, work on operating reserve market competitiveness enhancements was progressed, including rule drafting. Other rule updates were completed, and the draft mothball rule was filed in Q4 2022.

The AESO is a data hub for industry, and we are committed to facilitating industry innovation and consumer optionality to enhance efficiency and enable new business models. In 2022, we launched the first iteration of the Current Supply Demand (CSD) Dashboard on the new External Data Portal, which provides a new way to visualize and access key AESO data such as Alberta Internal Load and Pool Price.

The transmission system must continue to evolve and remain resilient in the face of evolving challenges, including increasing levels of renewable generation and distributed resources, electrification of the transportation system, climate change and cyber threats.

In 2022, the AESO is focused on enhancing system frequency response, ensuring extreme event preparedness, assessing future reliability needs as supply transforms, assessing need for climate adaptation plans, and enhancing cyber security capabilities.

Collaborating with stakeholders to prioritize and coordinate the resolution of key issues that are within the AESO's mandate, and of importance to industry and Albertans, remains a priority. In 2022, the AESO successfully streamlined engagements, with the objective of reducing the volume of engagements overall and focusing on those that were the most important.

Engagement priorities in 2022 included the Budget Review Process, Net-Zero Emissions Pathways, Alberta Reliability Standards Development & Monitoring, Energy Storage Rules Amendment and Changes to the Connection Process. The AESO also launched a new engagement platform in 2022 that provides more flexible options for providing feedback, dynamic online engagement tools, visualization of end-to-end engagement project lifecycles, and direct stakeholder management of their own content.



2,300
STAKEHOLDERS
ENGAGED



46 sessions
▼ decrease of 20 from 2021

LOOKING FORWARD

In 2023, enabling and leading the transformation continues to be the AESO's key focus.

We will facilitate the development of solutions for both large and small consumers in managing the rising cost of delivered energy, while balancing diverse stakeholder interests. Grid reliability remains our top priority, and we will work closely with industry to identify and address the risks, challenges and implications of our changing system.

The AESO will foster market fidelity and investor confidence through the transformation, addressing the impacts to the market of an influx of renewables on the system and the potential pathways to net-zero.

The AESO will continue to efficiently and effectively deliver on our internal and external business initiatives to create value for stakeholders and the province as a whole. We are committed to demonstrating to Albertans that they can look to our organization for electricity industry leadership, and that they can be confident the transmission system and electricity framework continue to be managed efficiently and reliably, every day.

