

Technology Adoption and Innovation Focus: Manufactured Capital Management

Technology and innovation are an existing and increasing focus at TransAlta. As we navigate significant macro changes from energy transition, the impacts of climate change and decarbonization, and the continued rise of digital technology, automation and artificial intelligence, we are proactively applying technology solutions across our business. Our conversion of coal units to gas is an excellent example of utilizing useful manufactured capital or infrastructure. We also continue to adopt and apply innovative solutions to meet customer demand for power.

Innovation: Idea Generation and Project Management

Project Greenlight has been a key driver in ensuring the Corporation continues to provide year-over-year improvements in innovation. The program is focused on bottom-up innovation, which means ideas are generated by employees. Emphasizing bottom-up innovation across the Corporation has resulted in a strong culture of idea generation, where employee ideas are developed and advanced into business cases, adhering to project management best practices to ensure the delivery and success of the initiative.

Another initiative we promote is the Supplier Innovation Series, which brings in guest speakers from outside TransAlta to discuss innovation. This includes thought leaders on new technologies to discuss conceptual ideas that initiate creative thinking and suppliers that provide insight into commercial applications of evolving technologies. In 2020, the topics discussed included artificial intelligence, virtual and augmented reality, robotic welding, the connected workforce, design thinking and innovation in safety. Subsequent to each session, small employee-led workshops consolidate ideas to further flesh out and drive new Greenlight initiatives.

Key priority practices addressed by the Supplier Innovation Series:

- Creativity and entrepreneurial thinking;
- Bottom-up innovation;
- Knowledge sharing; and
- Capturing external ideas.

For further details on our investment in our workforce, please see the Talent and Employee Development section of this MD&A.

Innovation: Infrastructure Innovation

In 2015, the Government of Alberta introduced regulations designed to end coal-powered generation in the province by 2030. A number of our coal facilities had useful lives beyond 2030 and could be converted to use natural gas. We are planning to convert or repower Alberta coal units to natural gas in the 2020 to 2023 time frame. Our Sundance 6 facility has recently been converted to gas. Through our conversion to gas and the repowering of Sundance 5, our energy use, GHG emissions, air emissions, waste generation and water usage will significantly decline. Repurposing the facilities rather than decommissioning them supports the concept of reuse and aligns with the UN's SDGs, specifically "Goal 9: Industry, Innovation and Infrastructure."

Innovation: Applied Technologies

TransAlta has been at the forefront of innovation in the power-generation sector since the early 1900s when we developed hydro assets. We have been an early adopter and developer of wind technology in Canada and are now one of the largest wind generators in the country. Today we run a Wind Control Centre that monitors, to the second, every wind turbine we operate across North America. In 2015, we made our first investment in solar technology with the purchase of a 21 MW solar facility in Massachusetts and in 2020 we installed the first utility-scale battery in Alberta at our Summerview II wind facility. From 2000 to 2020, we have grown renewables capacity from approximately 900 MW to over 2,500 MW.

As we balance growth with decarbonization, we continue to seek solutions to innovate and create value for investors, society and the environment. This is evidenced by our continued execution of the accelerated conversion to gas plans, construction of the 207 MW Windrise wind project located in Alberta, and investment in the 137 MW Skookumchuck wind facility in Washington State. In 2020, we also acquired a contracted 29 MW cogeneration facility in Michigan. Cogeneration is recognized by regulatory bodies for its efficient generation of power when compared to other forms of natural gas power generation. It reduces the natural gas required by industrial processes by generating high-efficiency steam and power versus a boiler and grid supply approach. The distributed system also provides independence from the power grid and avoids the need to construct additional transmission lines.

We are also investing in battery storage. TransAlta began commercial operations of Alberta's first utility-scale lithium-ion battery storage facility, called WindCharger, on Oct. 15, 2020. This project is unique as it uses TransAlta's existing Summerview II wind facility to charge the battery, allowing WindCharger to be a truly renewable battery energy storage system. The project uses Tesla technology and has a nameplate capacity of 10 MW with a total storage capacity of 20 MWh. TransAlta received co-funding for this project from Emissions Reduction Alberta. The potential exists for the expansion of this technology, and we are investigating the viability of battery storage at our various wind facility locations and for use in developing customer-specific energy supply solutions.

Our teams continuously explore the use of applied or new technologies to find solutions to expand or adapt our fleet in an ever-changing world. This helps protect our shareholder value and maintain delivery of reliable and affordable electricity. We know that new technologies will emerge over the next number of years as the industry continues to drive towards lower emissions while maintaining a reliable and affordable product for customers. Our teams continue to be involved in assessing emerging technologies such as hydrogen and carbon capture and storage as well as the development of bespoke behind-the-fence solutions for customers using a combination of technologies such as renewables and batteries. The following are further examples of how we have developed innovative solutions to optimize and maximize value from our fleet:

Operations Diagnostic Centre

TransAlta has run its Operations Diagnostic Centre ("ODC") since 2008. The ODC monitors coal-fired, gas-fired and wind generating assets across Australia, Canada and the US. A centralized team of engineers and operations specialists remotely monitors our power facilities for emerging equipment reliability and performance issues. ODC staff are trained in the development and use of specialized equipment monitoring software and they apply their experience to power facility operations. If an equipment issue is detected, the ODC notifies facility operations to investigate and remedy the issue before there is an impact to operations. This support is critical to reliability and performance of our operations. By way of example, if a wind turbine starts to underperform compared to others, our operation team is notified and will work to investigate and remedy the issue. The monitoring, analysis and diagnostics completed by the ODC are focused on early identification of equipment issues based on longer-term trend analysis and complements day-to-day facility operations.

Data & Innovation

TransAlta created the Data & Innovation team in 2019 to modernize its data infrastructure to take advantage of new opportunities in analytics and artificial intelligence. The Data & Innovation team is cross-functional, composed of data architects, data scientists, data analysts, software developers, engineers, project managers, and financial and systems analysts. The team focuses its efforts on the delivery and enhancement of TransAlta's Modern Data Architecture, the rapid delivery of data-driven applications, the design and implementation of machine learning and artificial intelligence models and the advancement of process automation through the Robotic Process Automation Centre of Excellence. In 2020, the Data & Innovation team worked with partners across the business to create new tools and processes that improve our financial position and return capacity to our people. A few of the highlights from this work include:

- GenOS, an innovative new platform where data is used to drive the actions of our assets and the decisions of our people, piloted with Wind Operations. This pilot project combines data and analytics from a variety of sources into one central web application and creates new opportunities to drive further adoption of automation across our operations; and
- Industry partnership with AltaML Applied AI Lab, a groundbreaking initiative that focuses on building and expanding local talent while improving our business through the application of machine learning and artificial intelligence.