# IGNITE

Scovan, Energy Solutions | December 2023 Volume 7

Scovan

## CANADIAN CCS LEADERSHIP IS KEY TO A SUSTAINBLE FUTURE

Shaping Tomorrow's Leaders at the Haskayne MBA Case Competition

Q & A with Eavor Technologies Inc.

# IGNITE

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**Call for artists:** Scovan is looking for a local Indigenous artist to feature in a future issue of IGNITE. Submit your name to Lindsay.Hill@scovan.ca

# FOREWORD

BY KELLY MANTEI, VP OPERATIONS, SCOVAN

In the ever-evolving landscape of the energy sector, we find ourselves at a pivotal juncture. It is a time marked by transformation, where we stand at the crossroads of tradition and innovation. The gap between present-day practices and the vision of a net-zero future is vast. To remedy this, we must balance today's energy needs with tomorrow's aspirations by harnessing the knowledge and technology at our disposal to chart a course that ensures energy security while safeguarding our planet.

Carbon capture and other decarbonization strategies emerge as the front runners in this journey. They hold the promise of mitigating our environmental footprint, reducing emissions, and fostering a sustainable energy ecosystem. However, they also underscore the issue of resource allocation, where careful planning and cooperation are essential.

Funding and economic challenges also loom, requiring innovative solutions to drive projects forward. The road ahead is not devoid of difficulty, but it is one that we must navigate with resilience and adaptability, recognizing that the future depends on the choices we make today.

In this pursuit of a sustainable future, Western Canada's energy sector is leading the way in sustainable energy solutions. Through vision and determination, we are forging the path ahead for others to follow. It is a testament to the power of collaboration, innovation, and the unyielding entrepreneurial spirit that has contributed to Alberta's success, time and time again.

The pages ahead are a collaborative effort, bringing experts and thought leaders together to help navigate the oil and gas industry's transformation. Together, we have the power to steer the energy industry toward a future that is not only economically viable but environmentally responsible. ***Let the journey begin.***



# LAND ACKNOWLEDGEMENT

In the spirit of respect, reciprocity and truth, we honour and acknowledge the traditional Treaty 7 and Treaty 6 territories in which our Scovan community lives and works.

Treaty 7 territory—the traditional and ancestral territory of the Blackfoot Confederacy: Kainai, Piikani and Siksika as well as the Tsuu T'ina Nation and Stoney Nakoda First Nation. Treaty 6 territory—the traditional and ancestral territory of the Cree, Dene, Blackfoot, Saulteaux and Nakota Sioux.

We acknowledge that this territory is home to the Métis Nation of Alberta, Regions 2, 3 and 4 within the historical Northwest Métis homeland. Finally, we acknowledge all Nations – Indigenous and non – who live, work and play on this land, and who honour and celebrate this territory.

As Scovan progresses our ESG plan we renew our committment to creating sustainable relationships with Indigenous communities wherever we operate.

**Call for artists:** Scovan is looking for a local Indigenous artist to feature in the next issue of IGNITE. Submit your name to Lindsay.Hill@scovan.ca


# LEADING THE WAY IN OILFIELD INNOVATION

**BY PHIL HENDERSON, PADX PROGRAM MANAGER, SCOVAN**

Conceived nearly a decade ago and put into practice through the establishment of PadX Partnership two years ago, our vision for the PadX well pad solution is rooted in the commitment to drive progress and create opportunities within the industry. PadX sets out to deliver maximum value to producers through an innovative, standardized, modular, and streamlined well pad approach. However, as with any technology, there is always room for improvement. At Scovan, we are dedicated to continuously refining our SAGD modules to meet the ever-evolving needs of our clients.

In recent years, Scovan has made significant strides in enhancing our PadX well pad module design. We are proud to announce that we have successfully executed our first PadX modules, including the completion and delivery of the Strathcona D08 project, consisting of five well pairs, is currently steaming with the use of our innovative PadX technology. The MEG MD project, which features nine well pairs and one Balance of Pad (BOP), is also in progress, and we have initiated a PadX installation for Connacher's Algar project, made up of five well pairs and one BOP.

One key factor that has contributed to our success is our new operational philosophy. By actively listening to and addressing the concerns of our consortium clients, we have developed a roadmap for continuous product improvement. This includes the implementation of a change management process to identify, incorporate, and execute necessary improvements.

To ensure efficient and effective execution of these improvements, we have also appointed a new product development program manager and created a clear accountability structure through our PadX accountabilities chart and RACI (Responsible, Accountable, Consulted, Informed) matrix. Additionally, we have adopted EOS (Entrepreneurial Operating System) and traction processes specifically for PadX, setting a clear three-year vision for the program and aligning internal priorities across all business units.

Moreover, we are constantly advancing the PadX program to provide offerings to address the unique needs of different operating conditions, such as gas lifts and slant wells. This utility expansion has also caught the attention of other industry players, leading to an increase in sales beyond our initial partnerships.

At Scovan, we are committed to integrating lean manufacturing principles in all aspects of our business. This includes early value stream mapping, which has allowed us to identify and optimize our assembly line process for SAGD module production. Through experience and continuous improvements, we have also updated our targets and set a competitive sales price for our modules.

Our dedication to innovation has also resulted in a pending patent for our PadX technology in Canada. With over 100 well pair implementations in sight, we are continuously enhancing our program with the goal of releasing PadX 2.0 in 2024. Through these efforts, we have developed net present value calculations that have identified a potential improvement of up to 30% on total well pad cost.

As part of our commitment to sustainability and environmental responsibility, we have implemented our veritree program on all PadX projects. With every purchase of PadX, clients can participate in a reforestation program that offsets the footprint of their well pad project. Through veritree, we are able to restore our planet. We are creating local jobs, sequestering carbon and restoring ecosystems together. This means that Scovan is not only building well pad modules but we are also creating a PadX Forest through our partnership with veritree.com.

Through our continuous improvement efforts, supply chain partnerships and flexible commercial models, we strive to provide our clients with the most efficient and cost-effective solutions for their needs. We look forward to further developments in this ever-evolving industry and are devoted to remaining leaders in SAGD technology.

Scovan is further developing artificial intelligence and operational optimization for PadX. The short-term victory is improved efficiency and automation of engineering deliverables. The long-term opportunity is creating a digital platform that plans, measures, predicts and optimizes performance to reduce emissions and make you more money.

We doubled down on our investment into industry programs like PadX. Our first version 1 PadX modules have come off the line and are in field production. This program has more importance now than ever before through standardization, securing of long lead equipment, agility in execution, reduced pricing, allowing everyone to elevate their most precious commodity – people to solve more pressing challenges, and shorter project timeframes.

As a natural bolt on technology to PadX, Hip Vap's commercial demonstration of our revolutionary Produced Water Boiler technology is successfully generating steam. Scovan is committed to continuing to challenge the business of energy through new technology development and improving the long-term success of your projects. Our vision is to play a significant role in the current and future success of the energy industry. Scovan is being intentional to create an organization that meets the needs of today and the opportunity of tomorrow. Thanks for being part of it.

> In today's competitive job market, where skilled professionals hold a significant advantage, businesses face distinct challenges when acquiring and retaining top-tier talent.



# STRATEGIC HIRING IN AN EMPLOYEE MARKET

BY SAMANTHA LEES, HUMAN RESOURCES COORDINATOR, SCOVAN

In today's competitive job market, where skilled workers have the upper hand, businesses face unique challenges when it comes to hiring and retaining top talent. To stay competitive and thrive in an employee's market, Scovan adopts a strategic approach which emphasizes the importance of having the Right People in the Right Seats. Further, it is instrumental that when selecting the right candidate, we are leveraging our core values; Figure It Out, Disrupt for the Better, Work Hard, and do all of those things with Good Vibes and Great Energy.

**Right People:** In a talent-driven job market, the competition for skilled individuals is fierce. When it comes to hiring, Scovan does not only prioritize technical skills but also places a significant emphasis on cultural fit, good character and alignment with our core values. Employees who resonate with our culture seem to be more engaged, motivated, and committed to Scovan's vision and targets. The equation is simple; engaged employees are less likely to be a flight risk.

**Right Seat:** Strategic hiring involves capitalizing on the employee's greatest strengths, skills, and passion. At Scovan, each quarter we evaluate each employee to ensure they occupy a role that they understand, are genuinely motivated to do their job and have the resources to fulfill their responsibilities effectively. By evaluating candidates through the 'Get it, Want it, Capacity' framework, Scovan is able to make informed decisions that go beyond qualifications, fostering a team of individuals who not only have the skills but also the desire to contribute wholeheartedly to the company's success.

Core values are a magnet for top talent. At Scovan we prominently display and live through our core values, which we believe attracts the right candidates to our organization. While skills and qualifications are important, character is often the distinguishing factor between good hires and great hires. In an employee's market, it is crucial that we recognize that you can train and develop skills, but character is intrinsic to an individual. Hiring candidates with strong character and their values align with ours, ensures that Scovan can adapt to the ebbs and flows of the oil and gas industry.

In a competitive market, retaining employees is as important as hiring. At Scoven, we focus on creating a collaborative and fun environment where employees are recognized and rewarded for their efforts. We have social gatherings, committees, and initiatives such as Cheers for Peers where employees can celebrate their team-mates for small yet impactful things that they do every day. By focusing on efforts such as these and core values, we are able to create an environment where employees feel connected and valued, which ultimately has led to our success.

Scovan is able to thrive in an employee's market because we strategically hire the right people for the right seats, and use our core values to guide us in selecting the strongest candidate. ■

# MANDATORY REPORTING IN WESTERN CANADA: CHALLENGES AND OPPORTUNITIES

BY JOÁNRI DUURSEMA, MANAGER SPECIAL PROJECTS, ENSERVA

In recent years, there has been a growing movement towards mandatory corporate reporting on environmental, social, and governance (ESG) factors. This movement is being driven by a number of factors, including increasing investor focus in ESG factors, growing public concern about climate change and other sustainability issues, translating to governmental pressure to improve corporate social responsibility.

This can be seen in the recent reporting requirement changes in the Corporate Sustainability Reporting Directive (CSRD) in the European Union that will expand the pool of companies required to report by more than 400% and will include North American companies that operate in the EU and meet certain criteria. In Canada, the Canadian Securities Commission is similarly exploring expanded mandatory reporting, with the Alberta Securities Commission (ASC) and British Columbia Securities Commission (BCSC) both announcing plans to implement mandatory ESG disclosure requirements for listed companies. The ASC's requirements will come into effect in 2023, while the BCSC's requirements will come into effect in 2024.

As many have already experienced, mandatory reporting in Western Canada is a complex issue with both challenges and opportunities. While these challenges are significant, many companies have also taken up the challenge in creative ways, showing the innovation and resiliency that exists within the people, communities, and companies in the Canadian Energy sector.

## Opportunities

Mandatory reporting presents several opportunities spanning all areas of business. According to a study by the Harvard Business School, companies that embrace ESG principles outperform their peers on financial metrics such as return on assets, return on equity, and return on invested capital. Another study by the University of Oxford, found that companies with good ESG performance are less likely to experience bankruptcy and have lower costs of capital. In Canada, a study by the Canadian Chamber of Commerce also found that mandatory ESG reporting could create up to 100,000 new jobs and boost the economy by $100 billion over the next decade. On a day-today basis, companies may also see reduced insurance costs, access to capital to support new 'green' projects, and better staff retention and engagement.

## Challenges

Despite these opportunities, there are also significant challenges to generalised mandatory emissions reporting, especially where the criteria will be implemented in a very short timeframe.

One of the biggest challenges is the lack of standardised reporting requirements and industry-informed reporting requirements. There are a number of different ESG reporting frameworks, and each one has its own set of requirements, many, if not most, of which were developed in the absence of comprehensive consultation with not only large production companies, but also the unlisted companies supplying and supporting them. As a result, businesses may likely be put in a position of complying with one standard and arbitrarily not complying with many others.

The cost of that arbitrary non-compliance may include the loss of financing option, insurance for new or current projects, as well as secondary negative impacts on share prices. All of these are materially high costs for arguably very little proven movement towards the UN SDG emissions targets.

Another significant challenge is the cost of compliance. Mandatory reporting requires businesses to collect and report data on their environmental, social, and governance (ESG) performance. This can be a time-consuming and expensive process, especially for smaller businesses.

## The importance of First Nations engagement and development

First Nations peoples in Canada have a long history as stewards of the land, water, and traditional knowledge and practices from those communities are inspiring new ways to engage sustainably not only with the land and waterways, but also with the communities who make their homes there. This critical opportunity to recognise and support the continuing work with First Nations communities by, among others, resources industries, is not recognised in the current form of mandated reporting.

One of the key lessons that we can learn from First Nations peoples is the importance of taking a long-term view of sustainability. This has been recognized by many First Nations communities in Canada and some, like the National Coalition of Chiefs have even gone so far as to translate these principles, and others, into suggested engagement criteria that can be used to expand the currently limited view of sustainability. Mandated reporting, if intended to function as a tool to measure the impact of emitting industries, must account for overall impact beyond base emissions.

## Case Studies

Despite these challenges, many companies have already started innovating to decrease their impact and improve the environments in which they operate. Examples of this can be seen in Secure Energy's large abandonment, remediation, and proclamation projects for pipelines and wells in Western Canada as part of the Alberta Site Rehabilitation Program.

Another such project is one with Pimee Well Services, owned by six First Nations, including Frog Lake in northeastern Alberta, to reclaim wells in and around First Nations and Métis Settlements while making use of allocated federal funding.

A Calgary start-up, Carbonova, is building a facility to make carbon nanofibers from captured CO2 and methane. The resulting material is slated to be lighter, stronger, and more flexible than steel, and has potential uses in batteries, electric vehicles, concrete, tires, reinforced plastics, semiconductors, among others.

## Conclusion

Mandatory reporting for ENSERVA members in Western Canada is a complex issue with both challenges and opportunities. The conversation around a more sustainable future is one that everyone should be active participants in to create a future that we can all work and thrive in. It also needs to be a broader conversation, not just about emissions – but more broadly about the total impact.

By engaging actively with traditionally high-emitting industries to create and enforce properly consultative and informed standards, the opportunity for incredible innovation within those industries to create solutions few others can, will be enabled.

Scovan is committed to its ESG strategy and making a positive impact on our environment and our community.

## In-Text References


- Lomborg, B. (2007). COOLING: A global warming wake-up call. London: Constable.
- Gates, B. (2021). How to avoid a climate disaster. Allen Lane.


## Footnotes

- [1] According to a recent study by McKinsey & Company, ESG-compliant companies outperformed their non-compliant peers by 2.4% on average over the past five years.
- [2] A recent survey by Deloitte found that 75% of consumers are willing to pay a premium for products and services from companies that are committed to sustainability.

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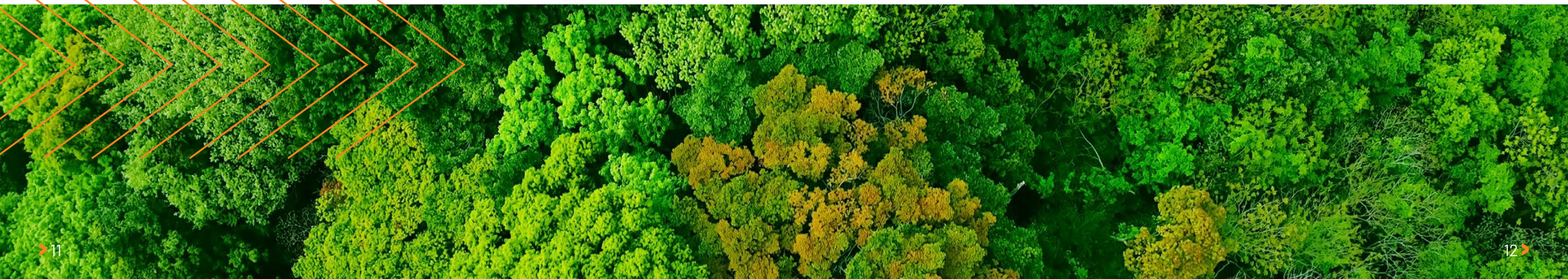





# SCOVAN SHINES IN CORPORATE CHALLENGE 2023!

***We applaud the hard work of all Calgary Corporate Challenge teams, companies, and sponsors who helped raise funds for several non-profit organizations like the Heart and Stroke Foundation. Our team placed 8th out of 29 teams in the Green Division, securing nine top-6 finishes and four medals. Thank you to our 12 captains and 54 participants, with representation from every department, including many first-time players.***

# CARBON CAPTURE AND STORAGE – ASSESSING THE SUBSURFACE

BY BRAD HAYES, PH.D, P.GEOL., PRESIDENT, PETREL ROBERTSON CONSULTING LTD.

Carbon Capture and Storage (CCS) stands as a pillar in Canada's strategy to mitigate its net greenhouse gas emissions. With a strong track record as a global leader in the operation of CCS facilities, Canada possesses the necessary tools and expertise to foster substantial industry growth.

The optimal conditions for effective carbon capture are found in locations where carbon dioxide can be extracted from high-concentration gas streams, notably within refineries, cement plants, waste-to-gas facilities, and various industrial sites. The keys to success revolve around identifying and characterizing subsurface reservoirs possessing the necessary geological characteristics for secure CO2 storage spanning millions of years.

As depicted in Figure 1, the ideal subsurface scenario for carbon storage contains porous and permeable rock formations characterized by abundant pore space to store CO2 and high permeability, facilitating the swift injection of CO2 (see Fig. 2). It is worth noting that these characteristics closely resemble those of promising oil and gas reservoirs, giving Western Canada a substantial advantage, as explorations of the subsurface have persisted for well over a century.

These reservoirs are naturally full of fluids, whether hydrocarbons or saline water. When introducing CO2 into these reservoirs, the existing fluids must either be compressed or displaced. Depleted oil and gas reservoirs, where oil and gas have already been extracted, are ideal targets due to their known pore space availability. The search is focused on substantial, contiguous volumes of reservoir rock, enabling large-scale CO2 injection into each wellbore without encountering obstructive subsurface impediments.

The most suitable sequestration reservoir is situated at depths exceeding 800 meters, where CO2 resides in a supercritical phase, combining the density of a liquid with the low viscosity of a gas. This unique state allows for efficient packing of CO2 into pore spaces and facilitates its movement.

Geologists are essential in identifying effective sealing rock layers above the sequestration reservoir. These layers, with minimal porosity and permeability, serve as barriers, confining injected CO2 deep within the reservoir. Geomechanical analyses are indispensable in ensuring the integrity of these sealing rocks, especially as they are exposed to changing subsurface pressures during injection.

Under stringent standards, engineers drilling sequestration wells must safeguard shallow freshwater reserves from contamination from deeper reservoirs or drilling fluids (see Fig. 1). This precautionary measure underscores the responsibility associated with subsurface operations involving fluids from deep reservoirs.

## CCS Projects in Canada

The landscape of CCS projects in Canada is vibrant and expanding. Currently, 25 carbon hub projects have gained approval from the



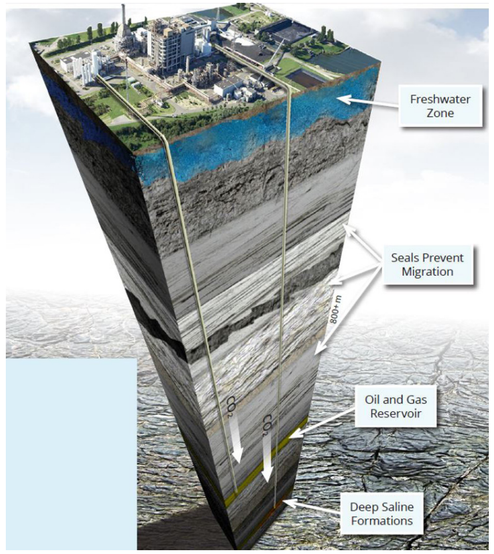



**Figure 1.** Block diagram illustrating the relationship between deep saline formations for CO2 storage, shallow freshwater aquifers and surface facilities (PCOR Partnership Atlas, Energy & Environmental Research Centre, 2021)

Alberta government. A notable initiative in the Cold Lake region, led by the Pathways Alliance — a consortium of oilsands operators, involves the assessment of the Basal Cambrian sandstone as a storage medium for CO2 from oilsands projects. This initiative is set to commence by 2030, buoyed by the impressive performance of the Shell Quest project, injecting millions of tonnes of CO2 into the Basal Cambrian near Edmonton for over seven years.

Further south, the Alberta Carbon Trunk Line plays a crucial role, transporting emissions from the Industrial Heartland to the Clive area near Red Deer. The CO2 is injected into oil reservoirs within the Leduc Formation. Extensive geological and engineering analysis guides this endeavour to enhance oil recovery and increase oil extraction efficiency.

The Aquistore project in Saskatchewan is pivotal; CO2 from the Boundary Dam coal-fired power station is sequestered in another Basal Cambrian sandstone reservoir. British Columbia is also on the CCS map, with the Clarke Lake Gas Field being assessed for its capacity to store CO2.

Across Canada, diverse industrial operations require CCS to reduce their carbon emissions. However, regions that don't have a history of oil and gas drilling lack the necessary knowledge about the subsurface. Recognizing this, Natural Resource Canada (NRCan) and other institutions are allocating resources to research projects to bridge these knowledge gaps. Nonetheless, it will be several years before we can conclusively determine the existence of substantial potential in these regions.

Scovan is working with clients in Western Canada on early-stage feasibility and FEED studies for CCUS applications. As these technologies continue to advance, Scovan is poised to provide expertise in the complex applications of Carbon Capture and sequestration.

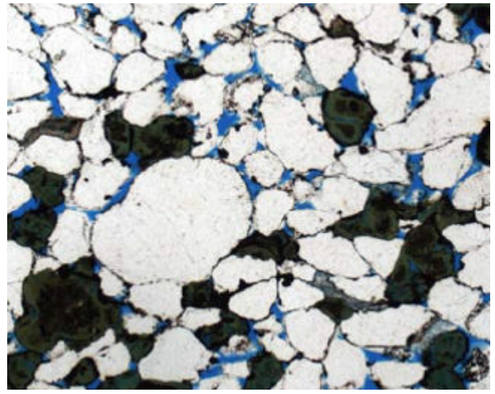


**Figure 2.** Photomicrograph of Basal Cambrian sandstone, cut and polished so thin that light can pass through it. Under a microscope, we see individual sand grains (in white) up to 0.5mm across and blue pore spaces where fluids like CO2 can be stored. This rock has a porosity of about 12%, and the pore spaces are well connected in three dimensions, making it highly permeable.

# THE CANADIAN OIL SANDS ENTERS AN ERA OF OPTIMIZATION

**BY CELINA HWANG, DIRECTOR, NORTH AMERICAN CRUDE OIL MARKETS, S&P GLOBAL COMMODITY INSIGHTS**

Canada has over 100 years of history in crude oil production and today is the fourth largest producer in the world at nearly 5 million barrels per day in 2023. Western Canada produces 95% of the oil, two thirds of which comes from the oil sands, with the remainder being produced offshore in eastern Canada. S&P Global Commodity Insights anticipates that Canadian crude oil production will reach nearly 5.5 million b/d by 2030— largely due to growth from the oil sands.

The Canadian oil sands has entered a new phase of its development – an era of optimization. The modern oil sands industry started with the Great Canadian Oil Sands mine producing its first oil in 1967. By the end of the century, production reached half a million barrels per day. In 2001, the first commercial steam-assisted gravity draining (also known as "SAGD") oil sands facility came online, starting a new period of oil sands production – one based on new construction and expansion. Between 2001 - 2020, oil sands production grew rapidly, reaching 2.8 million barrels per day, fueled by construction of greenfield oil sands sites and later brownfield expansions. However, since 2020, the industry began entering yet another era – one where production growth comes primarily from optimization of existing assets. By the end of this decade, S&P Global Commodity Insights expects oil sands production will reach 3.7 million barrels per day, making the oil sands the sixth largest producing region globally.

As oil sands crude production has grown, so has the demand for pipeline export capacity. Western Canadian oil production is remote, and product must travel long distances to end markets across North America. In response, pipeline capacity expanded—growing nearly 2.2 million barrels per day between 2007 and 2023. However, the increase in pipeline capacity was not always able keep up with demand, resulting in a volatile western Canadian crude price. The most infamous example occurred in late 2018, when production growth outpaced available pipeline capacity — combined with a temporary drop in heavy crude demand — the western Canadian oil price fell drastically from approximately C$40/b to C$18/b in two months. However, since 2018 nearly 875,000 b/d of incremental export pipeline capacity has been added, including Enbridge's Line 3 Replacement Project in late 2021. By early 2024, an additional 590,000 b/d of pipeline capacity should come online with the startup of the Trans Mountain Pipeline Expansion. We estimate these additions coupled with potential for further optimization of existing pipelines could lead to stabilization of the western Canadian crude price.

Both downside and upside risks to the production outlook could tip this anticipated balance. Downside risks that could impact production include tighter capital discipline requirements from investors and emissions policies that could put further investment in the industry at risk should environmental mandates prove to be too stringent. An upside risk is that the industry's productivity could increase more than expected via optimization projects. Because these projects develop organically throughout the industry, their production impacts are challenging to forecast. Additionally, steam displacement technologies could provide another source for unanticipated production growth. This technology reduces steam demand per unit of output in the oil sands, lowers emissions, but also frees up steam to be redeployed to grow production at new wells. The upside production growth potential is not infinite, though. In the near future, capital may be pulled away from oil sands projects and towards the advancement of several large-scale decarbonization projects, such as carbon capture and storage.

Scovan's Innovation Center is developing products that can improve the optimization of SAGD assets, reduce carbon emissions, and help propel the industry forward.

**Source:** S&P Global Commodity Insights, ©2023 by S&P Global Inc.

# EFFICIENCY UNLEASHED: REVERSE OSMOSIS AS AN ESSENTIAL TOOL FOR SUSTAINABLE STEAM GENERATION IN ALBERTA'S SAGD OPERATIONS

BY PATRICK PERERA, P.ENG, PROJECT ENGINEER, SCOVAN

**Steam-Assisted Gravity Drainage (SAGD) stands as a widely embraced technique for heavy oil extraction in Canadian heavy oil assets. However, the efficacy of this method heavily depends on water availability. In light of escalating concerns regarding water scarcity and environmental sustainability, the integration of advanced technologies for oil extraction becomes imperative. This article delves into the pivotal role of Reverse Osmosis (RO) in providing makeup water for SAGD operations and explores the innovative HipVap and Orsil technologies as complementary solutions aimed at reducing water usage.**

## The Water Challenge in Oilsands Operations

Water availability is a perpetual concern, and as thermal operations seek expansion, the judicious use of this invaluable resource becomes even more critical. The report "Facts About Water in Alberta" highlights challenges in the province's water supply due to climate change, population growth, and industrial demand. According to the Alberta Water Portal Society, 21% of the population relies on groundwater for drinking. Given this context, it is imperative for oil-producing companies to adopt sustainable practices that minimize water consumption while maximizing oil recovery.

## Embracing the Brackish Water Renaissance

Reverse Osmosis technology emerges as a crucial player in SAGD oil production, offering an efficient means to treat and purify brackish water, supplementing produced water in steam generation. Through RO, thermal operations can exclusively rely on subsurface brackish aquifers that, without treatment, are unfit for various industrial applications, thereby enhancing the industry's environmental sustainability and its impact on water conservation.

## The Scaling Solution

RO operates by utilizing a semi-permeable membrane to eliminate impurities, salts, and contaminants from water, generating high-quality, low-TDS (Total Dissolved Solids) water suitable for steam production. By treating brackish water before entering steam generators, RO mitigates scaling and fouling, enhancing efficiency and prolonging the lifespan of steam generation facilities.

## Sustainable Operations Through Synergy

The integration of a brackish water RO system with Scovan's proprietary produced water technologies, such as HipVap and ORSIL, proves to be a clever and cost-effective approach for thermal operators to enhance their environmental stewardship.

## Efficiency Economics

By leveraging untreated produced water, HipVap's steam generation technology reduces the complexity and space required for traditional equipment, producing SAGD quality steam. ORSIL's on-site blowdown technology allows operators to increase water recycling and reduce disposal volumes by concentrating an off-site landfill-safe by-product, reducing the number of off-site trucking loads.

## Navigating Regulatory Waters

RO technology facilitates the use of brackish groundwater, minimizing the draw from near-surface freshwater aquifers and surface water, allowing operations to stay economically within source water limits. The use of RO, coupled with advanced technologies like HipVap and ORSIL, demonstrates a commitment to sustainable practices, aligning with the growing environmental consciousness in Canada and beyond.

## Conclusion and Call to Action

Canadian oil sands have pioneered some of the most environmentally sustainable production methods globally. In a world where water scarcity and environmental sustainability are paramount concerns, it is essential for thermal operations to normalize technological solutions like RO. The industry must continue advancing and collaborating with technology providers such as Scovan to discover innovative ways to improve SAGD operations. Scovan achieves this through reverse osmosis projects and the development of new technologies, such as HipVap and ORSIL, reducing water usage, enhancing SAGD operation efficiency, and demonstrating a commitment to environmental responsibility. Together, we can ensure a brighter and more sustainable future for Canada's oil industry. ■

# CANADIAN CCS LEADERSHIP IS KEY TO A SUSTAINABLE FUTURE

**BY JAMES FANN, VICE PRESIDENT OF BUSINESS DEVELOPMENT AND CORPORATE AFFAIRS, INTERNATIONAL CCS**

The quest to establish a carbon-neutral world presents Canadians with a formidable challenge, given the energy-intensive nature of our lifestyles and our economy's reliance on emissions-intensive industries that supply essential products and resources in high demand globally. The urgency of this matter is underscored by our national climate objectives, which aim to reduce greenhouse gas emissions by one-third by 2030 and achieve net-zero emissions across the nation by 2050.

Thankfully, many technologies essential for achieving these goals are already operational in Canada. One noteworthy solution in which we hold a position of global leadership is Carbon Capture and Storage (CCS). Canada's influence in this field exceeds its relative size, housing five of the world's 37 operational commercial CCS facilities and accounting for approximately 15 percent of the world's current CCS capacity, even though our nation contributes less than two percent of global $CO_2$ emissions.

CCS projects in Canada have securely stored over 47 million tonnes of carbon dioxide, equivalent to removing more than 10 million cars from our roads. These achievements can be attributed to initiatives such as SaskPower's Boundary Dam Unit 3 CCS facility, the world's first CCS facility on a commercial power plant, which has captured more than 5.5 million tonnes of $CO_2$ since 2014. Similarly, the Quest CCS facility, operated by Shell, has effectively sequestered over 7 million tonnes of $CO_2$ from the Scotford Refinery near Edmonton since 2015. Further along the CCS value chain, our extensive expertise in process engineering, reservoir geology, and pipeline development played a pivotal role in constructing the world's largest-capacity $CO_2$ pipeline, the Alberta Carbon Trunk Line, and the most extensive storage project for anthropogenic $CO_2$ in the Weyburn-Midale oil field of southeast Saskatchewan, where more than 38 million tonnes of $CO_2$ have been securely and permanently stored since 2000.

Boundary Dam Unit 3 CCS facility at SaskPower's Boundary Dam coal-fired power plant near Estevan, Sask. (the world's first CCS facility on a power plant).

Canada is primed to lead the next wave of carbon capture projects and reap substantial benefits from the imminent CCS boom. We have favourable geological conditions for safe underground $CO_2$ storage, a skilled workforce, robust cleantech innovation programs, world-class regulatory procedures, and government incentives to encourage investments. Leveraging these assets is pivotal to unlocking the opportunities that accompany the significant expansion of CCS within Canada and on a global scale.

Under Canada's existing federal emissions reduction plan, national CCS capacity is projected to triple by 2030, reaching at least 15 million tonnes annually. However, the Canadian Energy Regulator's latest long-term outlook suggests that to achieve net-zero emissions by 2050, national CCS capacity, including carbon utilization projects, must escalate to 60-80 million tonnes per year by 2050—significantly exceeding the current capacity of about seven million tonnes annually.

On a global scale, the challenge is even more daunting. The International Energy Agency contends that global CCS capacity must exceed 800 million tonnes annually by 2030, a monumental increase from the current capture of about 40 million tonnes. Achieving the climate targets outlined in the Paris Agreement requires a more than 100-fold growth of the CCS industry by 2050.

Recognizing the swiftly narrowing window of opportunity, business leaders understand the urgency of gaining a competitive edge by delivering low-carbon products that the world continues to demand. CCS and other emissions reduction projects are among the most substantial investments planned within Canada's emissions-intensive industries. Virtually all of the nation's resource-based companies, including sectors like cement, steel, fertilizer manufacturing, mining, electricity generation, and oil and gas, are exploring CCS integration. Each of these initiatives holds the potential to generate thousands of high-quality jobs, forge economic partnerships with Indigenous groups, and provide ongoing employment opportunities for facility operation and maintenance, thereby supporting local communities.

Beyond the immediate economic advantages, Canada's leadership in the CCS sector offers broader long-term prospects. The innovation and expertise cultivated through clean tech initiatives can be readily exported, making them highly sought after as global climate action gains momentum.

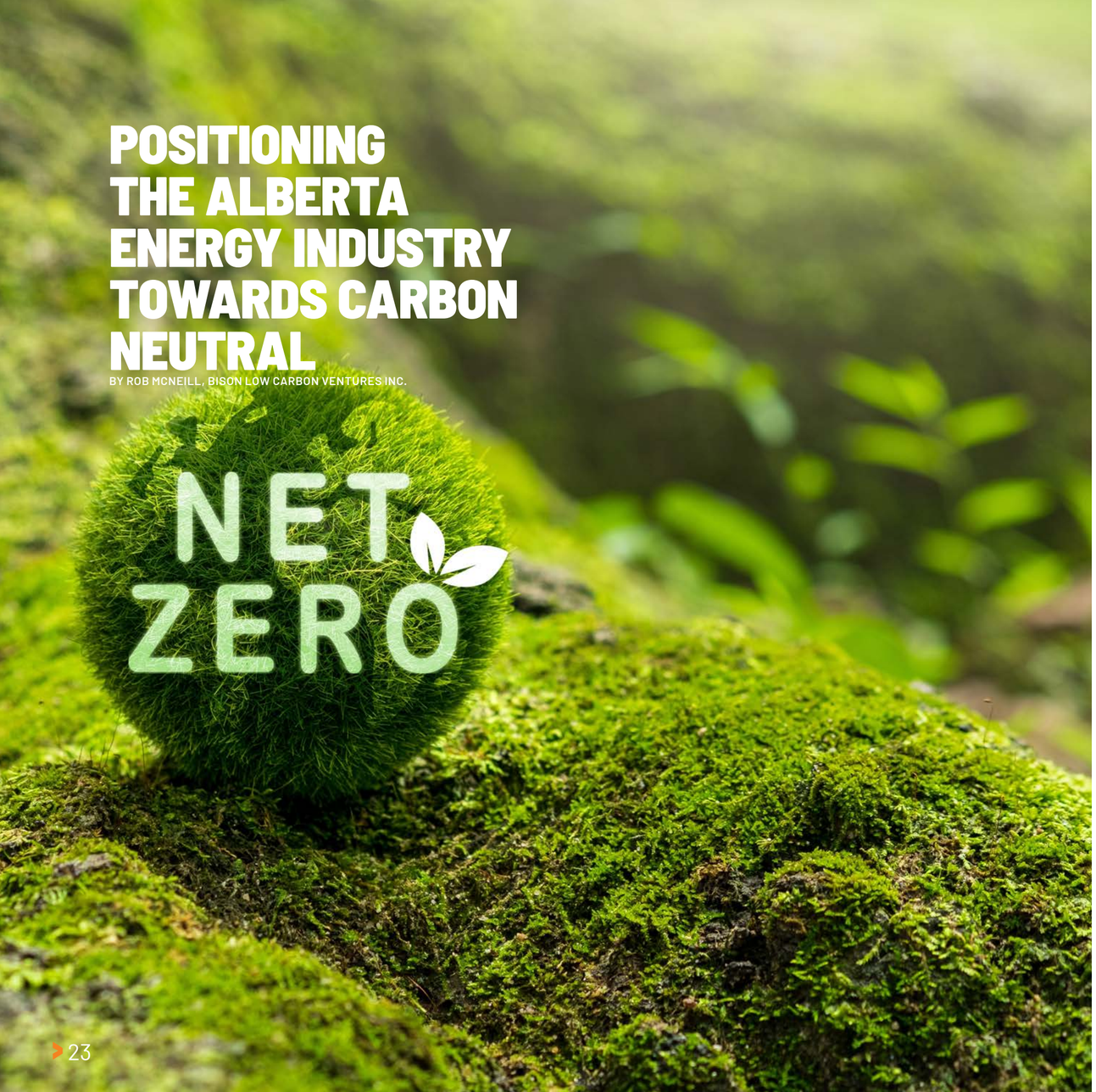
As with any evolving technology, the rapid expansion of CCS is accompanied by uncertainties and unforeseen challenges. Applying the knowledge and lessons learned from the first generation of CCS projects is instrumental in mitigating risk, reducing costs, and enhancing the performance of the multitude of new projects planned worldwide.

Canada is well-positioned to assume a leadership role in the CCS arena. With a rich history in the energy sector, a skilled workforce, a culture that nurtures innovation, and the necessary financial and community support, we stand ready to make a substantial contribution to the global transition towards sustainable energy.

Scovan provides the technical expertise to support clients with Carbon Capture and Sequestration projects. ■

# POSITIONING THE ALBERTA ENERGY INDUSTRY TOWARDS CARBON NEUTRAL

BY ROB MCNEILL, BISON LOW CARBON VENTURES INC.






As we move towards Net Zero by 2050, we have seen the emergence of technologies, individual leaders and leading organizations. Pathways Alliance is collaborating to set Canada's oil sands on a path to reach net-zero emissions. However, initiatives such as this are focused on large producers and large scale solutions. This leaves the question of how to bridge the gap for small emitters? How do we make solutions feasible for small to mid sized facilities and emitters?

Early in 2021 the Alberta Energy Regulator (AER) announced that they would be soliciting proposals for $CO_2$ sequestration in underground reservoirs in the province. The founders of Bison Low Carbon Ventures decided to leverage their extensive experience in the Western Canadian Sedimentary Basin and make an application to the AER to secure sequestration leases according to the stipulations made by the AER as part of the application process.

Bison undertook a review of geologic formations in central Alberta and chose to submit two applications to the AER, one covering approximately 70,000ha near Morinville and a second of similar size near Drumheller. The applications were submitted during the first half of 2022 and the AER replied in late 2022 indicating that the applications had been successful.

The approval granted by the AER gives Bison exclusive rights, for a period of five years, to undertake detailed evaluation of their acreages to determine the technical and economic feasibility of establishing a carbon sequestration hub. If the evaluation of the projects prove favourable, Bison has the opportunity to make application to the AER to convert the concessions from an Evaluation Permit to a Commercial Permit. Given the proximity to the Industrial Heartland, Bison elected to focus their technical and business development efforts on their asset near Morinville, which they have named Meadowbrook Carbon Sequestration Hub (MCSH).

Bison has advanced their evaluation of the MCSH concession by acquiring seismic data, modelling the reservoir, and have drilled and tested their first injection well. In addition, they have initiated discussions with several companies whose operations have significant emissions footprints in the Heartland area. These discussions have given Bison sufficient background to establish a design basis for the pipeline transportation of liquid $CO_2$ and related facilities to construct an injection hub. Engineering and economic analysis continue with business development activities towards the submission of an application for a commercial permit.

An interesting development that has arisen as part of Bison's review of $CO_2$ emitters is the number of small emitters in relative close proximity to the MCSH. There are a number of energy facilities, compressor stations, gas plants and oil batteries in the area that have modest emissions but sufficient that $CO_2$ taxes will cause detrimental economic effects on the operations. The problem is that these volumes would never support the capital expenditure required for pipeline connection. Accordingly, Bison has started looking into the economic viability of a trucking solution. As part of the evaluation, Bison decided that they needed a good understanding of the current status regarding the development of small modular post combustion carbon capture technologies. Bison partnered with their engineering contractor, SCOVAN, to undertake a detailed review of all the companies currently active in this space. The number of companies pursuing this is impressive and Bison and SCOVAN continue to review these to determine the best candidates as the evaluation of trucking liquid $CO_2$ volumes to a sequestration hub unfolds. ■


# SHAPING TOMORROW'S LEADERS AT THE HASKAYNE MBA CASE COMPETITION

BY ALEX BRUTON, INNOVATION SPECIALIST, SCOVAN

On November 3, 2023, the University of Calgary's Haskayne School of Business buzzed with innovative ideas as it hosted its annual MBA Case Competition. The event, featuring 60 students across 15 teams, was a convergence of diverse perspectives and groundbreaking approaches in the business world.

Scovan played an exciting role in the competition, going beyond mere sponsorship to shaping the core of the business case used in the event. For the first time, the competition moved away from publicly available business scenarios, and focused instead on a real-world challenge of how best to commercialize our pioneering HipVap technology. This was an exciting way to bring actual business opportunities from a local industry leader into an academic setting.

The case's practical focus on HipVap technology offered a fertile environment for hands-on learning and real-world application. Participants delved into the technology's potential to transform Steam Assisted Gravity Drainage (SAGD) operations, aligning directly with the global pursuit of Net Zero goals.

Released to the students a week in advance, the case presented three critical hypotheses: firstly, evaluating HipVap's remote steam capabilities in enhancing operational flexibility and efficiency; secondly, its significant carbon advantages, essential for adhering to strict emission reduction regulations; and thirdly, the possibilities of extending HipVap's application beyond conventional SAGD operations, thereby broadening the scope of energy production. These hypotheses represented tangible challenges in the energy sector, providing students with an opportunity to engage with real issues whose solutions could significantly advance sustainable energy production.

Presentations and feedback sessions took place throughout a six-hour day and the four top teams competed in an exciting live finale held in front of the entire group in the stunning new Mathison Hall.

A panel of seven distinguished judges assessed the teams, blending industry expertise and academic acumen. This panel included Cameron Welsh of Haskayne School of Business, Alejandro Stump from SAP, Abeer Habibullah of BMO, Sarah Haraburda and Arun Thomas of McKinsey & Co, and Scovan's own Alex Bruton and Phil Henderson. Their collective input ensured a thorough and balanced evaluation of the innovative solutions proposed by the students.

Our participation in the Haskayne MBA Case Competition aligns with our Environmental, Social, and Governance (ESG) goals, particularly in fostering community involvement and educational development. By integrating real-world challenges into an academic context, we are not only aiming to promote innovation but also to inspire the next generation of leaders in sustainable energy. We believe it reflects our dedication to cultivating a skilled workforce capable of making significant contributions to sustainable development in the oil and gas industry.

The competition was more than just an academic exercise; it was a dynamic forum for nurturing the energy sector's future leaders. Through such events, Scovan underscores its commitment to bridging the gap between industry and academia, playing a crucial role in the collective journey towards a sustainable, Net Zero future. Our involvement stands as a testament to our unwavering commitment to innovation, sustainability, and nurturing the industry leaders of tomorrow.

Our sincere thanks to Nazil Abdul Azeez, Mohammad Homoyoun, and the whole Haskayne MBA Society for inviting us to be involved in this making exciting experience happen.

# Q & A WITH EAVOR TECHNOLOGIES

BY TREVOR PHENIX, SENIOR VP DEVELOPMENT, SCOVAN AND MICHAEL HOLMES, VP SYSTEMS ENGINEERING & STRATEGY, EAVOR TECHNOLOGIES INC.

**Trevor Phenix (TP):** What is Eavor's purpose? What is your group setting out to do?

**Michael Holmes (MH):** Our purpose is to use the earth to cleanly power the world and enable local energy autonomy everywhere. Our closed-loop geothermal technology is the first truly scalable form of clean baseload power.

**Trevor Phenix (TP):** With the recent achievement of securing $182 million in Series B financing. Can you tell us how this funding, particularly the $90 million investment from the Canada Growth Fund (CGF), will impact Eavor's growth?

**Michael Holmes (MH):** The CGF's support is a significant catalyst for our growth. It bridges the gap we encountered in the market, especially in the so-called "valley of death" between venture capital and growth equity. This funding allows us to scale our closed-loop geothermal technology, and the partnership with PSP, a respected investor managing the fund, helps us attract additional investors.

**TP:** Can you elaborate on Eavor's technology and how it addresses challenges that have hindered traditional geothermal methods from scaling globally?

**MH:** Eavor's closed-loop geothermal technology is designed to provide reliable, scalable, and dispatchable clean power. It mitigates issues that have limited the global scalability of traditional geothermal methods. Our conduction-based technology acts like a reverse-radiator, extracting heat from hot subsurface rock. This innovation allows us to provide 24-7 carbon-free energy that is deployable globally.

**TP:** The focus on addressing the challenges posed by intermittent renewable energy sources is intriguing. How does Eavor plan to overcome the limitations of intermittent sources like wind and solar in achieving full decarbonization?

**MH:** Intermittent sources like wind and solar, while effective, have limitations in achieving full decarbonization on their own due to their intermittent nature. Eavor aims to address this gap by providing secure, reliable and clean energy. Our innovative closed-loop geothermal technology, Eavor-Loop™, efficiently harvests heat from deep within the earth without relying on traditional geothermal methods. Unlike conventional geothermal systems limited by specific conditions, Eavor-Loop™ is globally scalable and mitigates many issues associated with traditional and Enhanced Geothermal Systems. Our technology offers a solution that can be deployed in towns, cities, and industrial sites worldwide.

**TP:** Eavor's first commercial project in Geretsried, Germany, recently saw its inauguration. Can you share some insights into the project and its significance?

**MH:** The Geretsried project is a culmination of our dedication and hard work. It underscores the reach we've achieved as a company. The technology's successful demonstration projects led to this commercial venture, and the inauguration in August 2023 was a moment of fulfillment. German Chancellor Olaf Scholz even congratulated the company during the event.

**TP:** Looking ahead, what are Eavor's ambitions for the future, and how do you see your technology influencing the global energy landscape?

**MH:** Our ambition is to provide near-boundless energy almost anywhere on the planet. Eavor's technology, with its carbon-free, 24-7 energy, is relatively unconstrained by subsurface considerations. We aim to integrate into any government's energy portfolio, offering a scalable solution for secure and clean energy deployment globally.

**TP:** Thank you, Michael, for sharing these insights into Eavor Technologies Inc. and its revolutionary approach to geothermal energy. We appreciate your time. ■

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