CHOA

JOURNAL

DECEMBER 2024

CHOA LEADS

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President's Message

CHOA is a non-profit organization that brings together a full range of stakeholders at all levels: operating companies, oilfield services, professional & financial services companies, indigenous communities, education & research institutions, and government & regulatory agencies.

*We provide diverse platforms to '**CONNECT. SHARE. LEARN. LEAD.**' through knowledge exchange and fostering solutions to the current challenges of our industry. We create opportunities for professional development, relationship-building, and leadership across the community working in heavy oil, oil sands, CCUS, hydrogen, and energy-related and adjacent sectors.*

CHOA exists to build and support a community that sparks the shifts and drives the advances necessary to increase the competitiveness and contributions of our heavy oil and oil sands industry through the energy transition.

At CHOA we believe that by coming together to share ideas and educate the next generation, we can tackle the unique challenges of our industry and supply the world with the responsible energy it requires.

Each year we reinforce our foundational commitments to our members and partners to collaborate for greater impact and strengthen our brand to grow our community and reach new audiences.

Looking ahead, we continue to foster the long-term relationships with our industry partners in heavy oil and oil sands, impart lessons learned, drive advances, and invest in our organizational sustainability while building our brand and expanding our community of energy professionals.

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President
CHOA

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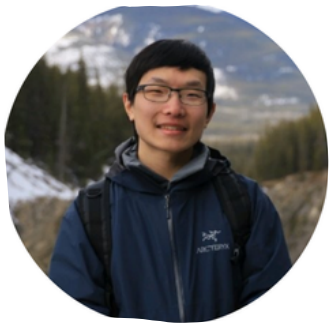

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Interview with Lorraine Mitchelmore

Former Canada Country Chair at Shell

CHOA Editorial Committee

First, CHOA wants to offer congratulations on your CIWB award and your recognition for professional excellence and commitment to advancing diversity. To kick off the interview and to help our readership get to know you a bit better, can you tell us about how you ended up as Canada Country Chair at Shell and, more recently, Suncor, BMO and Cheniere Energy boards? Can you share one or two things that were pivotal along the way?

There wasn't any single pivotal moment that determined my trajectory; rather, it was the culmination of various roles and experiences. From my early years as a geophysicist in Calgary, I was determined to gain exposure to the international oil and gas industry. Over the span of 30 years, I have worked in over 15 countries, residing in three of them. This broadened my perspective and deepened my understanding of global dynamics within the industry. I was fortunate to join Shell when I returned to Canada in 2002, where I was given significant leadership roles spanning conventionals, unconventional shale, and oil sands. These roles provided invaluable experience, and together with my international background, I believe prepared me well for the responsibility of leading Shell Canada as the country chair. When I retired from executive roles in 2015, my background across multiple international corporations naturally led me to board positions in large, complex global organizations.

The breadth of my experiences, from technical roles to leadership positions in various parts of the global energy industry, I believe, equipped me with the skills to contribute to these boards. In essence, those global opportunities for learning and growth paved the way for my journey to leadership positions and board memberships.

You are known to be passionate about diversity and women leadership. Why is this so important to you? Can you please tell us about the organization Advancing Women Executives? What's it all about and what impact is it having within corporations at the C-Suite level?

I am deeply passionate about diversity and women is leadership because I firmly believe in the power of great leadership and the importance of realizing the full potential of every individual. When half of the world's population is possibly hindered from reaching their full potential, it represents a loss of invaluable leadership talent. Talented women shouldnt have to struggle excessively to access opportunities that should be readily available to them. In today's increasingly complex world, exceptional leadership is essential to navigate through the challenges we face. Women bring a unique perspective to leadership, and diverse viewpoints are crucial for addressing these complex issues effectively. This is why I have put my energy behind Advancing Women Executives (AWE).

AWE is an organization that holds significant importance to me. It was initiated by a group of industry women in the US and supported by McKinsey & Company, who recognized that, despite multiple decades and a strong pipeline, there was little progress in advancing women into leadership roles in the industry.

AWE focuses on developing senior women executives to prepare them for C-suite and CEO roles. It goes beyond traditional training programs by creating a supportive network of highly talented women who no longer feel isolated in their journey. I often reflect on how impactful it would have been to have such a network when I was advancing in my career. Now, it's incredibly fulfilling to give back to these remarkable women and provide them with the support they need for success. The success of AWE is evident in the remarkable achievements of its members. In a relatively short period, several women have been promoted to the C-suite, and some have even become CEOs.

We celebrate each other's accomplishments and provide encouragement along the way. AWE is instrumental in preventing talented women from opting out due to the numerous barriers they often face.

Overall, AWE is making a profound impact by empowering women to break through the glass ceiling and assume leadership positions they rightfully deserve.

With your work chairing the Future Economic Strategy Table for the federal government in mind, how do you see the future for Canada's energy sector and, more specifically, the Canadian heavy oil and oil sands sector?

I've always maintained an optimistic outlook for Canadas energy sector. Canada boasts world-class innovation and a commitment to environmental stewardship, factors that position us as leaders in the global energy landscape, especially as we embark on building a low carbon economy.

Over the years, the industry has harnessed innovation and determination to develop tough resources like North American shale and the oil sands, showcasing our industry's potential. As we continue to develop and operate these resources with the expectations of reaching net zero, the same innovation and determination will become ever more important. Canada's resources have to be considered in the context of global competitiveness both economically and environmentally. The good news is in recent years, the oil sands breakeven price has become comparable to other global resources. Moreover, significant progress has been made in reducing emissions intensity, indicating a commitment to environmental responsibility.

However, to achieve the goal of net zero, we need a supportive policy framework from the government. With the right policies in place, the industry can achieve its targets for net-zero emissions. It's essential for the Canadian government to advocate for our industry's interests on the global stage.

The Resources of the Future Economic Strategy Table that I chaired for the federal government in 2017-18 was instrumental in developing policy recommendations to enhance our resource industries competitiveness while also addressing environmental concerns. Two of the single most important recommendations were to streamline regulations and build a supportive innovation ecosystem, both of which would have significantly helped closed the productivity gap with the US and bolstered economic growth. Unfortunately, the slow implementation of all of these recommendations has hindered our progress, exacerbating Canada's productivity challenges.

Moving forward, the government must adopt a balanced approach, avoiding picking winners and losers, instead fostering a transition to a low-carbon economy while supporting economic growth and getting out of the way of innovation. Canada has the potential to not only make our foundational carbon-intensive industries environmentally and economically competitive but can also unleash the innovation in clean industrial technology sector where these companies can then export their technologies globally. I have to give the government credit for creating the Canada Growth fund which can provide capital to scale up and commercialise clean technologies for the industrial sector. Our industrial sectors are a part of the solution towards a low carbon economy, and I would argue cannot be achieved without them. Industry and government need to come together to collaborate and support the development of these new technologies. The entire ecosystem needs to work together if we are to realise our potential. Canadians should take pride that we can become world leaders in this low carbon economy with all of our comparative advantages in natural resources and technology innovation.

In the last 10 years, versus the 10 prior to that, it has been a challenge to advance large capital projects in energy and we are now also seeing investment outflows from Canada. What are your thoughts around our competitiveness? What will bring investment back? Will we be able to attract the capital we need to succeed in our decarbonization efforts?

First and foremost, it's imperative for governments to recognize the critical role of our energy industry in both serving global customers and driving Canadian prosperity. This industry contributes a substantial portion of our exports, underscoring its significance to our economy. Canada possesses abundant natural resources, a strong rule of law, and a skilled workforce, all of which are foundational elements for competitiveness. However, to truly capitalize on these comparative advantages, governments must implement policies to eliminate unnecessary roadblocks and support our industries to become global leaders.

It's nonsensical to contemplate shutting down our own industry, only to have other less responsible countries fill the void in global supply. As long as demand persists, Canada should aspire to be the supplier of choice, leveraging our global position to responsibly and sustainably bring our resource industry into the future. Creating a conducive environment for investment requires providing certainty to investors regarding attractive risk-adjusted returns for both resource and technology solution companies.

By fostering regulatory stability, and demonstrating a commitment to supporting responsible, resource development, Canada can instill confidence in investors and encourage capital inflows. Ultimately, by adopting a proactive stance that prioritizes competitiveness and sustainability, Canada can position itself as a preferred destination for investment in energy and advance our decarbonization efforts more effectively than we are today.

How can we shift the perception of Canada's heavy oil and oil sands and become recognized as the global barrel of choice?

Shifting the perception of Canada's heavy oil and oil sands to become the global barrel of choice requires a multifaceted approach, with strong government collaboration being a critical factor. Take Norway, for example, which is renowned as an environmental leader. Despite similarities with Canada's industry, Norway's success stems from a government that recognizes the importance of balancing traditional resource development with sustainability.

In Canada, our industry has long been committed to environmental stewardship, evidenced by reduction in emissions intensity, initiatives such as embracing net-zero emissions and the establishment of advanced industry groups like Pathways. However, to truly excel on the global stage, we need government collaboration.

A supportive government can help take advantage of the opportunity for the energy sector to decarbonize. By adopting policies that encourage innovation and responsible resource development, while also fostering the growth of low-carbon technologies, Canada can position itself as a leader in both spheres.

It's crucial to recognize that demand for oil continues to grow, even in countries like Norway with a strong focus on electric vehicles. Therefore, our focus should be on developing our existing industry to meet the low-carbon standards of the future, while also embracing the opportunities presented by a transitioning economy.

In essence, by aligning government collaboration with industry initiatives and promoting Canada's commitment to environmental stewardship and innovation, we can enhance the performance and perception of our heavy oil and oil sands sectors and establish ourselves as the global barrel of choice. It is time for Canada to feel that pride as a nation.

With your whole career in mind, what are you most proud of, and what are you most excited about looking forward?

Reflecting on my entire career, I am most proud of the strides we have made in the energy industry around innovation and the potential for even greater achievements in the future. What excites me most is the prospect of realizing this potential with a government that champions our industry's capabilities and understands the pivotal role we play in both our existing operations and driving innovation to make carbon-intensive industries worldwide more environmentally competitive.

I envision Canada as a global leader as the energy industry continues to grow and evolve, known for our commitment to sustainability and innovation. This represents a significant opportunity not only for our industry but also for Canada's economic prosperity and global influence.

Furthermore, I am thrilled by the ongoing efforts to unleash the incredible talent of women in our industry. Seeing more women ascend to CEO positions will not only be a testament to their abilities but also a catalyst for changing the perception and brand of our industry. It's an exciting prospect that holds immense promise for driving positive change and fostering diversity and inclusion within our sector.

Is there anything else you would like to share with our readership?

I am blessed to have had a fantastic career in the energy industry. It is a foundation for economic prosperity. There is an incredible future for our industry to embrace the low carbon economy and solve the challenges of this next frontier. I encourage the government, industry and our innovation ecosystem to collaborate and focus to build an industry that is branded globally as one of the most diverse and sustainable; one that generations of Canadians can be proud of for years to come.

Lorraine Mitchelmore
Independent Director

Lorraine Mitchelmore has more than 30 years of oil and gas experience with a third of her career working internationally. Her most recent roles include CEO of Enlighten Innovations, various senior positions in Royal Dutch Shell, including Executive Vice-President Heavy Oil Americas and President and Country Chair of Shell Canada from 2009-2016. Prior to Royal Dutch Shell, she held various positions in BHP Petroleum, Chevron and Petro Canada. Ms. Mitchelmore's business experience includes leadership in operations, strategic planning, business development, exploration and appraisal, technology start-ups, and public policy.

She serves on the Bank of Montreal, Suncor Energy, Cheniere Energy Board, AIMCo of Directors and Advisory Council for Advancing Women Executives. Ms. Mitchelmore has served as a board member and advisor to numerous private and non-profit organizations, including Enlighten Innovations, TransMountain Corporation, Shell Canada, the Canadian Council of Chief Executives, Conference Board of Canada, Asia Pacific Foundation, the Federal Government's NAFTA Environmental Advisory Council, Catalyst board of Advisors and was Chair of the Federal Resources of the Future Economic Strategy Table. She has previously been an Associate of the Rockies Creative Destruction Lab, co-founder and co-chair of Smart Prosperity, chaired the 2015 Governor Generals Leadership Conference and co-Chaired the 2015 Calgary United Way campaign.

Lorraine holds a BSc honours in Geophysics from Memorial University of Newfoundland, a MSc in Geophysics from the University of Melbourne, Australia and a MBA with Distinction from Kingston Business School in London, England.

CHOA CONNECTS

Forging our Future
Profitable Sustainable Heavy Oil

7:00am - 6:00pm
Hudson, Calgary, AB
November 7, 2024

THANK YOU TO OUR CONNECTS 2024 INDUSTRY PARTNERS!

CHOA CONNECTS is a business-oriented conference that brings together subject matter experts, upper management and influential industry professionals with a common goal – to seize the opportunities of the energy transformation and forge a profitable and sustainable future for heavy oil. The full-day event explores Indigenous economic reconciliation, leadership strategies, investment decisions, multi-lateral development, direct air capture, hydrogen technologies and more. The conference promises a diverse and dynamic program that delves deep into the industry's transformative potential and provides a space for attendees to grow their industry connections.

CHOA CONNECTS

Forging our Future

Profitable Sustainable Heavy Oil

7:00am - 6:00pm
Hudson, Calgary, AB
November 7, 2024

THANK YOU TO OUR CONNECTS 2024 INDUSTRY PARTNERS!

Conference Program

Shaping the Future of Leadership

Dale Hansen (MacPhail School of Energy, SAIT)
Melanie Peacock (Double M Training and Consulting)
Stephen Mason (Reconciliation Energy Transition Inc.)

Join us as we delve into the evolving landscape of leadership. This session will explore human resources and leadership challenges, Indigenous economic reconciliation, and the future of the energy industry in terms of human capital. Don't miss this opportunity to gain valuable perspectives and strategies for future-ready leadership.

Unlocking Value: Multilaterals in Heavy Oil and SAGD Project Insights

Pavey Gill (McDaniel & Associates)
Christina Ng (Athabasca Oil Corporation)
Calin Dragoie (Chinook Consulting)
Brad Gordon (IPC Canada Ltd.)

This session delves into advancements in multilateral well design and their application across the Western Canadian Sedimentary Basin. We will also explore the economics behind current SAGD pad development in the McMurray, highlighting how these innovations are driving efficiency and profitability in heavy oil production.

What is Driving Investment in the Oil Sands?

Randy Ollenberger (BMO Capital Markets)
Kent Ferguson (Suncor Energy Inc.)
Mike Verney (McDaniel & Associates)
Rob Morgan (Industry Leader)

The panel discussion aims to provide a comprehensive understanding of the factors driving investment decisions in the oil sands. By connecting business strategies with capital market expectations, the session will highlight the importance of sustainability, innovation, and strategic alignment in securing investment and ensuring long-term competitiveness in the market.

Innovative Energy Convergence: Direct Air Capture, Hydrogen and the Future of Alberta's Upstream Industry

Ericka Rios (Alberta Innovates)
Tom Liles (Rystad Energy)
Christine Baine (Worley)

Explore how direct air capture and hydrogen technologies are revolutionizing Alberta's upstream oil industry. Presentations in this session will provide insights into the latest advancements and their implications for Alberta energy production, alongside a future outlook for the Alberta upstream industry.

RUBY LITTLECHILD
National Director, Indigenous Relations
AtkinsRéalis

DALE HANSEN
Dean, MacPhail School of Energy
Southern Alberta Institute of Technology

STEPHEN MASON
Chairman & CEO
Reconciliation Energy Transition Inc. (RETI)

MELANIE PEACOCK
HR Consultant
Double M Training & Consulting

PAVEY GILL
Evaluation Engineer
McDaniel & Associates

CHRISTINA NG
Reservoir Engineering Team Lead
Athabasca Oil Corporation

CALIN DRAGOIE
VP Geoscience
Chinook Consulting

BRAD GORDON
Blackrod Asset Lead
IPC Canada Ltd.

DAVID YAGER
Special Advisor, to Premier of Alberta
Executive Council

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BMO Capital Markets

KENT FERGUSON
SVP, Strategy, Sustainability & Corporate Development
Suncor Energy Inc.

MIKE VERNEY
Executive Vice President
McDaniel & Associates

ROB MORGAN
Industry Leader

ERICKA RIOS
Hydrogen and CCUS Manager, Clean Technology
Alberta Innovates

TOM LILES
VP, Upstream Research
Rystad Energy

CHRISTINE BAINE
VP, Development Lead
Worley 1PointFive Alliance

Interview with Alicia Quesnel

Managing Partner, BD&P Law

CHOA Editorial Committee

Interviewed in April 2024
by the CHOA Editorial Committee

Alicia Quesnel, 2024 CIWB Professional Services Award honouree is the Managing Partner of Burnet, Duckworth & Palmer LLP (BD&P), a leading business and complex litigation firm in Calgary, Alberta. Since joining BD&P as an articling student in 1994, Alicia has advised on over $100 billion of energy deals. She negotiates large scale unconventional resource and midstream infrastructure joint venture deals in connection with the development of Canada's LNG, oil sands, shale gas, CCUS and renewables sectors. A specialist in competition law and foreign investment, Alicia routinely helps companies secure regulatory approvals and advises on Competition Act and Investment Canada compliance matters.

First, CHOA wants to offer congratulations on your 2024 CIWB Professional Services Award – your recognition for professional excellence and commitment to advancing diversity. To kick off the interview and to help our readership get to know you a bit better, can you tell us a little bit about yourself? What's your story? When you consider your career so far, what are you most proud of, and what are you most excited about looking forward?

Like many Albertans, I was born in Saskatchewan. We moved to Calgary when I was 2, then shortly thereafter to Red Deer, where I grew up until I left home to go to university. I was always very studious, so I spent the next 10 years at university studying political science at the University of Lethbridge for my B.A., international relations at the University of Calgary, for my M.A., an LL.B. in law at Queen's University and finally, an LL.M from the University of Ottawa in international trade law. Notwithstanding my love of international politics, I always intended to come back to Calgary.

Growing up, Calgary was always the "big city". I have old pictures of my grandmother and my mother as a young girl walking downtown, then my mother and father as a young couple. This city called to me from an early age.

I was 12 when I decided to be a lawyer (not knowing, of course, what that entailed), and did not take any oil and gas or energy courses at university. But during my articles at Burnet, Duckworth & Palmer LLP (BD&P), I was introduced to the industry and I've never looked back. The energy industry is highly capital intensive, so it doesn't take long to build up a resume of deals worth billions. I have personally had the good fortune to have participated in about $100 billion worth of deals and projects over my career.

As a recognized female trailblazer, can you share one or two things that were pivotal to your success?

For those that know me, they know that I attribute much of my success to the mentors and sponsors that have supported me throughout my career at BD&P. I had the benefit of working with Mr. Palmer and his protégées, who have been some of the best and most respected lawyers in the industry – John Brussa, John Cuthbertson, Don Chernichen, Bill Maslechko, Grant Zawalsky, Ken Stickland, John Wilmot, Steve Cohen and Shannon Gangl – I could go on. It's a very long list! All these individuals provided me with so many excellent career opportunities – opportunities that I may not have gotten at another firm.

I have had exemplary role models and have tried to incorporate what I have learned from them into my own style of leadership and teaching. It is very rewarding to watch someone advance and thrive in their career knowing that you have helped in a small way. The energy and excitement that young people have when they are starting out their careers is infectious. It keeps us all learning and growing!

Working as an energy lawyer since 1994, how have you seen the energy sector shift when it comes to female leadership and engagement? What will take us to the next level?

There are so many more female leaders in the energy sector in 2024 than there were in 1994. Back then, it was unusual to see females in C-suite positions, including general counsel positions. But there were a few, which gave many of us hope for change. It is much more common today to see female energy sector executives in general counsel (legal), finance and human resources roles, but it is still less common to see female energy sector executives in CEO, business development and operational or technical executive roles. Thankfully, that too is changing. Getting those numbers to rise will require the business community to make strategic and mindful choices to sponsor more women at a fairly early stage in their career to help them build the skills they need to be considered for executive roles on par with their male colleagues.

How do you see the future for Canada's energy sector and, more specifically, the Canadian heavy oil and oil sands sector? How can we shift the perception of Canada's heavy oil and oil sands and become recognized as the global barrel of choice?

I think it is a myth that as global demand declines, the Canadian oil sands will be the first barrels to shut-in. The premise of this argument is that these commodities are the most carbon emission intensive and most expensive barrels to produce. But that, in fact, is not the case. There is almost negligible methane emissions from this sector which, when included as part of the carbon intensity of conventional crude oil production, puts these barrels on a much more level playing field. In addition, the six largest oil sands producers through the Pathways Alliance are, and will continue, to spend billions on increasing efficiencies and incorporating carbon reduction technologies (including CCUS) into their projects.

These are world class assets and producers will show to the world that net-zero is achievable.

In addition, it costs more to shut-in production from a heavy oil or oil sands project than it does to continue to produce, even in the face of lower commodity prices. While the upfront costs of developing oil sands assets are much greater than the upfront costs of developing conventional crude oil resources, the ongoing capital or marginal cost required to maintain production levels, is much less than the average cost of producing a barrel of conventional crude oil. The oil sands sector can withstand lower prices for longer. We know this from experience. When prices were low, even negative, in the past decade, producers of conventional crude oil stopped drilling new wells, resulting in decreased production of conventional crude oil. Production of oil sands, by contrast, was not impacted in nearly the same way. While low oil prices mean that new or greenfield oil sands projects are unlikely to be built, existing projects remain resilient with low production decline rates.

In the last 10 years, versus the 10 prior to that, it has been a challenge to advance large capital projects in energy and we are now also seeing investment outflows from Canada. What are your thoughts around our competitiveness? What will bring investment back? Will we be able to attract the capital we need to succeed in our decarbonization efforts?

Over the past decade, navigating the landscape of large capital-intensive energy projects has indeed presented its share of challenges. Notwithstanding setbacks like the 2014 price collapse and shifts in capital flow, we have learned a lot and adapted along the way. This industry is resilient and committed to success, which is something Albertans have always been known for. There's never really been a time when this province has stayed down and out for long.

“With determination and the support of both the provincial government and industry, we are charting a course towards contributing to a sustainable future, while maintaining energy sovereignty for our country.”

Today, our producers stand stronger, leaner and more efficient than ever before. While capital may not be flowing as freely as it once did, this period of restructuring has allowed the energy industry to refine its strategies and streamline operations. Certainly, there are hurdles to overcome. There is a need for policy alignment between different levels of government and industry stakeholders and between competing objectives. There is also a need for regulatory reform to rationalize the labyrinth of regulations that are pancaked one on top of the other. But, in recognizing these challenges, we also acknowledge the opportunity for collaboration to forge a path forward. In Alberta, we are proud of the work done by the CHOA and initiatives like the Pathways Alliance–a testament to the power of partnership and collective vision.

With determination and the support of both the provincial government and industry, we are charting a course towards contributing to a sustainable future, while maintaining energy sovereignty for our country. This is something many Canadians are obviously excited about, as the net inbound migration to our province demonstrates. The journey to 'net zero' may be challenging, but with our unwavering commitment and collaborative spirit, we are confident in the bright future that lies ahead for the energy sector and Alberta.

Alicia Quesnel
Managing Partner,
BD&P LLP

Alicia Quesnel, B.A., M.A., LL.B, LL.M, ICD.D, is the Managing Partner of Burnet, Duckworth & Palmer LLP (BD&P), a leading business and complex litigation firm in Calgary, Alberta. Since joining BD&P as an articling student in 1994, Alicia has advised on over $100 billion of energy deals. She negotiates large scale unconventional resource and midstream infrastructure joint venture deals in connection with the development of Canada's LNG, oil sands, shale gas, CCUS and renewables sectors. Alicia also advises on acquisitions, mergers and divestitures, and reorganizations and restructurings. A specialist in competition law and foreign investment, Alicia routinely helps companies secure regulatory approvals and advises on Competition Act and Investment Canada compliance matters.

She has been recognized as a leading energy lawyer by Who's Who Legal Thought Leaders: the Global Elite in 2020, 2023 and 2024. Alicia has also been recognized by Chambers Global, Legal 500 Canada, Best Lawyer, Who's Who Legal, International Who's Who of Business Lawyers, and Chambers Canada for her expertise in energy law. She was awarded the 2022 Women in Law Leadership Award (Private Practice) and the 2023 Female Trailblazers Award at the Canadian Law Awards.

Alicia is a former President of the Canadian Energy Law Foundation. Her community involvement includes serving as past Board Chair for the Wings of Hope Breast Cancer Foundation, director and Chair of SOS Children's Villages Canada and Second Vice-President and member of Board of Governors of the Calgary Petroleum Club.

Calgary Influential Women in Business Awards (CIWB) Announces 2024 Honourees

Calgary, AB - March 8, 2024 - The Calgary Influential Women in Business (CIWB) Awards proudly announces the exceptional honourees for 2024, recognizing outstanding leaders who have made significant contributions to Calgary's business community.

The CIWB Awards, now in its fifth year, continues to highlight the achievements of women leaders and their allies, fostering a culture of inclusion and empowerment in Calgary's corporate landscape.

"We are delighted to honour these exceptional individuals whose remarkable leadership not only propels Calgary's business community forward but also champions the advancement of women and diversity. The proceeds from the CIWB Awards directly contribute to Axis Connects, a non-profit committed to empowering women professionals into pivotal decision-making roles."
- Heather Culbert, co-founder of Axis Connects

- Lifetime Achievement: **Lorraine Mitchelmore**, formerly President and Country Chair/EVP Shell Canada, now serving as an Independent Director for several organizations, including Suncor, BMO, AIMCo, Cheniere Energy, Shell, Catalyst, and Trans Mountain.
- Male Champion: **Bryan de Lottinville**, Founder and Chief Evangelist of Benevity.
- Large Enterprise: **Doreen Cole**, EVP of Downstream at Cenovus.
- Small/Medium Enterprise: **Jennifer Massig**, CEO of Magna Engineering Services.
- Professional Services: **Alicia Quesnel**, Managing Partner at BDP LLP.
- Social Enterprise: **Wendy Beauchesne**, CEO of Alberta Cancer Foundation.

Be Part of the CHOA Community

Become an individual CHOA Member

- Belong to a supportive and collaborative community of heavy oil and oil sands professionals dedicated to tackle together the unique challenges of our industry.
- Volunteer in creating and sharing with our community articles, presentations, social or technical events in areas you are passionate about, efforts translated into volunteering and PD credits/hours.

JOIN NOW

- Have access to unique networking and relationship-building opportunities.
- Receive significant discount to technical and social events (co-)organized by CHOA, and acquire members-only information (like the monthly project updates and archived CHOA Journals). The discount from attending one major event can almost recoup the cost of a year's membership.

Become a CHOA Corporate Member or CHOA Partner

- Have access the CHOA community and its multiple channels chances to develop industry relationships and advance your business.
- Acquire brand prominence on all CHOA platforms (website, Journal, social media, multiple events, etc.).
- Receive an additional 50% discount on individual memberships for your team.
- Obtain flex credits equal to ~25% of your annual investment to be used according to your business interests.
- Gain priority entry and right-of-first refusal to (historically sold-out) events (e.g. FORE!CHOA Golf Invitational).
- Benefit from speaking opportunities and the capacity to jointly curate events to meet your goals, as well as the ability to participate in our Collaborative Recruitment Initiative, and offer seminars, workshops or courses that you have curated to our outreach audience in partnership with the CHOA.

[Visit our website](#) to learn more about our industry partners.
*Click the **Learn More** button to hear directly from our corporate sponsors.*

LEARN MORE

Reflecting on Success: Canadian Women in Energy's Allies in Energy 2024

Canadian Women in Energy recently concluded its annual Allies in Energy 2024 Executive Forum, celebrating diversity, leadership, and empowerment. This highly anticipated event provided a platform for industry professionals to gain valuable insights, forge meaningful connections, and draw inspiration from thought leaders.

With a mission to foster trust and community in a challenging environment, Allies in Energy 2024 delivered on its promise. Building upon the success of previous forums, the event provided a platform for candid discussions and meaningful dialogue on critical issues facing organizations within the energy sector today.

The foundation laid by past forums set the stage for another impactful gathering in 2024. From exploring themes of female empowerment and diversity to addressing complex challenges such as Indigenous relations and leadership, each event has left an indelible mark on participants.

At the heart of Allies in Energy 2024 was a focus on conflict resolution and navigating challenges within teams and organizations. Through panel discussions, attendees gained valuable insights into effective communication strategies, strategic alignment, and change management.

Central to the success of this forum were the esteemed moderators, Jennifer Koury and Shauna Holmes. Their expertise and leadership ensured that discussions remained focused, engaging, and impactful, guiding participants toward actionable outcomes and solutions.

*Watch this short **video** to hear directly from the speakers at the Allies in Energy 2024.*

The lineup of speakers this year brought together industry leaders with exceptional insights and intriguing backgrounds. Panelists Eileen Marikar, CFO – Keyera, Kara Slemko, VP, Corporate Development & Commercial Operations, & Land - Canadian Natural Resources, Keith Chiasson, COO – Cenovus, Kris Smith, CFO - Suncor, Rachel Moore, EVP Corporate Services – Ovintiv, Sharon Prete, Manager, People & Wellness - Perpetual Energy, and Shelly Witwer, Senior Vice President Business Development – Crescent Point Energy shared their stories of resilience, innovation, and leadership to a dynamic and engaged audience.

As participants reflect on their experiences at Allies, one thing is clear: this was more than just a forum – it was a catalyst for connections. By championing diversity, equity, and inclusive leadership, Canadian Women in Energy has created a platform where professionals can come together, share insights, and drive positive transformation in the energy sector.

Allies in Energy 2024 may be behind us but the legacy of this event lives on. Armed with new perspectives, tools, and connections, participants are better equipped to navigate the challenges and opportunities that lie ahead. As Canadian Women in Energy continues its mission to empower and inspire, the future of the energy industry looks brighter than ever.

Allies in Energy stands as a shining example of what can be achieved when diverse voices come together. As participants reflect on the success of this event, they carry forward the lessons learned, the connections made, and the inspiration gained, working together to build a more equitable and sustainable future for all.

Since its establishment in 2002, Canadian Women in Energy has stood as an advocate for inclusivity and empowerment within Calgary's energy sector. This non-profit organization has dedicated itself to promoting, supporting, and empowering women professionals, fostering a dynamic environment where diverse voices are valued and respected.

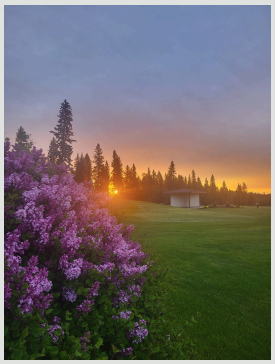
Canadian Women in Energy's membership is a vibrant tapestry, composed of women directly engaged in all facets of the energy industry. From newcomers in the industry to seasoned C-suite professionals, Canadian Women in Energy members bring a wealth of expertise and experience, united by shared professional and personal aspirations. The membership is a community built on integrity, where each member's unique perspective and experiences enriches the collective whole of the organization.

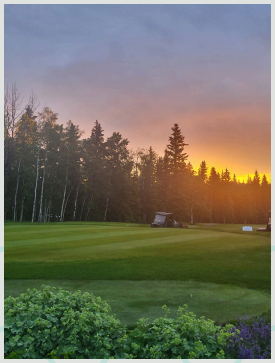
To learn more about Canadian Women in Energy or to become a member please visit their website www.canadianwomeninenergy.com.

FORE!CHOA Golf Invitational

The FORE!CHOA Golf Invitational is a prestigious event that celebrates the many relationships supporting our industry and the great successes we've achieved together. It offers golfers and sponsors the chance to be part of an exclusive group promoting their brand to and networking with leaders of Canada's energy industry. CHOA's golf tournament features chef-curated menus, live music entertainment, and engaging games designed to create delight and build client connections at each hole. Every year, we invite our industry partners to connect, play and celebrate on the green at one of the most prestigious golf clubs in the area.

FORE!CHOA is a tournament that brings people together. Hear firsthand from the golfers [in this short video.]





CHOA Stampede Social

CHOA is partnering with DCM Group and CWIE (Canadian Women In Energy) to create THE marquee pre-stampede party in town, a stylish evening of networking, success stories, and music on the Roof Patio of CRAFT Beer Market downtown Calgary.
Together with our industry partners, we share knowledge and leadership opportunities to spark the shifts and drive the advances the energy sector seeks, and we empower and engage professional women to positively impact our industry and our community. This delightful event is made possible by the contributions of our Event Sponsor: DCM Group, standing for agility, performance, and human value, while committing to building lasting partnerships and supporting the wider energy family.

dcm

CHOA

Canadian Women In Energy
Calgary Chapter








Will Scope 3 Affect You? Dispelling the Myths

Kelley Rutledge
Senior Analyst, Sustainability & Emissions Management
GLJ Ltd.

Will Scope 3 Affect You?

"Armed with knowledge that Scope 3 emissions might well affect you, there will be a discussion of methods to prepare your company and to turn addressing Scope 3 emissions into value creation."

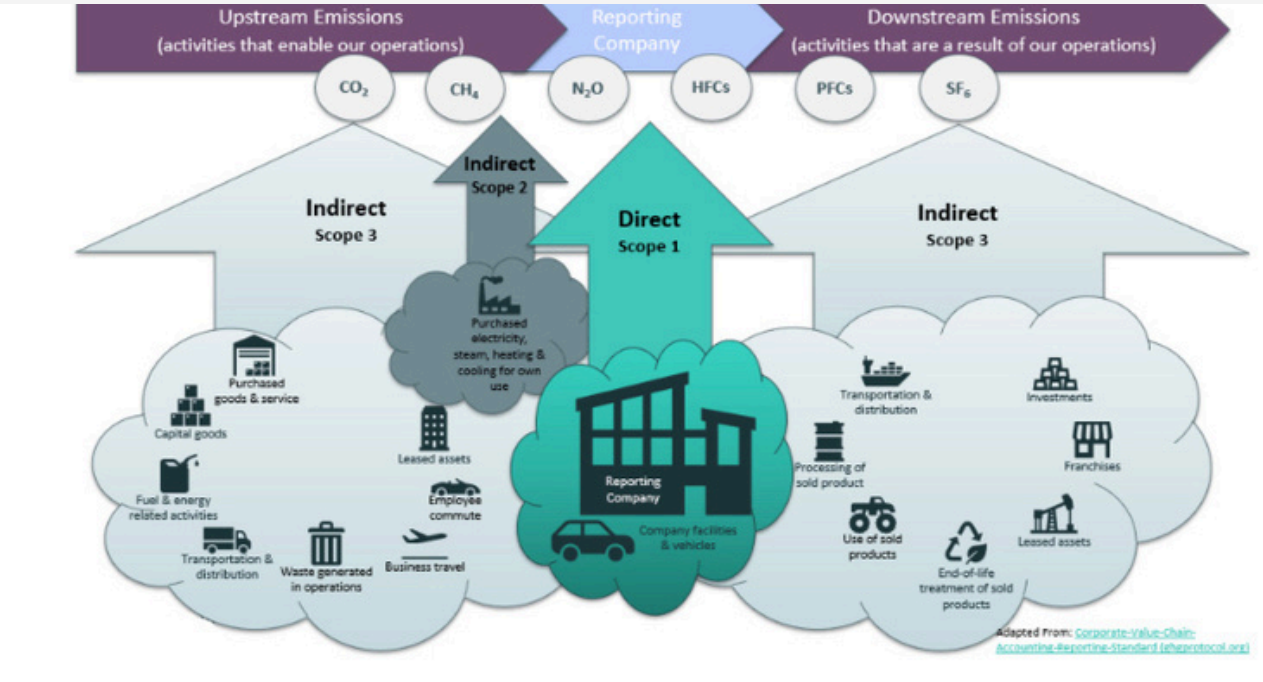
People have heard of Scope 3 emissions, but many shy away from learning more due to a misinterpretation of the many ways in which Scope 3 can affect them materially. This can be a result of believing that Scope 3 emissions are:

- too vague of a category to properly define, so why consider them?
- not applicable to their operations because they are immaterial.
- only a matter of reporting compliance for some industries, but not theirs.
- yet another cost, without the potential for value creation.

This article will begin by creating a robust definition that allows readers to start to understand their unique relation to Scope 3, both directly and indirectly. Next, common myths will be dispelled to illuminate the many ways that Scope 3 emissions impact most companies. Armed with knowledge that Scope 3 emissions might well affect you, there will be a discussion of methods to prepare your company and to turn addressing Scope 3 emissions into value creation.

"The US EPA clarifies that ... Scope 3 emissions, also referred to as value chain emissions, often represent the majority of an organization's total greenhouse gas (GHG) emissions."

Scope 3: What It Is and What It Isn't



Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in Scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions. (1)

The US EPA clarifies that the "scope 3 emissions for one organization are the scope 1 and 2 emissions of another organization. Scope 3 emissions, also referred to as value chain emissions, often represent the majority of an organization's total greenhouse gas (GHG) emissions." (2)

It is just clear enough to know it means something, but just vague enough to be easily ignored as not applicable. Not everyone is prepared to read over 150 pages of the Corporate Value Chain (Scope 3) Accounting and Reporting Standard to figure out what it actually means or how it applies to them.

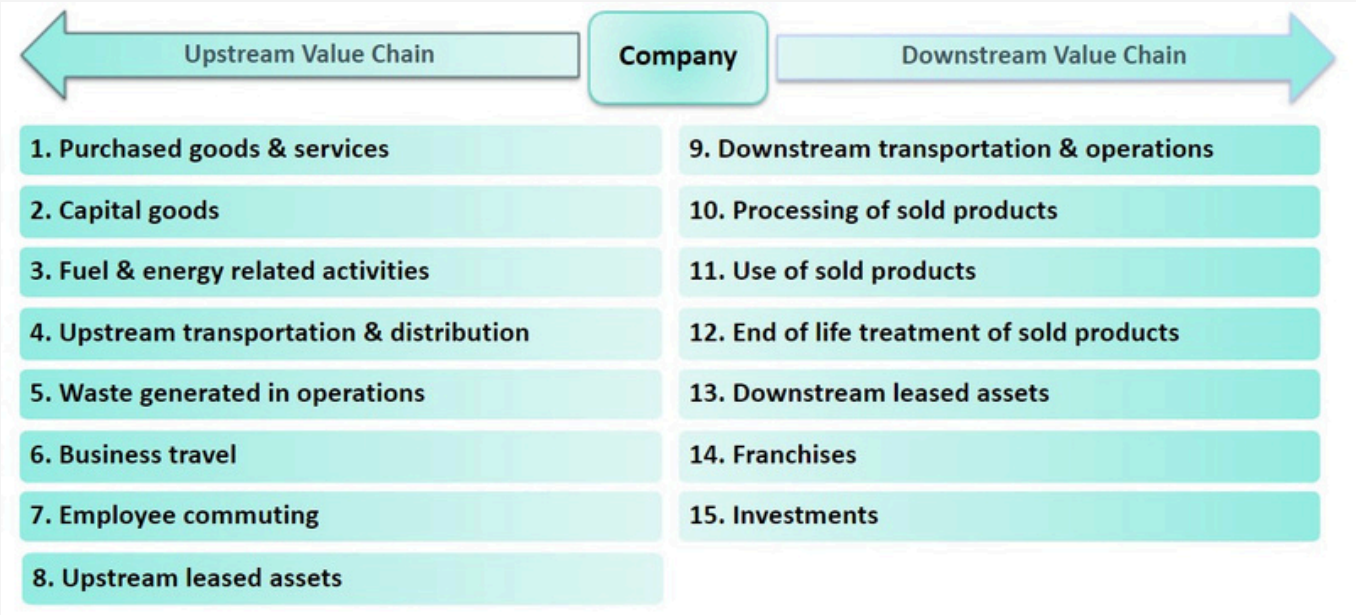
What is meant by upstream and downstream emissions?

How to know whether or not to include specific emissions in Scope 3 Emissions calculations?

Upstream and Downstream Emissions

An organization's value chain involves the suppliers of goods and services upstream of their operation as well as the downstream companies that are impacted by the sale of that organization's goods and services. The GHG Protocol has separated Scope 3 emissions into 15 categories to help an organization recognize areas in its value chain that need consideration. Once identified and quantified, an organization can analyze the categories that are most impacted by their organization's activities and start to target areas where there may be the greatest influence for change. Although it may seem overwhelming to acknowledge the breadth of a company's total emissions footprint, this is the realm where meaningful change starts to happen. Many of the people and companies that are within the value chain are not regulated, and it is through meaningful conversations that more producers, manufacturers, transporters, and retailers will start to consider their own footprint.

"Although it may seem overwhelming to acknowledge the breadth of a company's total emissions footprint, this is the realm where meaningful change starts to happen."



What to Include in Scope 3 Emissions?

Each organization's activities are unique and not every organization will have a value chain that incorporates all 15 categories.

To help clarify what this means, consider a service provider versus an oilsands producer. For a service provider, such as GLJ, our organization is able to meet our clients' needs through intellectual research and application. Those activities happen within the walls of our headquarters in Calgary. In comparison, an oilsands mining operation requires heavy equipment to maintain production throughout the mine. The combustion of the diesel fuel in those pieces of equipment would be included in that company's Scope 1 (direct) emissions.. However, that company would need to consider the Scope 3 emissions associated with the production and transportation of the diesel fuel, that is combusted by their equipment, to understand their total emissions footprint. A service provider, such as GLJ, would not have any of these emissions in category 3 or 4 associated with our operations.

After evaluating each category to determine whether your organization has emissions associated within it, the next step is to evaluate whether those emissions are material to your total emissions. To simplify, consider how much omitting those emissions from that source will affect your overall emissions. A specific threshold is not set by the GHG Protocol, so an organization needs to be aware of the regulatory specifications of their jurisdiction to ensure compliance. GLJ's Sustainability & Emissions Management team has worked directly with our clients to fully evaluate their current requirements and to prepare for upcoming international trends. However, we have also provided independent third-party verification of emissions profiles that companies have created internally. Both roles add a level of third-party assurance to the values reported.

But Who Cares ... You Should!

Equipped with a general understanding of what Scope 3 emissions are and how to evaluate them at a high level, many will still believe that they don't have to consider them further. Why is that? There are many common myths that people put out there as legitimate reasons not to care:

- Scope 3 emissions do not apply to me or my organization.
- Regulations do not require my size or type of organization to report our emissions.
- Scope 3 emssions are double counting.

Burying your head in the proverbial sand may have worked up until now, but national and international trends are rapidly forcing a change to that approach. Scope 3 emissions have the unique ability to impact your organization from multiple angles through numerous levers. **Understanding all the implications of Scope 3 and starting to prepare now can allow your organization to maximize its opportunities rather than just managing the impending risk.**

Scope 3 Emissions Do Not Apply to Me

There is a common misconception that Scope 3 only applies to public companies with large emissions profiles. This viewpoint is short sighted and leaves many companies at risk. Although there are obvious ways in which Scope 3 emissions impact some companies directly, the interesting part is the way in which Scope 3 emissions will impact a large majority of companies indirectly. Understanding the ways in which your company's emissions impact your value chain, the reasons that private companies need to be concerned, and the international regulatory pulse will help your company to meet the Scope 3 requirements that are at your doorstep.

"There is a common misconception that Scope 3 only applies to public companies with large emissions profiles."

Your Scope 1 and 2 Emissions are Another Organization's Scope 3 Emissions

One of the major mistakes that companies make is limiting their view of Scope 3 emissions to only what is within the boundaries of their own company. However, the reality is that your company is part of other companies' value chains. Simply stated, this means that your Scope 1 and 2 emissions are part of the Scope 3 emissions attributed to every single company in your value chain.

That subtle shift in perception allows for the realization that standards and regulations that require the reporting of Scope 3 emissions are a large sustainability lever. Consider a small business that provides office materials to an intermediate-sized oil and gas company. As an individual company, there might not be a requirement to report its emissions to any regulatory body. However, as energy companies come under greater scrutiny for their emissions as regulations evolve, that office supply company's clients will be required to consider and/or report their total emissions. This includes the oil company's Scope 3 emissions, which the office supply company is a part of.

This illustrates how companies that are not currently regulated may need to be able to quantify and report their emissions long before regulations impact them individually. Even though a company may not at this time be required to report its own emissions, it may need to report its emissions because they are a part of an emissions-reporting company's Scope 3 emissions footprint. Maintaining clients, that are required to report, means being able to provide their emissions profile or risk loss of that market share to other companies that are prepared.

"Even though a company may not at this time be required to report its own emissions, it may need to report its emissions because they are a part of an emissions-reporting company's Scope 3 emissions footprint."

This is the method in which the requirements enforced upon specific industries trickle down to all the companies that desire to remain a part of their value chain. To better understand this effect, a general understanding of the international regulatory framework, and how that is being implemented at the national level highlights this effect is required.

Regulatory Changes on the Horizon

As nations work to meet the terms of their increasingly ambitious international commitments to reduce emissions and address climate change, there is a corresponding evolution in applicable legislation and regulations. Governments need to be able to quantify emissions from industry to be able to understand the national emissions footprint and to track progress toward their targets; this means that they require reporting directly from emitters. In Canada there are mandatory reporting requirements for heavy emitters, but many sectors have been exempted from emissions reporting. However, the increasing demand for decision-useful information for investors has led to an increase in mandatory climate-related disclosures internationally. To be decision-useful the disclosures must be complete, accurate, comparable and verifiable which presented the need to develop an international framework and industry specific standards to promote the efficiency of global financial markets. Nations would then have the ability to incorporate these standards to create or enhance the reporting requirements within their local context.

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The Rise of an Integrated International Financial Reporting Standard for Sustainability

The need for complete, accurate, comparable, and reliable climate-related data led to the creation of several reporting frameworks and standards internationally such as those released by the Sustainability Accounting Standards Board (SASB), Task Force on Climate-Related Disclosures (TCFD), Climate Disclosure Standards Board (CDSB), International Integrated Reporting Council (IIRC), and Global Reporting Initiative (GRI). Each effectively promoted the disclosure of more sustainability-related information, but as companies adopted different standards the comparability between reports was diminished. There was a recognition through the different standards that there needed to be a single international standard that incorporated the most effective elements of all the disclosure mechanisms.

In 2021 SASB and IIRC combined to create the Value Reporting Foundation (VRF), and in 2022 the CDSB joined forces with the VRF to form the current International Sustainability Standards Board (ISSB). This independent board is under the umbrella of the International Financial Reporting Standards (IFRS) Foundation. The intention was to create a comprehensive reporting framework that would support investors for investment decisions, so the ISSB mirrored its sister agency under the IFRS: the International Accounting Standards Board (IASB).

After extensive collaboration and feedback, the ISSB released in July 2023 its sustainability disclosure guidelines:

- IFRS S1: General Requirements for Disclosure of Sustainability-Related Financial Information
- IFRS S2: Climate-Related Disclosures (3)

These industry-agnostic guidelines establish the framework for what sustainability information to report and how to report.

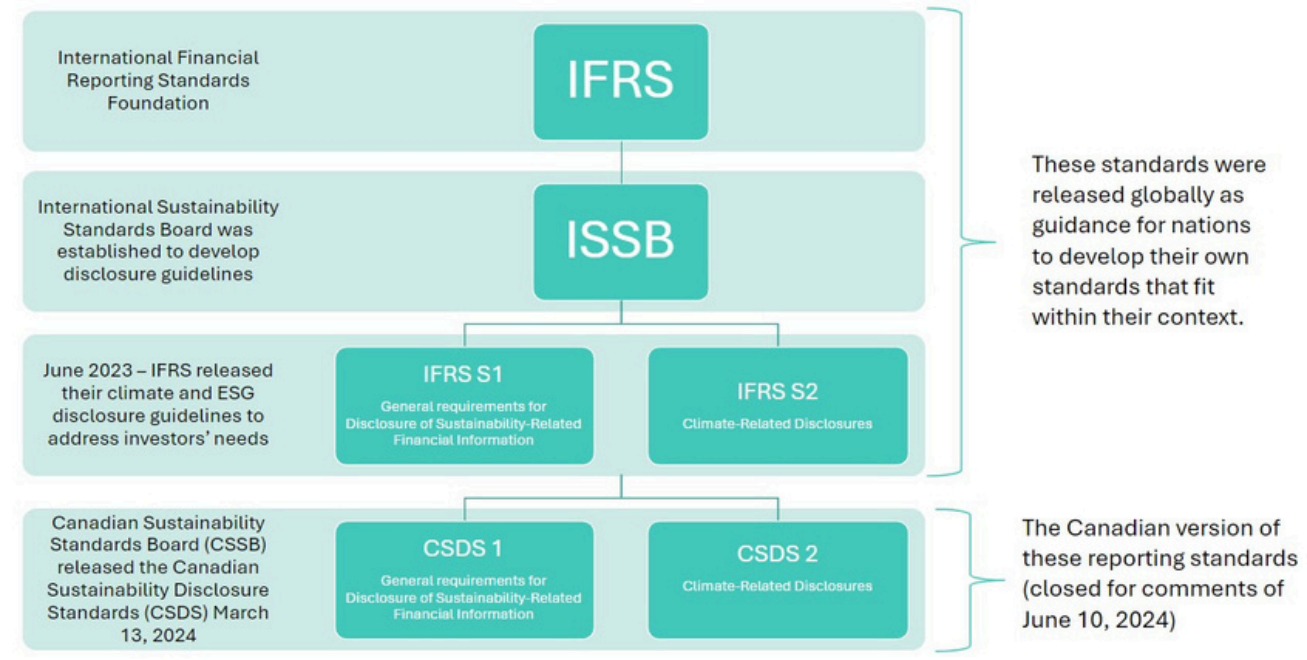
They incorporate investor-focused standards and frameworks from SASB, TCFD, IIRC, and CDSB as they promote complete, comparable, and reliable reporting. The core concepts of governance, strategy, risk management, and metrics and targets are taken directly from the TCFD. This establishes a structure for sustainability reporting across industries internationally. However, what applies to one sector may not apply to another; regulations that impact oil and gas exploration and production might not impact service companies. To ensure that the data is meaningful, the ISSB maintained the SASB industry-specific standards. For compliance, each industry must follow these standards for reporting, but they are permitted to refer to additional standards such as the CDSB and GRI for guidance on reporting additional information material to their organization.

The design of the IFRS S1 and IFRS S2 is to ensure that comprehensive decision-useful information is disclosed, that the application of the standards is international, and that the standards are interoperable with national requirements. Shortly after the release of the IFRS Sustainability Disclosure Standards, the International Organization of Securities Commissions released its endorsement of the standards (4), further promoting their adoption by the international financial industry. How the standards are applied at the national level is determined through national government agencies and regulatory bodies.

Translation into the Canadian Context

With the release of the IFRS S1 and IFRS S2 in July 2023, countries are working to adopt the standards into regulations that support their national context. Financial Reporting and Assurance Canada (FRAS) established the Canadian Sustainability Standards Board (CSSB) to create the Canadian Sustainability Disclosure Standards (CSDS) based on the IFRS Sustainability Disclosure Standards.

The CSSB released the exposure drafts of the CSDS 1 and CSDS 2 on March 13, 2024; the proposed standards were open for public comment until June 10, 2024. The proposed voluntary reporting is currently recommended to start January 2025 with the Scope 3 reporting requirements from the ISSB to be implemented January 2027 (5).



As with the international standards, the Canadian standards are voluntary until incorporated into regulations. The Canadian Securities Administrators have been waiting for the final release of the Canadian version of the IFRS Sustainability Disclosure Standards to finalize reporting requirements through the proposed National Instrument *NI 51-107: Disclosure of Climate-related Matters* (6). This National Instrument becomes mandatory through the provincial and territorial securities acts. Each of these levels of approvals follow due process, which includes public feedback before implementation. It is important to note that the CSA has been engaged with the CSSB through the development of the CSDS. The CSA is well informed of the CSSB's process and potentially capable of quickly implementing the standards once finalized. Relying on having additional time after the CSDS are released is a strategy that could hurt companies in the near future. Understanding, quantifying, and reporting direct emissions can be challenging. Scope 3 emissions are infinitely more complex and will take substantially more time to be able to confidently disclose. Companies need to start the process now.

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In addition to the indicators within Canada's borders that signal the increase in mandatory disclosures of climate-related information, companies can look to international mandatory reporting trends to support the requirement to address their Scope 3 emissions sooner rather than later. The evolution of reporting requirements in the EU and the US shed light on future disclosure in Canada.

The EU implemented the *Corporate Sustainability Reporting Directive* (CSRD) January 5, 2023, based on the European Sustainability Reporting Standards (ESRS). The ESRS was published in December 2023 with companies expected to apply them to their 2024 financial year. Canada can reasonably expect a similar turnaround from the release of the standards to their implementation by the CSA. Additional insight can be taken from the EU CSRD impacts both publicly traded and large private companies. As it is phased in, this will expand to medium and small businesses, indicating that mandatory reporting will impact more than just publicly listed companies.

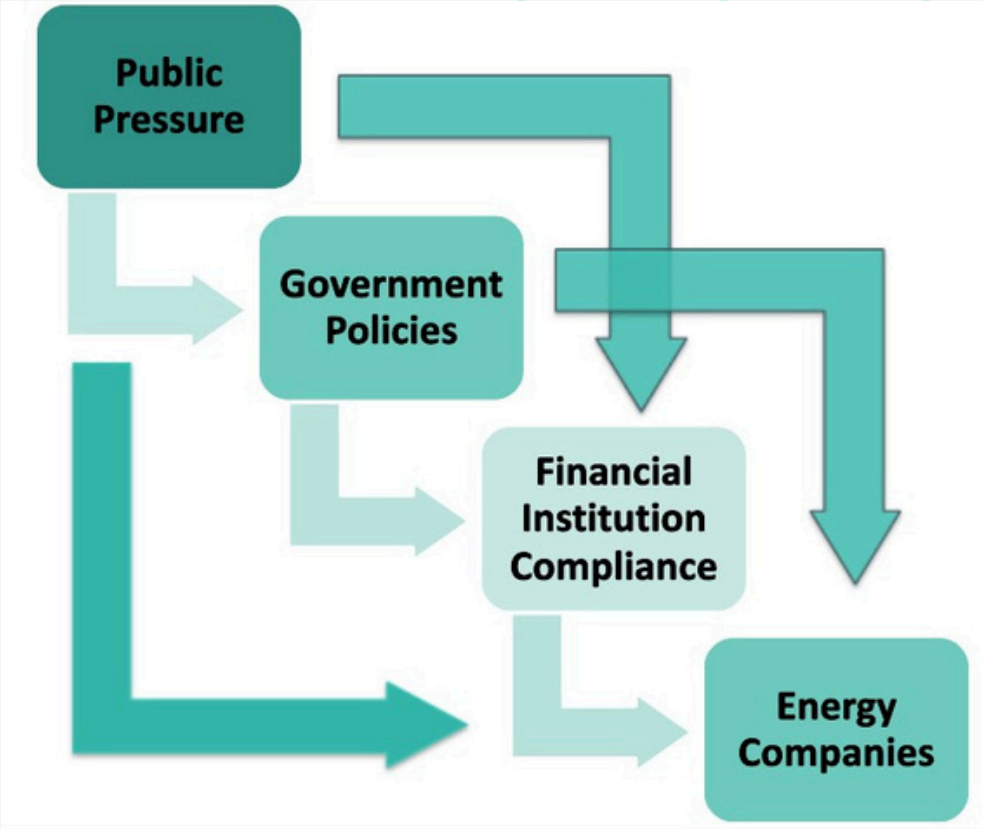
The US Securities Exchange Commission (SEC) released the final rules for *Enhancement and Standardization of Climate-Related Financial Disclosures for Investors* on March 6, 2024. Part of the delay in finalization was to evaluate and incorporate the IFRS Sustainability Disclosures Standards. The SEC Chair, Gary Gensler, recognized that many investors are utilizing Scope 3 emissions in their investment decisions, however, Scope 3 emissions were removed from the final rules (7). The final rules apply to both public and private companies. Disclosure requirements are established based on market capitalization. In California, the Climate Corporate Data Accountability Act was enacted in 2023 and requires Scope 3 emissions reporting starting in the 2027 financial year (8). This impacts any company formed in the US that does business in California with revenues over $1 billion. Although this state law is directed at larger companies, the trend is clear that the type of companies impacted is continuing to expand.

These international standards include Scope 3 emissions reporting and have expanded the number of companies required to disclose climate-related metrics. This indicates that the face of the reporting entity is continuing to change. Companies are advised to begin capturing their Scope 3 emissions to be ready to disclose under continually evolving frameworks.

Only Public Companies are Affected

Each regulatory jurisdiction is unique in the specific industries or the size of companies that are required to report on their emissions. There are many ways in which these evolving regulations can impact every company, even if those that are not directly regulated. The regulatory trend is that more companies are being incorporated into mandatory sustainability requirements. The example in previous sections illustrated how unregulated companies may need to start quantifying and reporting their emissions voluntarily to maintain their market share, however there are additional ways in which this voluntary reporting may be required.

In Canada, the first companies expected to report are federally regulated financial institutions. This appears to be far removed from the average small business. However, federally regulated financial institutions include banks, trust companies, and pension funds, all of which provide capital through investments and financing. As these institutions are required to report their climate and sustainability risks, they will be forced to carefully evaluate the investments in their portfolios for the same risks. This means that there will be a greater onus on companies, that are not directly required to report, to disclose this information to maintain access to capital. This will include their emissions footprint as well as other material sustainability metrics.



In this manner, strategically implemented regulations result in the government indirectly influencing many industries to evaluate climate and sustainability risks long before there are federal or provincial requirements. The government is able to address public pressure to implement change without introducing additional legislation and regulations directly targeting many industries. In addition, it limits the resources required to receive, review, and enforce reporting. Finally, it allows the government to ensure that most industries are ready to report and more open to future regulatory expansions that may include more industries or smaller companies. This creates a natural progression of greater compliance nationwide as companies work to meet the demands of investors and financiers

" ... indirect pressure to provide sustainability information extends from banks to investors to insurance companies that are required to better understand risk profiles while managing their clients' unique needs. "

The Emissions Reporting/Access to Capital Nexus

As discussed, many Canadian companies will likely feel the pressure to report through financial instruments before being directly regulated themselves. This indirect pressure to provide sustainability information extends from banks to investors to insurance companies that are required to better understand risk profiles while managing their clients' unique needs.

Access to Capital

As financial institutions are required to disclose sustainability metrics and climate related risks, they will be forced to understand their total emissions. This means evaluating and reducing Scope 3 emissions. For most financial institutions, which are service providers, Scope 3 emissions will likely be their largest source of emissions and their most easily influenced source for emissions reductions. They can do this through influencing their clients to reduce their emissions via lending policies or through asset divestiture. Both are strong levers to encourage companies to understand current emissions and plan to minimize their contribution to global emissions.

Financial institutions are positioned to influence their clients through lending facilities such as sustainability-linked lending (SLL), which ties a company's ESG performance to preferred lending terms. Collaboration with the borrower determines the meaningful ESG targets with quantifiable metrics to measure progress. ESG performance that is in line with these established targets allows the company to potentially access reduced interest rates.

"Many financial institutions currently focus on Scope 1 and 2 emissions reductions, greater DEI (diversity, equity and inclusion) practices, or improved Indigenous engagement. However, as national and international climate targets become increasingly ambitious this focus may start to include absolute emissions which includes Scope 3."

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There is also the need for providers of capital to manage risk effectively, and there is increasing recognition that ESG performance is directly tied to a company's risk profile. As risks increase in relation to transitioning policy and market drivers, and the physical impacts of natural disasters continues to escalate, **financiers are required to consider how these factors impact a debtor's ability to meet repayment terms**. Decarbonization efforts, as a result of climate change, increase the risk associated with new carbon-intensive projects.

Banks are starting to reflect this in their lending policies. HSBC is an example of a global lending institution taking a strong stance. As part of its Net-Zero by 2050 target, it has publicly stated that it will "no longer provide new lending or capital markets finance for the specific purpose of projects pertaining to new oil and gas fields and related infrastructure when the primary use is in conjunction with new fields" (9). HSBC elaborate on its decarbonization goals by stating that it will not "provide any new financing to any client where the client declines to engage sufficiently on its transition plan or HSBC determines that the plan is not compatible with HSBC's Net Zero by 2050 target" (10). This demonstrates the need to understand absolute emissions profiles and be able to disclose that information to financial institutions to maintain access to capital.

Investing in Resiliency

Reporting requirements for banks are only one driver for change. Investors are leading the way in asking for access to material information for making investment decisions.

There has been increasing awareness that climate change fundamentally affects the long-term returns and resiliency of investments. Climate change creates the potential for both physical risks, such as wildfires experienced this past summer, and transitional risks, from changing environmental, social and governance policies and regulations.

Consider an energy company with major operations in a region experiencing mounting water stress due to increasing temperatures and changing hydrological cycles. The physical risk for wildfire potential escalates which opens that company to increased downtime and reduced production due to evacuation. In addition, any equipment or sites that are damaged due to the impacts of fire will also require replacement or restoration. Include the cost of regulations imposing increasing carbon prices and potential emissions caps driving those costs even higher for that oil and gas company. Suddenly investment in that company appears riskier than a counterpart that is in an area not impacted by drought. Those are easily illustrated examples of climate-related financial risks that investors consider material to their investment decisions, but this scrutiny is pushing into more intricate areas of sustainability including Scope 3 emissions.

Investor groups such as Climate Action 100+ includes over 700 investors that focus on engaging the largest emitters to reduce emissions, improve ESG performance, and increase climate-related disclosures (11). With $69 trillion in assets under member management, their recognition that improving ESG performance has a direct impact on creating long term value for shareholders, has influence on the decisions being made and a strengthening of climate-related disclosures from large emitters worldwide. They engage with the top 170 emitters which are evaluated on their absolute emissions – Scope 1, 2 and 3 emissions. Each company is evaluated based against the Climate Action 100+ *Net Zero Company Benchmark* which includes Scope 3 emissions reporting and reductions.

Oil and gas majors are on the list of companies evaluated, and since the formation of the Climate Action 100+ in 2017 there have been some massive movements in the net zero ambitions. In 2022, BP became the first to pledge a triple net-zero target for 2050 (12). According to their progress update in 2023, this addresses the emissions across the full life cycle of their products including production (Scope 3), operations (Scope 1 & 2), and sales (carbon intensity) (13). As the evaluation, transparency and disclosures increase from the majors, the expectation from investors will continue to trickle down to other oil and gas companies. Continued focus on Scope 3 emissions by investor groups will increase the importance of companies to measure and disclose this important sustainability metric as they work to attract investors that are increasingly concentrating on climate-related financial risks

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Insurance is Risk-Averse

By its very nature, insurance is meant to protect against risk. As climate change results in greater frequency and severity of natural disasters such as wildfires, hurricanes, and extended droughts, insurance companies are being exposed to a widening insurance protection gap; due to the rise in the economic loss associated with these catastrophic conditions, the insurance industry is continually falling short in the percentage of these losses that are insured. Continued losses have moved climate-related risks exposure to become a critical consideration for insurance companies (14).

This translates into insurance premiums that are rising to accommodate these additional costs and insurance companies pulling out of high-risk areas. The European Union's European Insurance and Occupational Pensions Authority (EIOPA) have already begun including the concept impact underwriting in their non-life insurance products. This allows them to consider climate adaptation measures in their underwriting practices (15). As with the introduction of dashcams to prove defensive driving, the need to be able to provide data that shows a reduced risk profile will be increasingly required to maintain access to lower insurance premiums. The evaluation of the emissions profiles of the value chain will allow the company to identify climate-related risks to the organization. Identifying and resolving these risks early will help the company to minimize the impacts of insurance companies responding to the climate-related risks exposure.

Raising Capital Sustainably (Sustainability-Linked Lending & Bonds)

There is a substantial silver lining to being prepared to report these sustainability metrics to banks, investors, and insurance companies. That is the ability to raise capital through preferential lending rates associated with Sustainability-Linked Lending, or through the release of Sustainability-Linked Bonds. Enerplus (16), Tamarack Valley Energy (17) and Petrobras (18) are examples of oil and gas companies that have transitioned credit facilities to sustainability-linked lending (SLL) facilities. Each has pledged ESG targets that represent improvements that are material to their organization and in return were able to negotiate better lending terms.

"There is a substantial silver lining to being prepared to report these sustainability metrics to banks, investors, and insurance companies. That is the ability to raise capital through preferential lending rates associated with Sustainability-Linked Lending, or through the release of Sustainability-Linked Bonds."

The specifics relating to our presentation of Tamarack's SLL Facility are limited to Q3 Interim Financial Statements, where notes describe that meeting sustainability performance targets (SPTs) will result in a decrease in the cost of borrowing up to 5 basis points (19). This demonstrates the savings that are realized as Tamarack advances its ESG performance. As long as Tamarack stays on target with the SPTs of GHG emissions reductions, advanced asset retirement obligations, and improved Indigenous employment, then the preferential terms of the SLL facility will be maintained.

In addition to SLLs, companies such as Enbridge (20) and Tamarack Valley (21) have released sustainability-linked bonds (SLB) and notes to help raise capital for their organizations. As with SLL, SLBs are tied to ESG key performance indicators (KPIs) and sustainability performance targets (SPTs). Failure to meet targets results in a step-up in interest rates payable, providing increased incentive to measure, track, and report performance.

Whether it is through SLL facilities or the release of SLBs, sustainability performance is tied to an effective strategy for gaining access to additional capital. The business case to become a leader in responsible development and to accurately measure and report ESG KPIs is demonstrated through these strategies. With oil and gas companies, emissions reductions are focused on Scope 1 and 2 emissions but increasing focus on decarbonization will extend this focus to include Scope 3 in the near future. In addition, companies with a low direct emissions profile, such as pure-play royalty companies, may not be able to access these financial mechanisms without looking at their Scope 3 emissions. This illustrates the strategic advantage that these companies might be able to gain through determining the emissions in their value chain before it is mandatory to report.

"Companies need to begin evaluating their ability to meet the demands of banks, investors, and insurance companies that need to understand risk profiles (including Scope 3 emissions) before seeking new capital or insurance policies. "

Companies need to begin evaluating their ability to meet the demands of banks, investors, and insurance companies that need to understand risk profiles (including Scope 3 emissions) before seeking new capital or insurance policies. Determining material topics for disclosure, quantifying, recording, and reporting this information can be both time and labor intensive. Delays in starting the process can have major price implications.

The Double Counting Dilemma

Double counting continues to be brought up in the realm of Scope 3 emissions. The argument is that there is a vast potential for value chain emissions to be counted by more than one organization as they earnestly try to recognize their total emissions. There is some validity in this statement, but it is rooted in a misunderstanding regarding the intentions of Scope 3 emissions versus Scope 1 and 2. To reduce the chance of double counting there needs to be an internationally recognized standard and corresponding methodology that is incorporated in legislation enacting mandatory reporting globally. This would allow for complete, comparable, and verifiable data to be accessed on a global scale.

Before taking the last two sentences as support for the double counting argument, stop to consider that the intent behind Scope 3 emissions reporting differs from Scope 1 and 2. Scope 3 is meant to address the organization's absolute emissions footprint and to start the conversation to influence change within the broader value chain.

Addressing Your Emissions Footprint

Emissions reporting is intended to allow organizations to understand the total emissions profile from their business activities and to hold them accountable for implementing changes to reduce their footprint.

However, as the Scope level increases from Scope 1 to 2 to 3, it is understood that the ability to access complete, timely and reliable data decreases and that the ability to influence change diminishes. This is reflected in the level of accountability enforced through legislation.

Scope 1 emissions are regulated federally through the Greenhouse Gas Reporting Program and the Greenhouse Gas Pollution Pricing Act which enforces GHG reporting and carbon pricing. **Each organization has the ability to improve their measurement, recording and reporting methods** to ensure accuracy. Furthermore, they can choose to invest in improvements in leak detection and repair, equipment and process efficiencies, decarbonization technologies, and asset diversification. An organization's direct ability to implement change allows regulatory bodies to effectively hold companies accountable through reporting and taxation.

In Alberta, the Technology Innovation and Emissions Reduction (TIER) regulation requires large emitters to report GHG emissions. It currently applies to facilities with annual GHG emissions over 100,000 tonnes of CO2 equivalent (CO2e) or an annual importation of hydrogen (H2) over 10,000 tonnes. Emissions in excess of the facility-specific benchmarks are subject to carbon pricing which increases annually by $15/tonne of CO2e up to $170/tonne CO2e in 2030 . TIER provides flexibility for emitters by allowing the reduction of the final tax amount through emissions reductions, emissions performance credits, or Alberta-based emissions offsets (22).

Similar to Scope 1, organizations have influence over their sources for power, heating, and cooling to facilitate their organization's operations. In most areas, there are multiple options for power providers and customers have the ability to choose to incorporate lower carbon emissions. As demand increases for low carbon power generation, an increase in investment for additional sources occurs.

Larger companies that operate in areas with fewer choices can collaborate with power generation companies to improve their carbon footprint through power purchase agreements (PPAs). By agreeing to purchase the low carbon energy at a predetermined price, it lowers the associated risk for the power generator and allows it to invest in decarbonization efforts that support client goals. In addition, most power generation companies need to record and report their emissions, meaning that reliable data is easily accessible to their clients. This supports organizations to report effectively on their Scope 2 emissions. The combination of access to data and ability to influence change makes Scope 2 emissions an easy addition for reporting and for efforts to improve total emissions. However, the inability to directly control the emissions of related to power, heating, and cooling generation means that regulatory bodies could require reporting, but they would be limited in their ability to enforce change.

As an organization starts to account for Scope 3 emissions, additional issues will arise. Not all the companies or customers in a given value chain will be required to report emissions which may limit access to complete data. Technologies or products may be nascent and reliable data related to emissions may not yet be available. Large portions of Scope 3 data may be unknown or may be an approximation. Inability to access accurate, complete, timely, and reliable data leads to a greater potential for over, or underestimation, of a value chain's emissions and the portion that is attributable to an organization's activities. Double counting is inevitable in the nascent stages of Scope 3 reporting.

Before having that 'Ah ha! I knew it' moment, stop to reconsider the Scope 1 emissions regulations. The Greenhouse Gas Reporting Program was established in 2004 and has evolved slowly to include smaller emitters. Heavy emitters have had 20 years to understand direct emissions and to help bring better monitoring equipment to scale. Smaller emitters can benefit from this technology being more affordable as they needed to report. The Greenhouse Gas Pricing Act came into effect in 2019 and Alberta has had output-based pricing in effect since 2007.

This has incentivized industry to reduce emissions for years. It took time and increasingly stringent requirements to allow Scope 1 emissions reporting and improvements to mature. The same will be the case for Scope 3 emissions.

As more governments consider including Scope 3 emissions in mandatory climate-related disclosures, it is with the understanding that there are challenges outside of the reporting organization's control to provide complete, accurate, and verifiable data for their entire value chain. However, as with Scope 1 and 2 emissions, the process needs to begin to be able to improve. A company needs to start to evaluate value chain to identify what is material, where there are gaps in information, and how to manage risks and maximize opportunities. As organizations start this process, governments tend to be flexible in the reporting requirements for Scope 3. This is part of the process for an organization to understand the full emissions impact of their organization's activities and to identify areas for improvement. As with Scope 1 emissions, it can be expected that these requirements will become more stringent as nations work to achieve their net zero targets.

"Alberta has had output-based pricing in effect since 2007. This has incentivized industry to reduce emissions for years. It took time and increasingly stringent requirements to allow Scope 1 emissions reporting and improvements to mature. The same will be the case for Scope 3 emissions."

Starting the Conversation for Change

As requirements for reporting become more stringent, more companies will be required to report. Many companies have realized this means that even if they do not need to report yet, that this process will take time and are starting to engage with companies in their supply chain. This allows the reporting organization to understand what information is available, how it can influence more companies to disclose their emissions and what risks and opportunities exist within its value chain. Once that information is known, the reporting company can start the conversations for change.

Consider a large midstream producer that has been hiring a local caterer that has excellent service, incredible food and employs local people. As the midstream producer evaluates its supply chain, it will likely identify that this small business does not report emissions. It have the option to choose a large caterer that does report to be able fill this data requirement. However, when it compares the potential emissions of this caterer in relation to the upstream exploration, production, and transportation of the oil and gas integral to the organization's production, it will likely realize that these emissions are immaterial in comparison to the rest of its Scope 3 emissions. As it continues to support this local business, it can also work to educate the caterer of simple ways to start understanding and disclosing emissions. In this way it can stay true to its organizational goals while helping smaller businesses learn how to become more accountable in the future.

During this same exercise, that midstream producer realizes that exploration and production is an enormous part of its Scope 3 emissions profile. Oil and gas are integral to its operations, which means that as long as its business model remains the same, it will need to continue to purchase these products. However, by evaluating the emissions profiles of potential producers there will be a recognition that there is a sliding scale of improving performance in the industry. There may be a need to reduce the volumes from companies with poor emissions profiles and that lack plans to improve. Conversely, starting to address Scope 3 emissions before it is mandatory can give this midstream producer the flexibility to discuss its goals for improvement with these producers, highlighting the need for improved performance. **This can give the upstream producers the time and incentive to start to reduce their emissions to maintain their market share** with that midstream organization. This is how the midstream producer can start to influence real emissions reductions in its supply chain.

This process may also start to highlight the oil and gas companies that have pursued independent third-party verification of their hydrocarbons as being responsibly sourced. Independent organizations such as Equitable Origins (non-profit), MiQ (not-for-profit) and Project Canary (B Corp) work with oil and gas companies to evaluate their environmental and social impacts. This ensures the data is complete, transparent, and third party verified.

Quebec distributor, Energir, recognized the value in sourcing responsibly sourced gas (RSG) and signed an agreement in 2020 to purchase gas certified under the EO100™ Standard for Responsible Energy from Seven Generations Energy (acquired by ARC Resources) at a premium (23). The certified RSG, which started through evaluating and working with its supply chain, ensured that Energir was able to meet its ESG goals.

"This process may also start to highlight the oil and gas companies that have pursued independent third-party verification of their hydrocarbons as being responsibly sourced. "

By starting to assess supply chain, it enables conversations, encourage continued improvement, and collaborate to access products that align with corporate goals. Starting early means that organizations have the time and flexibility to implement these initiatives in a staged and cost-effective manner. As with many things in business, waiting until the last minute may lead to paying a higher price to remain compliant. The ones that start in advance can balance premium pricing with lower cost alternatives from companies that are actively working to improve. In this way, the reporting organization can influence real change over time while strategically managing their costs.

Show Me the Data!

The other part of double counting is related to the inability to access complete, accurate, and reliable data. As more companies are required to report, data will become more available. Likewise, as more companies evaluate their Scope 3 emissions, companies that are not required to report will also start to disclose more to their value chain. Furthermore, as more companies initiate reporting, the technology to monitor, measure, and record will improve, and **the costs will reduce as demand increases.** This will make it easier and more affordable for smaller organizations to have source measurements of their emissions. All of these factors will improve the quality and accessibility of the data and will reduce the incidence of double counting in the future. However, this takes time to allow the reporting environment to mature. The effort starts now to ensure that the future is more transparent.

Double counting is inevitable at early stages, which is why regulations considering mandatory reporting and are not attached to carbon pricing. The intention is for companies to understand their total emissions footprint, and to start influencing positive change in their supply chain early enough to be managed cost effectively. All of these efforts will lead to improved data quality, which will eventually reduce the incidence of double counting.

In this second part of a two-part article, Kelley Rutledge of GLJ Ltd. completes her discussion of how Scope 3 GHG emissions reporting is now beginning to affect many of our organizations.

Scope 3 Emissions…. $ound$ Expen$ive!!

The biggest myth is that Scope 3 emissions represent only costs to an organization. In previous sections we have discussed the benefits of avoided costs through reducing insurance premiums and securing lower interest rates, and of capital generation through maintaining access to market share, attracting savvy investors, and offering Sustainability-Linked Bonds. This section will delve deeper into how GLJ has been helping clients to recognize the additional cost reductions and maximize value through differentiation.

Most companies consider investments based on the ROI, however we have been shifting the focus with our clients to a Sustainability Return on Investment or SROI. This involves widening the scope past the next quarter or corporate year end and making a holistic evaluation of each decision. This includes being able to quantify the qualitative environmental and social impacts. By looking at the full picture, boards, shareholders, and stakeholders are able to understand the direct and indirect economics behind each investment decision. The cost reduction and market optimization strategies discussed below include some of the many aspects considered in an SROI.

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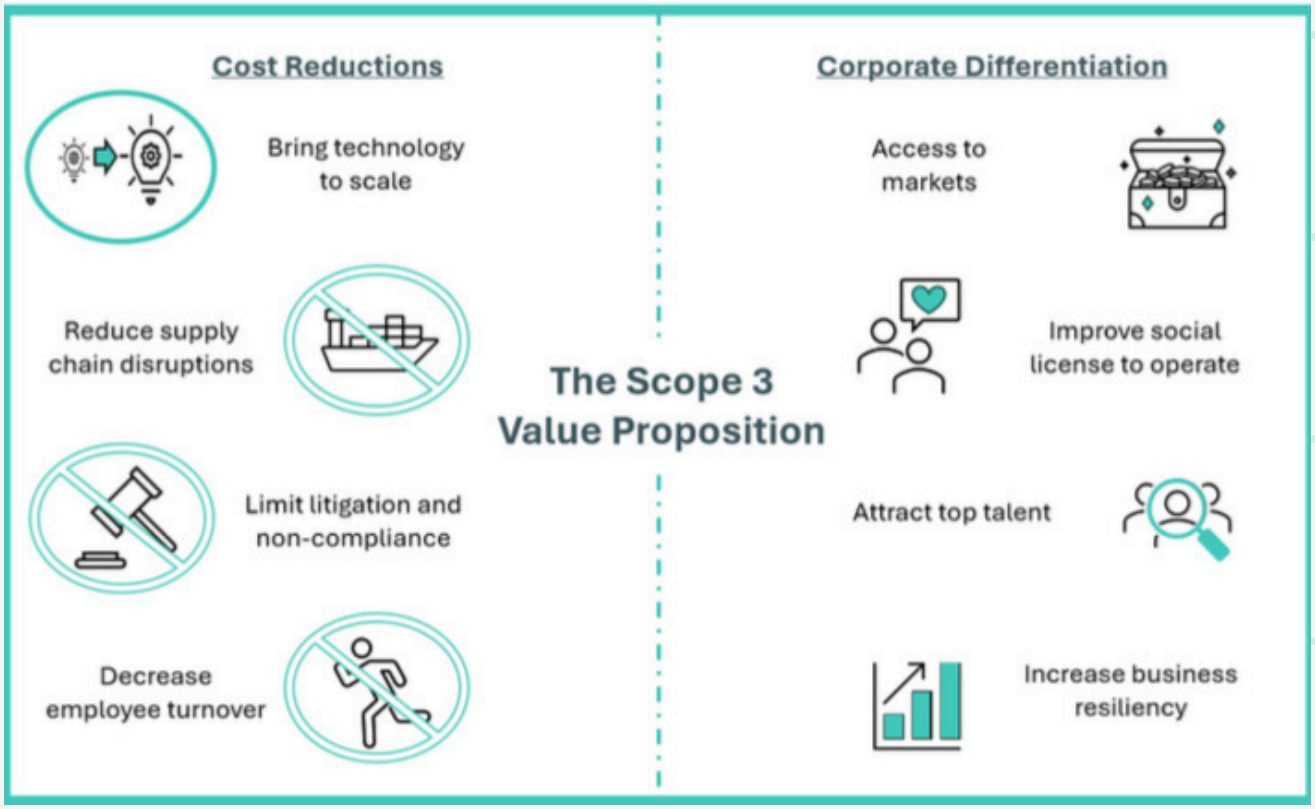


Cost Reductions

There are many cost reductions that can be linked to identifying, quantifying, reporting and improving an organization's Scope 3 emissions:

- Bringing to scale more sustainable options
- Reducing supply chain disruptions
- Minimizing cost of non-compliance
- Avoiding litigation
- Retaining talent

This is not meant to be an exhaustive list, rather to start the process of realizing the incredible influence that addressing these emissions can have.

Bringing to Scale More Sustainable Options

The focus on Scope 3 emissions forces a company to evaluate the supply chain from a different perspective. Previously, suppliers have been assessed on gradients of quality, availability, and cost as purchasers attempt to manage budgets. As long as they managed to stay within allocated budgets and the goods arrived on time, there was no need to delve deeper. Consider the purchase of pump manufactured in Canada versus a similar pump produced in Asia (assuming that a cross border pricing mechanism is not in place). Generally, the pump from Asia will have a lower price point even with shipping included. However, if a company considers the environmental standards that each company is held to and the emissions associated with transportation the balance starts to shift. As international pressures increase to improve environmental standards and emissions, companies in nations with lower environmental standards will need to invest large amounts to attain the Canadian standards. In addition, the transport industry is under increasing scrutiny to improve emissions profile which will require additional investments. This will lead to increased costs for production and transportation which will be passed on to the end user.

By considering the Canadian company now, the organization would reduce Scope 3 emissions associated with the manufacture and transportation of those products. These reductions would extend to replacement parts further reducing the emissions profile. By supporting the local company, the organization could help increase the scale and affordability of that pump and thereby reduce costs and emissions.

"The focus on Scope 3 emissions forces a company to evaluate the supply chain from a different perspective."

Reducing Supply Chain Disruptions

The choice to switch to the more emissions friendly option would extend into improving supply chain security and resiliency. Companies are realizing the importance of understanding the resiliency of the source of supplies. COVID-19 was the first glimpse of major supply disruptions as transport companies ground to a halt to manage a global pandemic. Although this disruption was not attributed to emissions, the repercussions for trade are still being felt. Although local manufacturers also had to slow production in this time, the additional hurdle of overseas transportation was absent for them. With geopolitical tensions mounting around the world, the headlines continually show the disruption of trade routes and mounting costs as transport ships have to deviate far off course. This not only causes unexpected prices for purchasers to soar, but it also increases the time for expected delivery. It has become increasingly clear that foreign suppliers are more vulnerable to global conditions that can be minimized through local sourcing with the added benefit of reducing absolute emissions.

Disruptions to an organization's supply chain can have costly consequences. Consider again the pump example during the expansion of a tailings plant. The delay of this integral piece of equipment can cost the company by having to pay crews that are on standby, reduced production output to manage reduced capacity of operations at the current facility, and the interest associated with a delayed plant start up. Quite quickly the indirect costs of the pumps, that are now being shipped around the Cape of Good Hope in Africa instead of through the Red Sea, mount in addition to the direct costs of increased transit. Considering purchases based on Scope 3 emissions could have already eliminated many overseas purchases and allowed companies to avoid these unintentional costs.

"It has become increasingly clear that foreign suppliers are more vulnerable to global conditions that can be minimized through local sourcing with the added benefit of reducing absolute emissions."

Minimizing Cost of Non-Compliance

Gone are the days of regulators giving out a "slap on the wrist" for non-compliance. The cost for non-compliance extends further than fines, penalties, and administrative sanctions imposed by regulatory agencies; it has moved into the public arena. With litigation against companies and boards of directors increasingly common, protests against development on the rise, and the general public making more stringent decisions about the companies they want to work for and do business with, companies cannot afford to sit idly by. There is a mounting expectation for companies to go beyond regulatory requirements to increase transparency, to strengthen disclosures, and to improve performance regarding climate-related topics.

Avoiding Litigation

Public scrutiny of oil and gas companies is mounting globally. In the US the states of Rhode Island and California24 combined with municipalities and counties in Maryland, Colorado, and Hawaii (25) have filed lawsuits against major oil companies alleging they knowingly contributed to climate change. In Canada, the Sue Big Oil movement is rallying local governments to join a similar class action suit against oil companies(26). Climate litigation continues to heat up, and one of the driving forces is the case against Royal Dutch Shell in the Netherlands.

The 2021 landmark ruling in Milieudefensie et al. v. Royal Dutch Shell plc. represented a shift in the belief that companies were immune from litigation regarding climate change mitigation policies. The environmental group Milieudefensie (Friends of Earth Netherlands) joined with other NGOs and over 17,000 citizens to serve Shell a court summons regarding the inadequate response to mitigate climate change.

The Hague District court ordered the Shell group to reduce the annual total volume of emissions 45% below the 2019 baseline by 2030; this includes the emissions from Scope 1, 2 and 3. Although this ruling is still under appeal, the court decision was provisionally enforceable requiring Shell to work toward reduction obligations as the appeal process occurs (27).

Continued public pressures are mounting for Shell as this court decision opened the pathway for the environmental charity, ClientEarth, a minority shareholder to apply to bring a derivative claim against the board of directors for failing to comply with the Mlieudefensie ruling. This was based heavily on Shell's failure to adequately address Scope 3 emissions, which entailed the majority of its aggregate emissions, and that they were going to miss the 2030 deadline for a 45% reduction. The claim was dismissed as ClientEarth failed to establish the standard of proof required by the courts (28), but these efforts managed to maintain the media spotlight on Shell's climate strategy and Scope 3 emissions. It was also attempted to establish the precedent of the Board of Directors being held personally accountable for reducing the impact on climate change. Failure to address climate-related risks is starting to increase the exposure of companies and their boards to litigation.

Retaining Talent

The attrition of talent has the upfront costs of job posting and recruitment, however the hidden costs associated with the loss of production, the gap in corporate knowledge, the training of new hires, and the potential for hiring the wrong candidate all add up to exponentially more (29). Estimates range from one half up to two times the lost employee's salary as the cost to replace that individual (30). This highlights the urgent need to retain an organization's talent.

The Great Resignation of 2021 has forced industry to reevaluate what is required to maintain top talent. Increasingly, the labour force is including whether their employer's social and environmental commitments align with their own evaluation of job satisfaction. Studies are increasingly showing the correlation between ESG performance and employee satisfaction, and that the Millennials and Gen Zs, that will soon comprise the majority of the workforce, are increasingly concerned with environmental and social factors (31). As companies work to retain human capital, consideration of corporate environmental performance is now a part of the equation. Being a leader in reporting and proving corporate momentum toward improvement will increasingly be required to maintain a loyal workforce. Effectively managing an organization's Scope 3 emissions can be a differentiating factor for employees and job satisfaction.

Market Optimization Through Differentiation

Reducing costs is an important first step toward a sustainable business strategy. However, the same information that allows an organization to reduce costs can also help them to identify strategies to improve market performance. This includes:

- Access to discerning markets and premium pricing
- Improved social license to operate
- The attraction of top-tier talent
- Enhanced corporate resiliency

Environmental performance can allow an organization to differentiate itself from competitors, improve revenues, and ensure that organizations remain profitable in these changing global markets.

"Effectively managing an organization's Scope 3 emissions can be a differentiating factor for employees and job satisfaction."

Environmentally Responsible Products Allow Access to Stringent markets and Premium Pricing

As companies continually attempt to improve margins, they look for ways to improve market share and the revenues from products and services. A thorough evaluation of the supply chain may reveal new technologies or process that can lead to sizeable emissions reductions that can differentiate an organization from competitors. Moreover, the recognition that a company's value chain is also evaluating theirs for the same reasons can allow establishment as the company of choice.

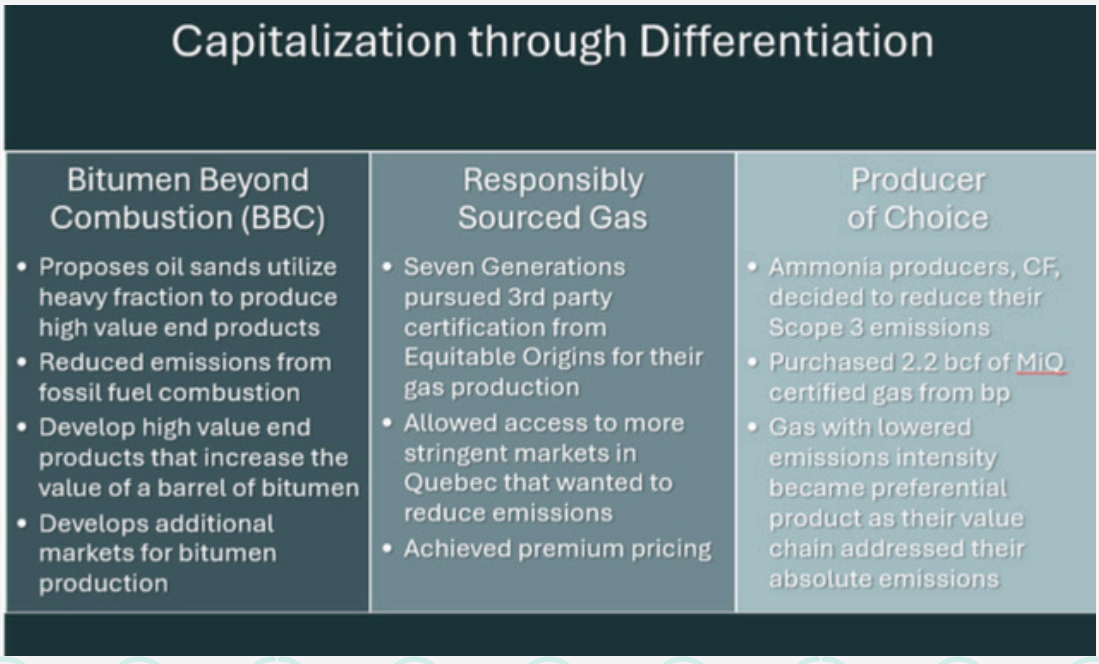
One of the largest issues facing oil and gas producers is managing the emissions from the combustion of fossil fuels. These emissions lie with the end user of the product which usually indicates that they are a part of Scope 3 emissions. As the focus intensifies on how to manage these emissions, the room for innovation has grown resulting in the development of alternative end use products. Oil sands producers struggle with a heavy emissions profile for fuel production combined with a large Scope 3 footprint for combustion. This led to the funding of research regarding Bitumen Beyond Combustion (BBC) products through Alberta Innovates.

In a paper released by Alberta Innovates, it was determined that diverting the heavy fraction from fuel production to the creation of carbon fibre, asphalt binder, or energy carbons (activated carbon and hard carbon) could lead to substantial emissions reductions and increased revenue (32). The greatest emissions reductions were realized through reducing the amount of fuel combustion, however additional reductions could be seen in both the manufacturing process and end use of products. Although there is an acknowledgment that pursuing this technology requires future investment, the potential value proposition of these alternatives may yield an additional $73-$179 per barrel of bitumen depending on the selected end product. By recognizing the sizeable Scope 3 emissions for bitumen production, innovators were able to identify high demand products that would reduce overall emissions, drive the value proposition, and find alternative markets for heavy oil as the market moves toward decarbonization.

"By recognizing the sizeable Scope 3 emissions for bitumen production, innovators were able to identify high demand products that would reduce overall emissions, drive the value proposition, and find alternative markets for heavy oil as the market moves toward decarbonization."

In the case of oil and gas producers this can translate to being able to establish hydrocarbons as responsibly sourced. As mentioned previously, this can be certified through independent assurance by Equitable Origins (non-profit), MiQ (not-for-profit) and Project Canary (B Corp). In 2020, this EO Certification translated to premium pricing for Seven Generation Energy (acquired by ARC Resources) when they sold responsibly sourced gas (RSG) to Energir. This certification allowed the Alberta-based company increased access to the Quebec market (33).

This extends to industries that use oil and gas as feedstock for products. CF Industries sought to decrease the Scope 3 emissions associated with its ammonia production. This led it to purchase 2.2 billion cubic feet (BCF) of certified gas from bp in 2023. This gas is certified through the independent, not-for-profit MiQ to have 90% lower methane emissions intensity than industry average (34). By recognizing its place in other organization's Scope 3 emissions, bp took steps to improve its ability to be producer of choice.



Fully understanding how Scope 3 emissions impact an organization and how an organization's emissions impact the Scope 3 emissions of their clients, can help an organization to pursue strategies to differentiate products and services from competitors. Being an early adopter can allow a company to capitalize on the transition as others work to catch up.

Social License to Operate

Litigation always draws a lot of negative attention, but any negative media can equally impact an organization by harming corporate reputation. The importance of a positive brand image has already been established, and this can extend into a company's social license to operate. As companies attempt to develop new projects it has been increasingly important to ensure that stakeholders and rightsholders are aligned with corporate strategy. Companies that fail to take this into consideration find costly delays in approval processes as there are additional steps to resolve these discrepancies (35). In the case of the Dakota Access Pipeline there have been continued delays, court battles, and mounting environmental assessments due to the protests of the Standing Rock Sioux Tribe (36). Environmental and social performance can be key to maintaining a good relationship with stakeholders and rightsholders. Reputable companies with meaningful engagement practices can streamline the process for approval allowing them to limit costly delays and negative publicity due to protests and opposition to development.

"Fully understanding how Scope 3 emissions impact an organization and how an organization's emissions impact the Scope 3 emissions of their clients, can help an organization to pursue strategies to differentiate products and services from competitors."

Talent Attraction

Differentiation can be realized through intangible assets such as an organization's employees. Maintaining a positive corporate culture that drives corporate success means being able to attract the right talent as the organization grows or changes. Corporate reputation is key to encouraging highly skilled people to consider joining an organization, and environmental performance is an important factor in that reputation.

One study found that over half of MBA graduates surveyed would accept lower pay to work for an organization that is environmentally responsible (37). Furthermore, other studies found that almost 40% of working adults would avoid working for a company with poor environmental performance (38). As companies compete to hire the best talent in the industry and that complement the current corporate culture, environmental performance will be increasingly important. And the reporting of the information will be vital as potential candidates review an organization before applying or accepting an offer. Working to continually improve absolute emissions and reporting progress against targets can help candidates to effectively evaluate environmental performance of an organization.

Corporate Resiliency

Corporate resiliency is no longer determined primarily through tangible assets or the returns on the quarterly financial statements. An organization's impacts on society and the environment around them is heavily scrutinized by financial institutions, investors, insurance companies, employees, stakeholders and rightsholders. It is paramount for organizations to understand these impacts and to be able to disclose the metrics surrounding them transparently. Providing complete, accurate, timely, and verifiable data is key to managing the risks associated with climate change and to maintain effective operations. In addition, this comprehensive access to data can allow companies to access new and more stringent markets, achieve premium pricing, and attract and retain industry's top talent.

Understanding the organization's absolute emissions footprint can allow them to effectively remain compliant in evolving regulatory requirements, manage escalating risks, and optimize future opportunities. Access to this information is vital for long-term corporate resiliency.

"One study found that over half of MBA graduates surveyed would accept lower pay to work for an organization that is environmentally responsible37. Furthermore, other studies found that almost 40% of working adults would avoid working for a company with poor environmental performance38."

Conclusion: Does Scope 3 Impact You?

The short answer is yes! Whether the impacts are directly through regulations, or indirectly through access to capital, maintaining market share, and retaining operational insurance, it is imperative to understand your Scope 3 emissions and your organization's role in your clients' Scope 3 emissions. In addition, Scope 3 emissions provides a unique opportunity to influence positive change in overall emissions reductions and to differentiate your company as a producer and employer of choice. Evaluation of Scope 3 emissions is time-intensive and requires attention long before mandatory regulations are imposed if a company intends to incorporate the information effectively into corporate strategy and manage the associated costs. There is an incredible opportunity for organizations to capitalize on these efforts if they are leaders in these initiatives. Waiting to get started will prove to be costly and may affect a corporation's ability to remain resilient and competitive in this changing energy landscape. If your organization doesn't have its own internal resources, it will benefit from obtaining capable support now to begin to navigate these increasingly challenging and complex Scope 3 reporting requirements and to turn this data into an effective strategy for its short, medium and long-term plans.

"If your organization doesn't have its own internal resources, it will benefit from obtaining capable support now to begin to navigate these increasingly challenging and complex Scope 3 reporting requirements and to turn this data into an effective strategy for its short, medium and long-term plans."

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Kelley Rutledge is a member of GLJ's Sustainability and Emissions Management team. As a Sustainability and Emissions Management Analyst, Kelley brings 15 years of operational experience in the upstream oil and gas industry, along with expertise in Sustainable Energy Development. She holds a BSc in Biological Sciences from the University of Alberta, a Fourth Class Power Engineering Certificate from NAIT, and a MSc in Sustainable Energy Development from the University of Calgary. Kelley is certified as a Sustainability Excellence Associate and an FSA Credential Holder. At GLJ, Kelley combines her professional and academic background to drive forward the energy transition.

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Engineering the Geothermal Heating and Cooling of Buildings

Silviu Livescu, Bedrock Energy

Geothermal Heating and Cooling of Buildings

Globally, we emit more than 50 billion tonnes of greenhouse gases each year, measured in carbon dioxide equivalents (CO2eq), with about 17.5% greenhouse gas (GHG) emissions being generated by the use of energy in buildings (Ritchie 2020). In the U.S., buildings account for more than one third of domestic climate pollution and $370 billion in annual energy costs (U.S. DOE 2024). A new comprehensive plan to reduce GHG emissions from buildings by 65% by 2035 and 90% by 2050 predicts consumer savings of more than $100 billion in annual energy costs and avoiding $17 billion in annual health costs (U.S. EERE 2024). To reach the overall GHG emissions reduction targets for the buildings sector, using geothermal energy and a new technology stack inspired by more than 50 years of oil and gas innovations can be quickly scaled up. The technology stack consists of an ultra-compact coiled tubing platform, real-time downhole telemetry hardware, and thermal subsurface modeling software. Using this multi-stack technology platform can significantly address the main adoption blockers of geothermal heating and cooling systems (i.e., affordability, predictability, and consistency) and greatly reduce the GHG emissions from buildings.

The Earth's temperature increases from atmospheric conditions to over 500°C in the lithosphere (the top layer of the crust), to around 1,000°C at the crust-mantle boundary, and to around 6,000°C at its center, with slight local variations within the first kilometers from the surface (Moncarz and Kurtyka 2023). At 10 kilometers of depth or shallower, just about every point on Earth has sufficient heat for power generation. And just about everywhere in the world, there is enough thermal energy within the first kilometer for heating and cooling of all our buildings.

"To reach the overall GHG emissions reduction targets for the buildings sector, using geothermal energy and a new technology stack inspired by more than 50 years of oil and gas innovations can be quickly scaled up. "

In his 2024 state of the Union address, U.S. President Biden spoke of how the Inflation Reduction Act (IRA) will cut America's energy costs, create jobs, and transform the U.S. efforts to address the climate crisis. His goal is to cut GHG emissions in the U.S. by an additional 31-44% by 2030 – on top of the present policy reductions of 24-25% - by investing in and promoting renewable and alternative energy technologies such as wind, solar, geothermal, and nuclear. Geothermal energy usage is poised to grow significantly in the current policy environment. The IRA benefits through 2034 provide drillers with certainty when investing in geothermal technology. In particular, IRA offers a 30-50% Energy Investment Tax Credit (ITC) for companies that install geothermal heating and cooling systems, also called geothermal heat pumps, ground-source heat pumps, geo-exchangers, or geo-heat exchangers. Businesses can deduct this percentage of their equipment and installation costs from their tax liability. This amounts to lowering the upfront installation costs by up to 50%, making geothermal energy extremely cost competitive with traditional heating and cooling systems.

The amount of energy used per capita varies due to such factors as the local climate and economy, but about 25 percent of the total energy worldwide is used for heating and cooling of residential, commercial, and industrial buildings. Most of these systems use fossil fuels to generate heat, which is then converted into electricity, which is then transported through energy-losing wires, and is eventually converted into heating and cooling of buildings. Geothermal heating and cooling systems have a reduced carbon footprint of about 90% when compared to modern heating and cooling systems that rely on fossil fuels or conventional HVAC systems. Decarbonizing buildings not only reduces GHG emissions, but also provides an added benefit in terms of lowering energy costs: geothermal systems can cut heating costs by 30-70% and cooling costs by 20-50% compared to traditional systems (Kapusta et al. 2023).

" ... about 25 percent of the total energy worldwide is used for heating and cooling of residential, commercial, and industrial buildings. Most of these systems use fossil fuels to generate heat."

There are several technology variations of geothermal heating and cooling systems. In general, they have three parts: 1. the geo-field, consisting of 500- to 1,500-ft deep vertical boreholes providing a closed-loop network of pipes; 2. geothermal heat pumps; and 3. the building HVAC sub-system. Here, the focus is on the geo-field construction, as this is a natural extension of the experience and expertise from the oil and gas industry.

For instance, defining large buildings as any buildings with an interior surface larger than 20,000 square feet, such as multi-family homes, commercial buildings, schools, universities, hospitals, military bases, warehouses, data centers, etc., a typical geo-field may consist of tens or hundreds or boreholes, with 10- to 25- ft between any two adjacent boreholes.

Geothermal heating and cooling systems are not a new concept, with high-profile systems being installed in many locations in the U.S., from Boise, Idaho, to New York City (Robins et al. 2021). Despite having been established as a proven technology, geothermal heating and cooling has several challenges, which, if not solved, prevent it from being scalable fast enough to meet the decarbonization aspirations mentioned above. In terms of subsurface capabilities, accurate site characterization, sound design methodologies, effective control logic, and short and long-term (life-cycle) performance analysis and optimization have been missing. Most of the existing drilling and geo-field construction techniques are similar to those from the water well drilling industry and not from the oil and gas industry (Khaleghi and Livescu 2023).

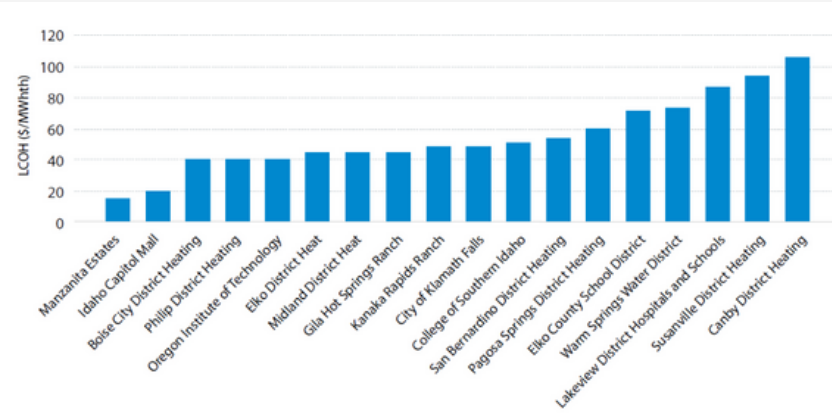

Figure 1 – Estimated LCOH for selected U.S. geothermal heating systems (Robins et al. 2021).

"Significantly reducing the large LCOH variability of geothermal heating and cooling of buildings should reduce their average LCOH below the average LCOH of natural gas."

The economic and thermal performance data of geothermal heating and cooling systems is sparse, and the levelized cost of heating (LCOH) of selected U.S. geothermal heating systems is shown in Figure 1 (Robins et al. 2021).

For comparison, the LCOH of selected U.S. and European geothermal heating systems ("GDH") and natural gas prices ("Natural Gas") are shown in Figure 2 (Robins et al. 2021). Assuming very optimistic conditions of 30-year lifetime, 5% discount rate, and overnight construction, LCOH for the selected U.S. systems ranges from $15 to $105/MWhth, with an average of $54/MWhth, which is lower than the average European LCOH of $69/MWhth, but higher than the average 2019 U.S. price of residential natural gas (IEA 2020). Significantly reducing the large LCOH variability of geothermal heating and cooling of buildings should reduce their average LCOH below the average LCOH of natural gas. This could be addressed by reducing the construction cost of geothermal heating and cooling systems and increasing their long-term energy consumption predictability and consistency.

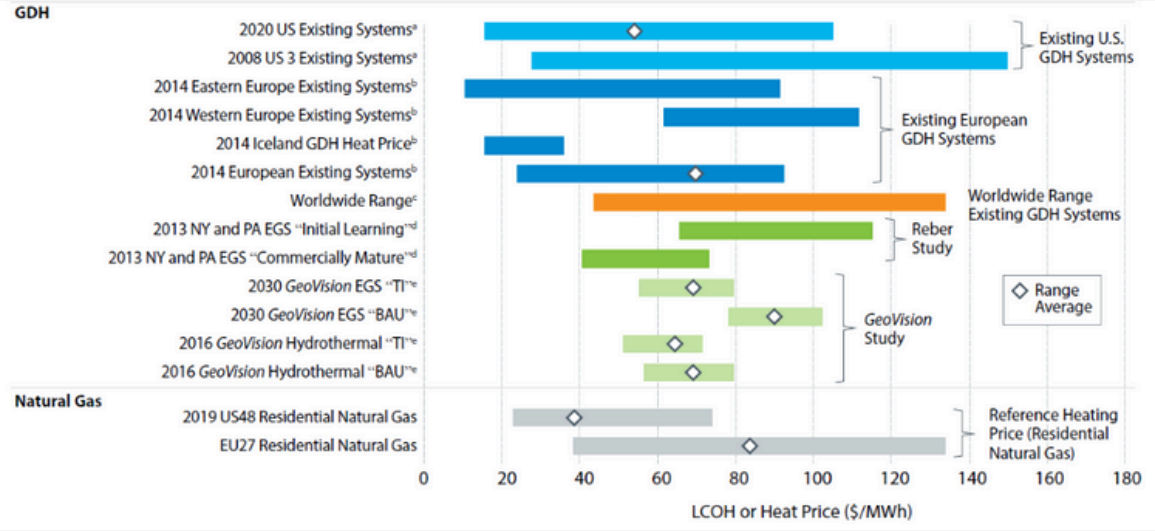

Figure 2 – Comparison of LCOH values for selected U.S. and European geothermal heating systems and natural gas prices (Robins et al. 2021).

Engineering Geothermal Heating and Cooling of Buildings

To address the current geo-field construction uncertainties and technical challenges, a new geo-field construction platform has recently been developed and deployed in Austin, Texas (Torres et al. 2024). It consists of an ultra-compact coiled tubing unit, shown in Figure 3, with integrated wired telemetry for real-time measurement of downhole parameters such as pressure, temperature, thermal conductivity, borehole inclination, weight-on-bit, etc., similar to those developed for oil and gas coiled tubing technologies (Livescu et al. 2018) and novel physics-based and data-driven subsurface heat models, again, similar to those developed for oil and gas coiled tubing applications (Aitken et al. 2018). Coiled tubing drilling is not a new technology and has received a large amount of press since the 1990s. However, it has never become a mainstream oil and gas well drilling technique due to several technical shortcomings, such as requirements for additional pipe handling equipment, long bottomhole assemblies, and larger blowout preventer stacks, and technical and operational difficulties with large diameter coiled tubing. Unlike the oil and gas wells, currently the shallow geothermal boreholes for the geothermal heating and cooling of buildings larger than 20,000 sqft are usually 300- to 600-ft deep (with the ultra-compact coiled tubing unit being able to drill 2,000-ft vertical boreholes), 4.5- to 6.5-in. in diameter, and open-hole.

Figure 3 – Example of a coiled tubing platform for shallow geo-field construction of large buildings in dense urban areas (Torres et al. 2024).

Thus, the geo-field construction for buildings is a great application for coiled tubing drilling due to its main advantages, including small footprint, high mobility, and quick operations.

The workflow for constructing a geo-field is:

1) based on the building size, location, and climate, an initial geo-field is designed, yielding the initial number and depths of boreholes;

2) while drilling, the subsurface conditions are measured and updated on the fly, and new geo-field layouts are simulated after each borehole is constructed, yielding updated number and depths of boreholes;

3) once the final geo-field layout is constructed, the geo-field network of pipes is connected to the geothermal heat pumps and the building HVAC sub-system.

“ … the geo-field construction for buildings is a great application for coiled tubing drilling due to its main advantages, including small footprint, high mobility, and quick operations.”

The extensive insights into the subsurface geological properties enable more efficient drilling operations, consequently reducing overall drilling costs and enhancing the financial viability of building heating and cooling projects. Further, during the operational phase, these models help maximize energy production potential while minimizing operational costs. One of the key innovations of this approach is the integration of the subsurface model with building energy models, making it possible to optimize the energy consumption of the entire building by more precisely matching energy demand with the corresponding energy source thereby addressing the issue of “thermal gap” between the subsurface domain and buildings.

"Using this multi-stack geo-field construction platform can not only greatly reduce GHG emissions from buildings, but also predictably and consistently reduce their average LCOH to about $30/MWhth, below the average LCOH of natural gas."

This approach has been already proven in a first-of-a-kind project in Austin, Texas, where the innovative geo-field construction platform was recently deployed in a parking lot of a commercial building with tenants inside.

Comparing to the current mainstream geo-field construction technologies consisting of rotary drilling rigs for water well drilling, this geo-field construction platform drilled three times faster and constructed a geo-field with a 60% smaller footprint, proving its affordability. The ability to measure downhole data in real time and update the geo-field layout on the fly is a powerful feature towards the long-term thermal performance predictability and consistency of the geothermal heating and cooling systems, which leads to the LCOH affordability, predictability, and consistency required for unlocking geo-field construction at massive scale. With extreme weather events from heat waves to cold weather anomalies increasing in frequency with a changing climate, geothermal heating and cooling presents as the low hanging fruit for increased reliability, resilience, comfort, and peace of mind for the built environment everywhere. Using this multi-stack geo-field construction platform can not only greatly reduce GHG emissions from buildings, but also predictably and consistently reduce their average LCOH to about $30/MWhth, below the average LCOH of natural gas (Bedrock Energy 2024).

Dr. Silviu Livescu, PhD
Co-founder and Chief Technology Officer
Bedrock Energy

Dr. Silviu Livescu is a co-founder and Chief Technology Officer of Bedrock Energy, a geothermal energy startup on the mission to radically reduce costs for people and the environment by transforming the heating and cooling of buildings. Previously, he was a tenured faculty of Geoenergy Science and Engineering at the University of Texas at Austin, a pressure pumping chief scientist at Baker Hughes, a research engineer at ExxonMobil, and a board technical director for the Society of Petroleum Engineers. He has authored 41 U.S. patents and patent applications and more than 100 papers and articles, and has extensive experience in multi-disciplinary research and technology development, innovation, intellectual property, product, strategy, and management applied to several geoenergy engineering (geothermal energy, direct air capture, carbon sequestration, underground thermal storage, and hydrocarbon production) technical disciplines, with focus on well engineering and operations (monitoring and telemetry systems, well drilling, construction, production, and data science and engineering analytics).

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Leaky Pipeline

Could the retention of mid-career STEM women be a symptom of a talent issue within our energy industry?

Julie Hawco,
2023 Young Women in Energy Award Winner
Founder, STEM Moms Project

Could the retention of mid-career STEM women be a symptom of a talent issue within our energy industry?

I first heard about the issue of retention for mid career STEM women being referred to as a 'Leaky Pipeline' back in 2021. Having spent two decades in the oil and gas industry, with over half of that time working within in-situ operational roles, I found this high-level analogy to be incredibly intriguing.

Firstly when it comes to oil and gas, there are specific drivers that incentivize operations to run as smoothly as possible – namely profitability and government regulations. A key component to successful business for oil and gas companies is ensuring the integrity of their assets. Vessels and pipelines are subjected to monitoring and maintenance, regular inspections to prevent production-loss incidents and when required remediations to ensure containment.

Our industry is highly skilled when it comes to pipeline design, construction, and operations. By no means am I a Subject Matter Expert for pipelines. However, I am knowledgeable in how oil and gas producers ensure their commodities are safely and securely transported from the wellhead to the point of custody transfer, being monitored and measured from point-A to point-B.

Additionally, our industry employs a large proportion of engineers and technical professionals, experienced problem solvers, who know that the first step to assessing a problem is to identify the variables contributing to the issue. Engineers are trained to analyze problems through the examination of details, trending of plots, and posing endless questions before deciding how best to move forward.

"What do we know from our physical pipelines that we could apply to the workforce pipeline?"

All of this left me with the following questions:

- How could it be that this industry has a metaphorical pipeline leak but are unable to fix it?
- What are the contributing factors causing this leak of mid-career STEM women?
- How are these contributing factors possibly affecting the rest of the workforce?
- What do we know from our physical pipelines that we could apply to the workforce pipeline?
- What if the same amount of rigour used in oil and gas operations was applied within organizations to their most important commodity – the people?

So, let's dive in, shall we?

In 2022, I was working at COSIA (Canada's Oil Sands Innovation Alliance) and spent my days bringing together working groups and consortiums across the oil sands industry so they could collaborate to innovate. The approach was to share operational and technical challenges and then work collaboratively to improve the issues through innovation and technology development.

I thought this inspiring model could be used towards a real-world social problem, specifically one that was near and dear to my heart – the retention of mid-career STEM Women.

"What if the same amount of rigour used in oil and gas operations was applied within organizations to their most important commodity – the people? "

I kicked off The STEM Moms Project and committed to spending my 'free time' performing a 'root cause analysis' on this mid-career Women in STEM retention issue in an attempt to solve my hypothesis that it was somehow correlated to the transition to parenthood.

What followed was a one-year long project, including 15 focus groups and over 50 participants to discuss all things at the intersection of Working Parent + Woman in STEM with the intention to understand:

- What are the challenges causing women to leave the professions at the mid-career point?
- What do these issues look like?
- What is unique about these specific challenges?
- What are the variables and contributing factors?
- How could they be better?

The endeavour resulted in three recommendations for consideration towards the improved retention of mid-career Women in STEM (full report and findings here: **www.stemmomsproject.com**).

Peeling back the onion of the STEM Moms Project revealed that one of the biggest levers to retaining Women in STEM and Working Parents is associated with workplace practices and policies related to workplace cultures and general non-gendered retention.

Stats Canada numbers state that 62% of families in Canada are dual income, with 19% single parent families – accounting for 81% of Canadian families that do not have a stay-at-home parent fully dedicated to managing both the family and the home. Working parenthood is a two-decades long endeavour and mathematically parents likely make up the largest grouping within our workforce.

" ... one of the biggest levers to retaining Women in STEM and Working Parents is associated with workplace practices and policies related to workplace cultures and general non-gendered retention. "

Many participants of the project felt unsupported as dual career families, attempting to share the parenting and household responsibilities with a co-parent who was simultaneously attempting to progress their own career. Inclusive, family-friendly and flexible policies allow both parents to advance their careers, actively participate in the home and allow for meaningful relationships between children and both their parents.

Participants also shared that a lack of support at the mid career phase for individual contributors not on the leadership path, by chance or by choice, was a challenging aspect. From both the angles of feeling engaged and supported, but also understanding what opportunities might exist for future growth and being fairly compensated for a technical career path.

What does this have to do with pipelines?

When it comes to pipeline design there are core containment principles to lean on. Specific materials are selected for sour gas to reduce the risk of corrosion. Steam lines use pressure let-down valves at the pad edge. Gas systems often require compression at specific locations to increase the pressure and ensure the commodity reaches its intended destination. We analyze and monitor for erosional velocity along bends. There is hardly an operational condition that is not considered when it comes to the optimal design of a pipeline system.

Once a piping system is designed and constructed, it is subjected to rigorous monitoring and maintenance to ensure uninterrupted operation. Realtime data is available, high and low set-points are selected for alarming systems, and redundancy is utilized to ensure that data is continuously monitored and accurate.

What if workplace policies were assessed for weak points in the system?

Just as equipment and piping are assessed for higher levels of corrosion and risk of leaks with the proper reinforcement provided to ensure the system runs smoothly – what if this same approach was used towards employee retention?

What if as an industry the goal was workforce optimization by prioritizing wellness, whether that's prevention of burnout for women and providing mental health supports for men – how might the work performance improve?

Are people feeling valued, supported, engaged? Are they fit to come to work mentally? Just as physical safety is prioritized in the field, are employees at all locations showing up as their best selves so that they're able to contribute their best work?

"What if as an industry the goal was workforce optimization by prioritizing wellness?"

What is the business case of the above? How can these benefits be quantified and prove that the value exists?

The past two years spent advocating for mid-career women in STEM has validated something that I have known since the start of my career close to two decades ago - Gender focused initiatives are important, but their effectiveness is challenged when buy-in is required from people who feel they have nothing to gain through engagement.

Asking peers to be allies because it's the right thing to do doesn't appear to work on a large scale. This is not a criticism, if anything it is the reality of human nature.

“… think outside of the box – what tools from your trade can you apply to a problem or an issue that you are passionate about?”

What if a different and less polarizing approach was applied – what about focusing on polices that improve outcomes for the general population (in this case working parents) but have a magnified impact on a smaller population within the group (i.e. STEM mothers)? Could it work?

The response to the STEM Moms Project is often one of intrigue and surprise but using an analytical and problem-solving approach towards a topic that I am passionate about seems quite logical to me. It is the connections made and conversations had that make me feel hopeful for positive and productive change towards a more supported and engaged workforce, and hopefully the retention for women will follow.

I encourage you to think outside of the box – what tools from your trade can you apply to a problem or an issue that you are passionate about?

Julie Hawco, P.Eng
Development Engineer,
Founder, STEM Moms Project

Julie is an engineer with over 15 years of experience working in Canada’s Energy sector focused on subsurface, operations, technology development and collaborative innovation. Currently she works as a development engineer at Suncor focusing on technology commercialization for insitu oil sands. Julie is a dedicated volunteer within Alberta’s energy ecosystem, a 2023 Young Women in Energy Award Winner and the founder of the STEM Moms Project – an initiative focused on improving the retention of mid-career STEM women.

Successful Cyclical Waterflood Pilot in a Mature Heavy Oil Field in Eastern Alberta

Sherif Abdelrahman, Teine Energy
Chad Bobier, Teine Energy

Abstract

Cyclical waterflooding can be applied in mature, heavy oil waterfloods to improve sweep efficiency and ultimate recovery. Modification of waterflood patterns has been successfully applied in several parts of the world such as the North Sea, Ecuador, Argentina, China and Russia.

In this paper we will present a successful cyclical waterflood pilot applied in the Mannville Group in Chauvin, Alberta, Canada. The paper will illustrate the workflow for designing the cyclical waterflood, the challenges faced and the surveillance program developed. This technique can be used in mature heavy oil fields to increase production at minimal cost and to extend the economic life of those fields.

The Cyclical Waterflooding Concept

Cyclical flooding is a type of waterflood in which the patterns have intermittent periods of injection and shut-in. The practice is intended to establish new communication paths between injectors and producers, away from previously swept channels; in doing so, previously un-swept oil can be mobilized and produced.

With successful waterflooding, it can be possible to:

- Increase oil production rate or maintain oil production rate at lower associated produced water volumes, therefore reducing operating cost of the facility and production issues that are associated with water production such as scaling, etc.

- Revive oil production at wells that have shown a strong channeling relationship with an offset injector.

There are several advantages of cyclical flooding:

- It is inexpensive to apply in field operations.
- There are no requirements to drill new wells or pump chemicals such as conformance gel to improve sweep.
- It offers the potential to improve the understanding of reservoir inter-well communication in the mature stage of the field.

Cyclical flooding was first applied in the early 1960s. It has been applied in different fields worldwide including China, USA, Russia and North Sea (Munoz et al., SPE 179612 and Schipanov et al., SPE 116873). The results of numerical simulation and experimental studies reported in the literature note higher recoveries by up to 10% (Schipanov et al., SPE 116873). Others reported maintaining the same oil production with a reduced field water cut.

Cyclical Flooding Subsurface Impacts

Positive impacts from cyclic waterflooding can come from a variety of aspects, such as:

Improvement in Areal Sweep Efficiency

- When a high-rate cycle of injection is initiated at an injector, new flow paths (streamlines) can be created in previously un-swept areas to sweep the oil towards the producer.
- When injection is shut-in, the reservoir pressure is reduced and oil can migrate into those swept pathways due to local pressure and capillarity (saturation) on gradients. With more oil in the higher mobility path, oil will have higher relative permeability. When injection is restarted, this oil will be swept to the producer. (Schipanov et al., SPE116873).

Vertical Crossflow Between Layers

- Theoretical and empirical studies have shown that cyclic waterflooding can lead to crossflow between low and high permeable zones. When injection is stopped, the high permeable layers get depressurized first; cross flow of oil can then take place from the lower permeable zone to the higher permeable zone due to a pressure gradient.
- Crossflow can also take place on a secondary role by capillary and gravity forces (Yaozhong et al., SPE 104440, Rublev et al., SPE 162015, and Schipanov et al., SPE 116873).
- This crossflow requires vertical communication between different layers. The lower the vertical permeability, the better the cyclic waterflood impact, since this means lower vertical communication during the injection cycle.

Capillary and Gravity Forces

- In water-wet rock, once injection stops, water will flow towards low permeable streaks due to imbibition, and oil will reverse flow from the low permeable streaks towards the more permeable streaks under reverse imbibition. Studies have shown that, for capillary effect to take place, the cycle duration needs to be over a certain duration (Schipanov et al., SPE 116873).

Flow from Dead-End Pores

- In some reservoirs, oil can be trapped in local cul-de-sac features by high reservoir pressure in a waterflood. West et al. (2014) noted that, when water injection is stopped and the reservoir pressure is reduced, this trapped oil can start to flow out to the main waterflood pathway via solution gas drive as gas exsolves if the pressure drops below the bubble point.

Certain heterogeneous reservoirs may thus be good candidates for cyclical waterfloods. Schipanov et al. (SPE 116873) built an analytical model that showed that the positive impact of cyclic waterflooding increases with the increasing number of layers. In other words, the more heterogeneous the reservoir is both areally and vertically in the reservoir, the higher the expected uplift from cyclical flooding.

Cyclical flooding is also recommended to be applied when there is strong communication or breakthroughs between injectors and producers and not before, according to modeling done by Brice et al. (SPE 170099).

Geology of the Pilot Area

The cyclical flood pilot was performed in the Sparky A Pool located in Sec 34-042-04W4. The pool, shown in Figure 1, is estimated to have an OOIP of 35.35 MMBO with a current recovery factor of ~14.5%. Oil within the pool has a gravity of 17^{O}API and 530 cP at reservoir conditions. The current interpretation of the reservoir is a Rex-aged North – South trending channel system with multiple cross-cutting channels. The channel system is overlain by the General Petroleum (GP) Formation and is underlain by the Detrital and/or Paleozoic.

The channel gross isopach ranges from several meters to over 60m in some localized areas.

The map in Figure 1 shows a Total Net Pay map over the pilot area. Net pay within the pilot area varies from several meters to over 20m. In areas where higher Net Pay values are observed, it is important to consider that this is not one homogeneous unit, but rather the stacked accumulation of multiple channels.

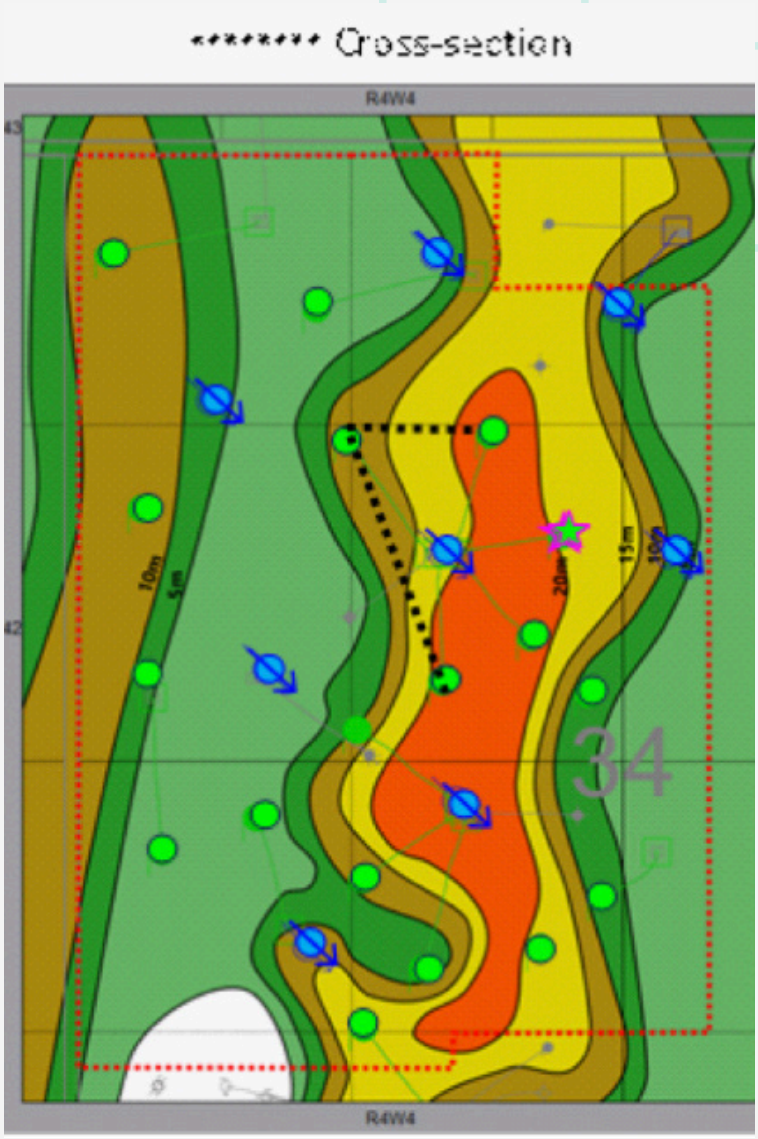

Figure 1: Rex Channel Net Pay Map

Core porosities from 5 cores within the pool range from 15.5% to over 37%, with an arithmetic average porosity of 26%. Core-derived permeabilities range from sub-1mD to 6.79D, with an arithmetic average perm of 867mD.

The stacking and cross-cutting natures of the channels within this system create stratigraphic complexity. Figures 1 and 2 show three wells located within the pilot area, highlighting a number of the channel sequences present in the pilot area. Both lateral and vertical permeability heterogeneity increases dramatically as these channels incise into one another.

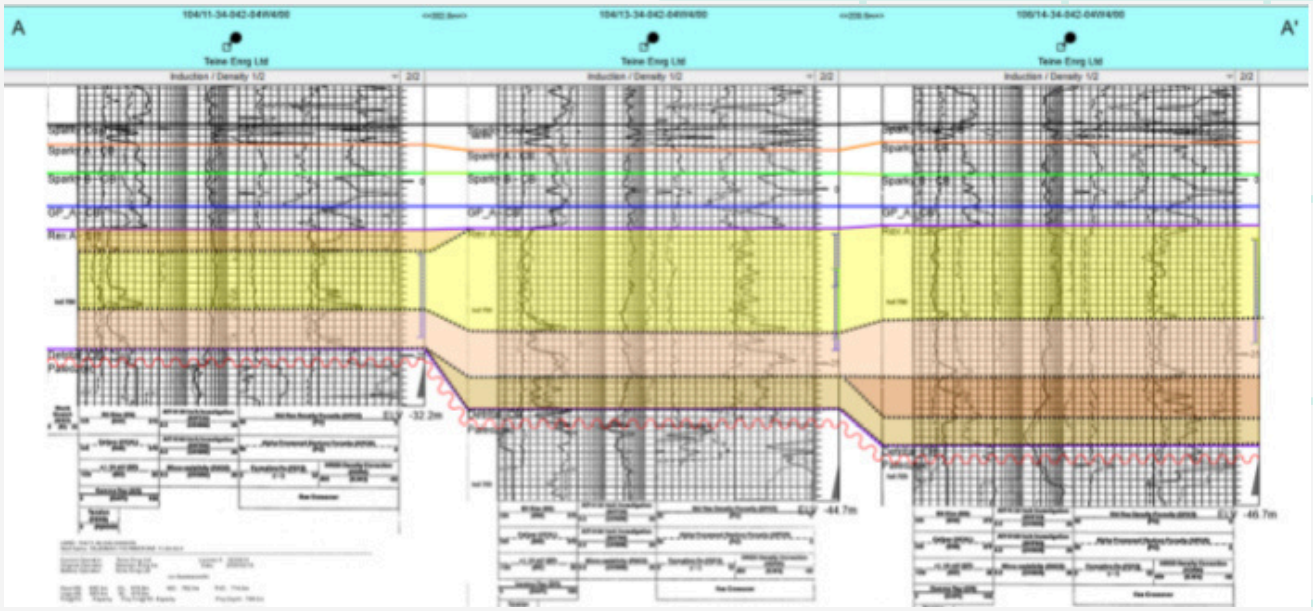

Figure 2: Rex Channel Cross-Section

Pilot Overview

The pilot area covers two pads (11-34 and 06-34) in the 11-34-042-04W4 battery with some peripheral wells. The wells included in the pilot area are a mix of vertical and deviated wells.

Average production statistics for the pilot area prior to the cyclical waterflood are listed below:

- Fluid Rate: ~580 m^3/d
- Oil Rate: ~13.8 m^3/d
- Injection Rate: ~595 m^3/d
- VRR: ~1
- Cum VRR: ~1

There were two cycles for the pilot run in May-July and August-December 2023. The locations of the pilot injectors and producers are shown in Figure 3.

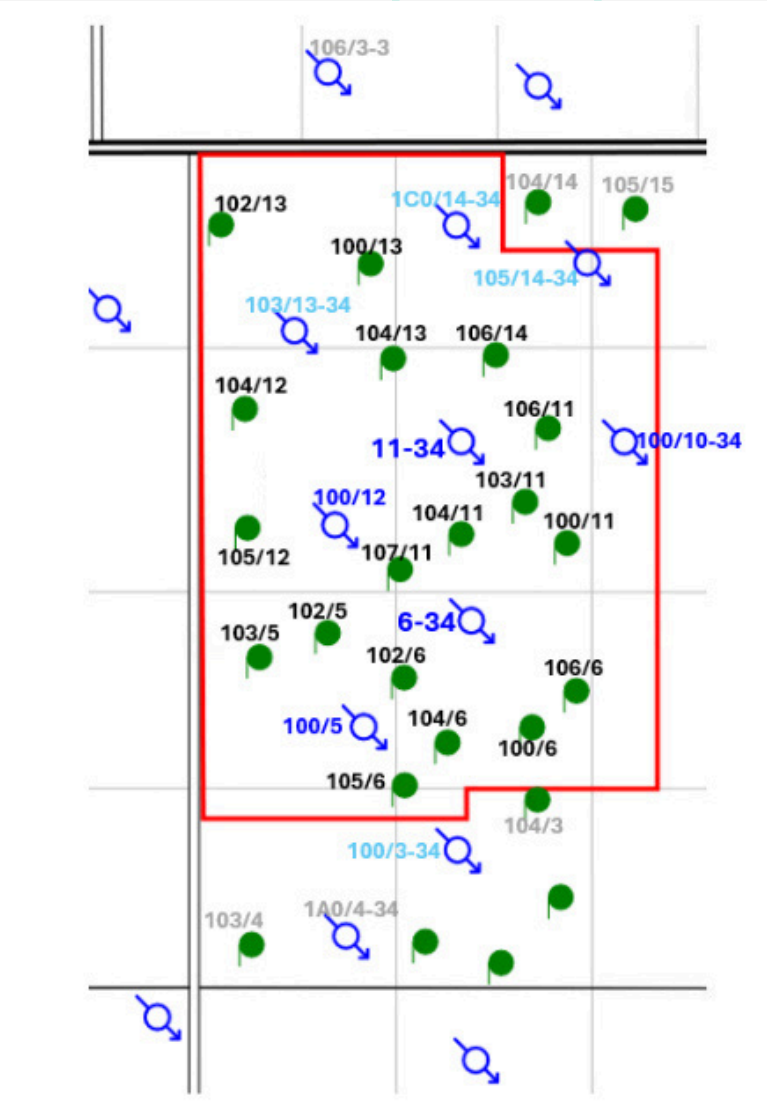

Figure 3: Pilot Area Outline and Wells

Cyclical Flood Design and Surveillance

Cycle 1 Design and Performance

- Cycle 1 design was carried out to have no injection in the “central” 11-34 and 6-34 injectors, with corresponding strong injection at other “peripheral” injection wells. The injection targets were set so that the pilot area voidage replacement ratio was set at 0.95 - 1. To compensate for the lost injection to the central wells, the peripheral wells injected at rates higher than those used during the continuous waterflood stage.

Cycle 2 Design and Performance

- Cycle 2 design was carried out to have reduced peripheral injection with higher central injection. The injection targets were set so that the pilot area voidage replacement ratio remained in the range of 0.95 - 1.

- One learning from Cycle 1 that was applied during Cycle 2 was to react to any wells going down for over a week by reducing injection.

Throughout both cycles, injection rates were adjusted according to the following observations:

- For wells having high fluid levels that could not produce at higher rates due to artificial lift limitations, injection wells that were identified to be in communication with them were slowed to lower injection rates.

- For wells that were pumped off, injection wells that were believed to be in communication with them were increased to higher rates.

Surveillance Plan

The surveillance plan included two components:

- Fluid level shots to determine pressure changes in the producers.
- Water cut samples to identify trends in performance.

The following surveillance activities were conducted:

- Fluid level shots were captured twice a week to define those wells that were very sensitive to injection changes.
- Once sensitive wells were determined, their fluid levels were captured on a high frequency basis and other wells were then adjusted to a lower frequency basis.

- Once steady state conditions were achieved after a new cycle was initiated, fluid level shots were reduced eventually to monthly.
- Wellhead watercut samples were taken on a weekly basis.
- Eventually, watercut sampling frequency was also reduced.

A significant degree of slugging or variation in water cuts was observed.

Pilot Results and Analysis

As is shown in Figure 4, the year-end 2023 exit rate showed an increase in production of 13% over the 2022 exit rate and a decrease in water cut to below 97%.

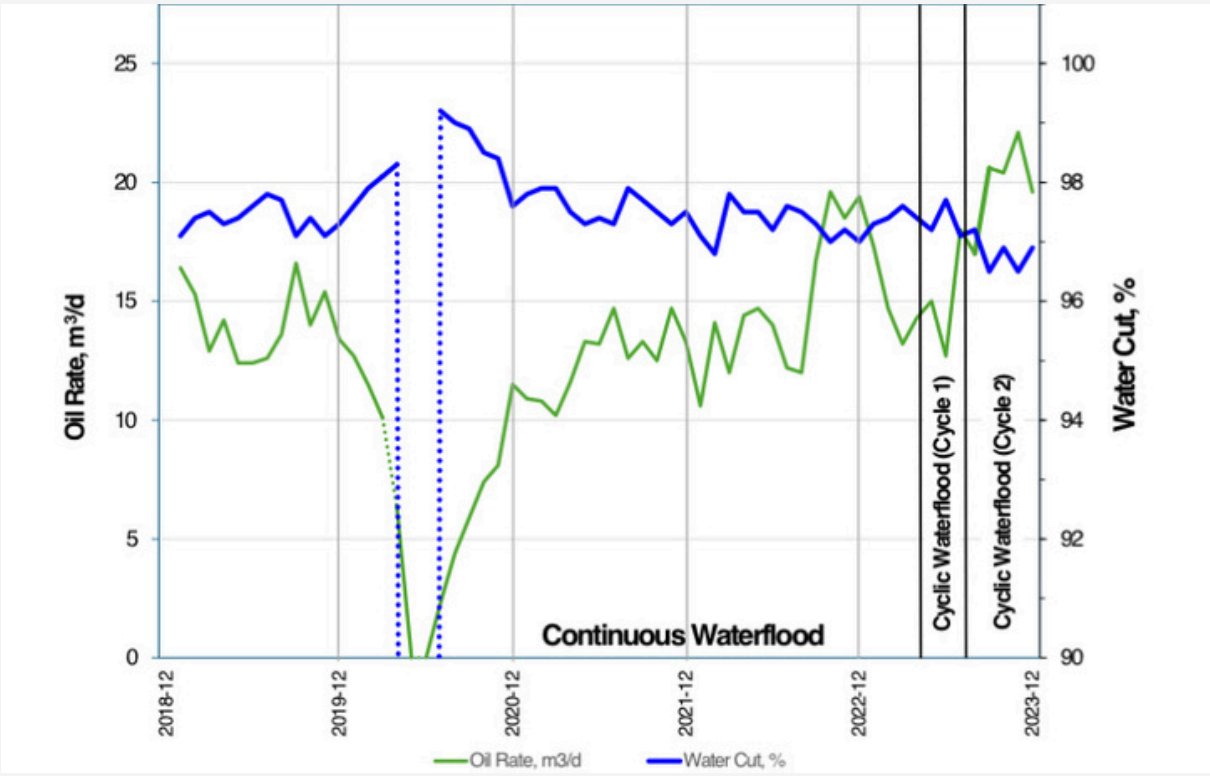

Figure 4: Pilot Area Production Performance

Given the monthly variations in both rate and water cut - both before and during the pilot test – a simple statistical test was conducted using Excel's ANOVA feature to assess the level of confidence that could be placed in the positive changes in these metrics.

In a “single factor” ANOVA test, two data sets are compared in terms of average values and variances in the data sets. The output of this comparison is a “P-Value” that describes the level of statistical confidence that can be placed in the hypothesis that the two average values and data sets are different. A P-Value of less than 0.05 is generally accepted to indicate a reasonably high level of confidence in the difference between the data and their averages.

Water-oil ratio and oil rate data during the Cyclical Waterflood pilot were compared to baseline values from January 2019 to April 2023; data from April 2020 to Nov 2020 was excluded since this period was affected by a major facility incident. For completeness, three comparisons were made in the changes in performance metrics:

- Continuous waterflooding vs Cycle 1 – were there any significant changes observed?
- Continuous waterflooding vs Cycle 1 and Cycle 2 – were there any significant changes observed when the two cycles were grouped together?
- Continuous waterflooding + Cycle 1 vs Cycle 2 – was there a significant contribution from Cycle 2 to the final result?

The average values for the groups compared are shown below in Table 1. The narrow ranges of values in the data sets support the benefits of conducting the statistical analysis.

Data Sets (Time Periods)	Average Water Cut (%)	Average Oil Rate (m^3/d)
Continuous waterflooding (Jan 2019 to April 2023)	97.5	13.7
Continuous waterflooding + Cycle 1 (Jan 2019 to June 2023)	97.5	13.7
Cycle 1 (May 2023 – June 2023)	97.3	15.2
Cycle 1 + Cycle 2 (May 2023 – December 2023)	97.0	18.2
Cycle 2 (July 2023 – December 2023)	96.8	19.9

Table 1: Average values of metrics of data sets

The results of the ANOVA tests are shown in Table 2.

Data Sets Compared		P-Value	
Data Set 1	**Data Set 2**	**Water-Oil Ratio**	**Oil Rate**
Continuous waterflooding	Cycle 1	0.96	0.94
Continuous waterflooding	Cycle 1 + Cycle 2	0.0014	1.5×10^{-5}
Continuous waterflooding + Cycle 1	Cycle 2	0.00017	$< 10^{-5}$

Table 2: Results of ANOVA tests: P-Values for comparison of data sets

As was noted above, P-values below 0.05 can be understood to indicate statistical significance. These results support the conclusion that the Cyclic waterflood pilot (Cycle 1 and Cycle 2) was able to:

- increase the average oil rate from 13.7 m^3/d during continuous waterflooding to 18.2 m^3/d during the pilot

- decrease the average water cut from 97.5% during the continuous waterflood to 97.0% during the pilot

As was noted earlier in the “Cyclic Flood design and Surveillance” section, the improved performance observed in Cycle 2 could have been aided by reducing injection in response to any wells going down for over a week.

Because of the comparatively short duration of Cycle 1, it is not possible to comment on whether any improvements would have been observed had Cycle 1 been conducted for a longer time. However, it is clear that the full cyclical flood was able to increase the 11-34-042-04W4 battery production to the highest level since March 2020. This led to a lower fixed opex component/bbl, therefore reducing opex/bbl vs plan by 18%. (Figure 5)

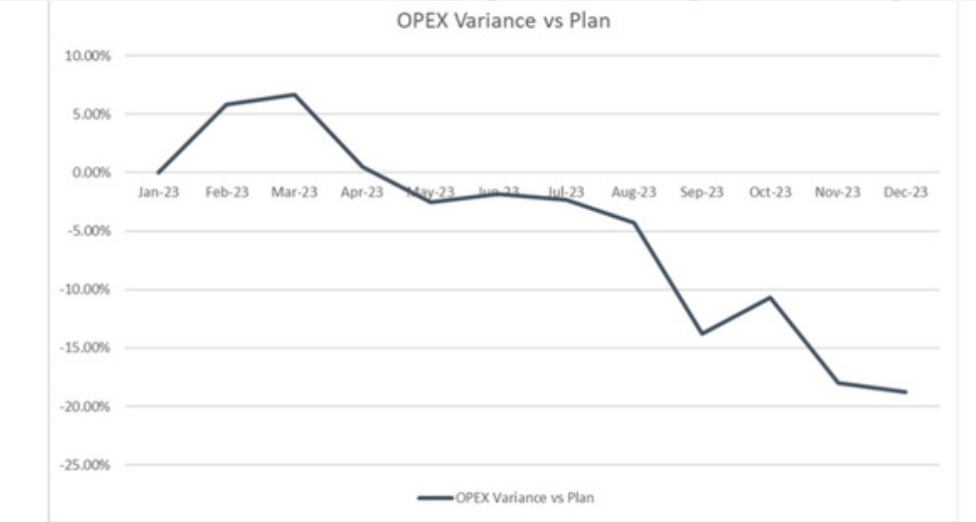

Figure 5. Opex Variance vs Plan

Concluding Comments

- The cyclical waterflood pilot in 11-34-042-04W4 battery was deemed to be successful. As a result of its success, other pilots were started in the Chauvin field.
- The success of this pilot would not have been possible without a well-implemented surveillance program.
- The data from the surveillance program helped manage the cyclical flood design during its operation and achieve the successful improvement in production performance.
- Throughout both cycles of the cyclical flood, a better understanding of inter-well communication was obtained.

Acknowledgments

The authors would like to acknowledge and thank Dr. Bruce Carey for his valuable contributions and guidance that were integrated into this paper and improved it.

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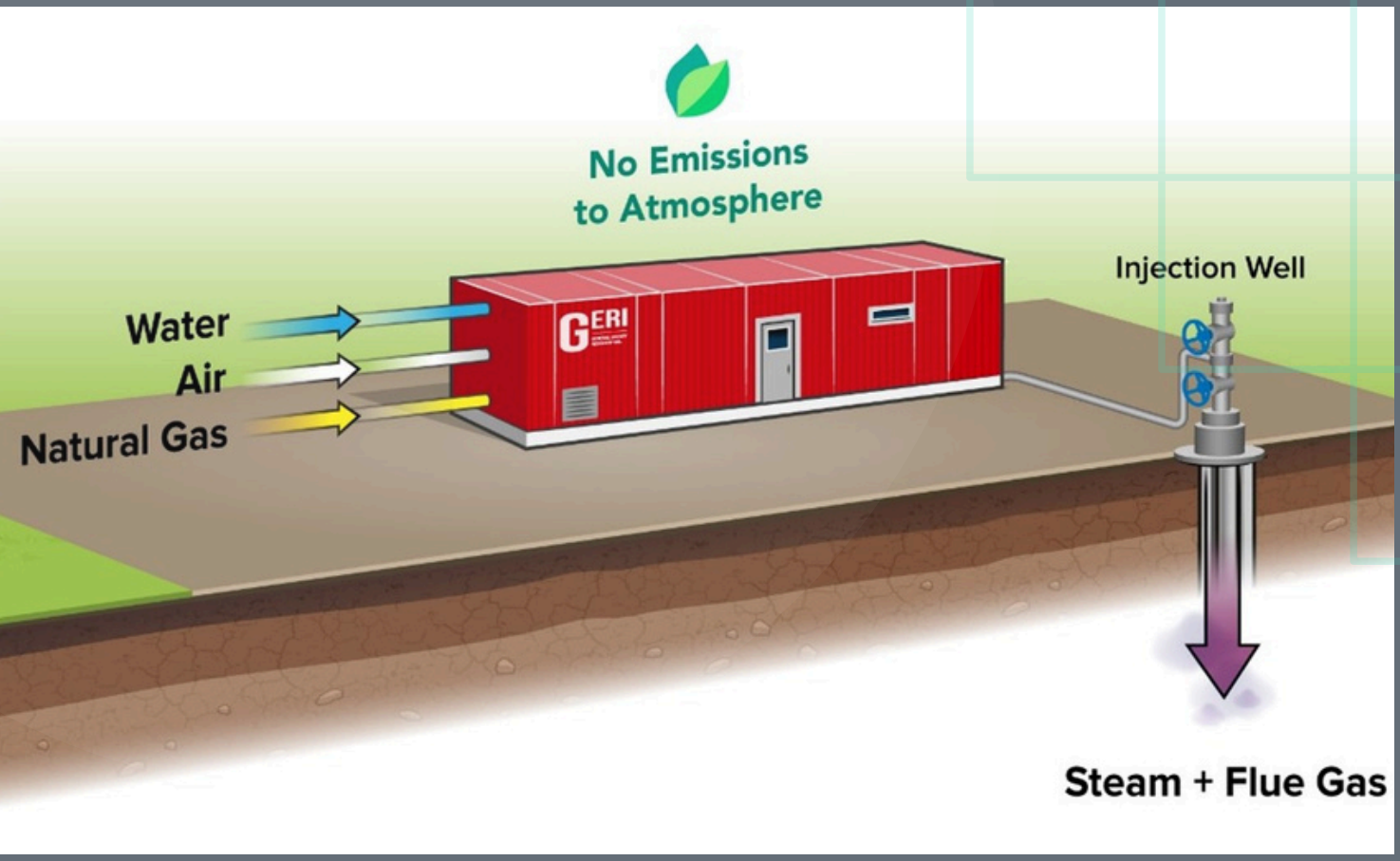
Sherif Abdelrahman
Senior Exploitation Engineer at Teine Energy



Reducing Costs in SAGD: NCG Co-Injection with GERI's DCSG Technology

by Thomas Hartley
GERI (General Energy Recovery Inc.)

Efforts to extract bitumen from Alberta's unique oil sands reserves have a long history. The invention of the steam-assisted gravity drainage (SAGD) process pioneered in 1978 by Dr. Roger Butler, eventually spurred a boom in the oil sands. SAGD is now responsible for over 1.3 million barrels of oil per day in the province.

In 1997, many years after SAGD was proven to effectively recover oil from in-situ oil sands, Butler proposed an improvement to his original SAGD process, called steam and gas push (SAGP). The idea was to co-inject non-condensable gas (NCG) along with steam, rather than using steam alone. The process offered to extend the range of reservoirs that could be produced economically. At the time, most SAGD wells were not at a life stage where large NCG injection was needed, and it took a decade before any appreciable adoption of the new process occurred.

EVALUATING THE BENEFITS AND TRADE-OFFS OF NCG CO-INJECTION

Today, co-injecting NCG is widely adopted by operators across many SAGD projects (used on about half of all SAGD well pads), and the economic and environmental benefits are well-accepted. Co-injecting NCG not only improves the economics and energy efficiency of the reservoir, but it also allows operators to re-direct precious steam to more profitable and efficient lower steam-to-oil-ratio (SOR) wells, resulting in even more oil production at lower carbon intensity.

Notwithstanding its benefits, co-injecting NCG comes at a cost. In 2022, over 250 million cubic feet per day (MMcf/d) of natural gas was injected in Canadian SAGD operations, of which a substantial portion remains in the reservoir and is not recovered. The percentage of injected gas that returns to surface is called the recycle ratio, and it varies widely - from between 90% to nearly negligible (immeasurable).

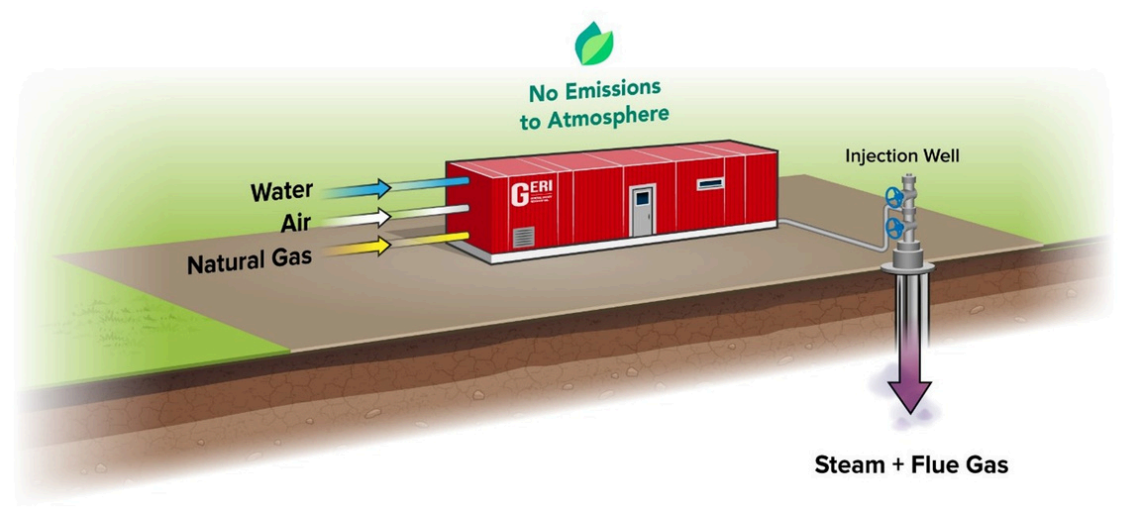
Assuming a mid-range recycle ratio of 50%, and $3/Mcf natural gas, NCG co-injection would cost at least $137 million annually across the industry.

Instead of using methane as the default NCG, GERI has developed a better solution for SAGD co-injection. GERI's Direct Contact Steam Generation (DCSG) technology brings additional, portable, steam capacity, but rather than venting the flue gas, it is a part of the product that is simultaneously injected downhole with the steam. This substantially reduces the amount of natural gas purchased for NCG co-injection, while mitigating the release of greenhouse gases and storing a portion of the carbon dioxide (CO2) in the reservoir.

Flue gases, primarily CO2 and nitrogen (N2), serve as NCG and may work even better than natural gas. CO2 can help by slightly reducing the viscosity of colder bitumen, and N2 can improve steam chamber development and accelerate the oil recovery rate.

Substituting equals volume of steam and natural gas used for NCG co-injection with GERI's DCSG output of steam and flue gas can reduce operating costs by about a third. GERI enables operators to increase both revenue and profit margins, while running with minimal downtime and fitting neatly into existing operations with little interference.

Additionally, the high energy efficiency of DCSG, along with the injection (and partial storage) of associated flue gas, can provide increased oil production at a lower carbon intensity compared to conventional co-injection methods.



Graphic depicting GERI's proprietary technology injecting into a well.

ANALYZING THE RISK OF CORROSION

A common concern raised in enhanced oil recovery projects using DCSG or injecting flue gas, is corrosion. GERI has reduced corrosion to safe, manageable levels, monitored with a corrosion coupon program.

The primary concern with corrosion is oxygen, which can come from slippage or air-rich combustion (often over 2% in typical flue gases). Through iterative design and operational improvements, GERI has reduced O2 in the injection stream to less than 100 ppm in the vapor phase.

Corrosion due to CO2, often present in active SAGD reservoirs, is another concern with flue gas injection. GERI's flue gas contains about 12% CO2 on a dry basis, but factoring in the steam and water, the CO2 concentration is only about 3.5%. This results in lower CO2 partial pressures, which are correlated with corrosion rate.

Insight from literature also indicates that as temperature increases from ambient to GERI's operating conditions, CO2 induced corrosion decreases by an order of magnitude, due to the formation of protective corrosion products that slow further corrosion.

UNDERSTANDING THE IMPACT OF THE FLUE GAS THAT IS PRODUCED BACK

Another concern is the portion of non-burnable CO2 and N2 injected that is produced back to the surface. In SAGD, the produced gas (containing CO2 and N2) is often blended with pipeline natural gas, lowering the heat content of the gas burned at the central processing facility (CPF).

Estimating dilution requires determining the percentage of injected gas that returns to surface (the recycle ratio), which varies substantially. In the case of natural gas NCG injection, the recycle ratio ranges from negligible to over 90%. Ideally, a DCSG project has a low recycle ratio.

The volume of pipeline gas used at a CPF is typically much larger than the volume of produced gas, providing a significant buffer to blend the non-burnable gases produced. Evaluation of a hypothetical, large-scale GERI project at several existing SAGD facilities showed that even under worst-case recycle ratio scenarios, due to the large volume of pipeline gas required, non-burnable gas content in the blended gas reaches only a few percent.

Reducing the heat content of gas burned at the CPF must be discussed with the operator, but these levels fit within the practical range of most industrial gas-fired equipment. If necessary, solutions like re-injecting produced gas on the pad or using a nitrogen rejection unit can be implemented, though these solutions add costs.

Thomas Hartley is the Engineering Manager at GERI (General Energy Recovery Inc.), a Calgary-based company that specializes in thermal technologies for enhancing and decarbonizing heavy oil recovery. He has over 13 years of experience working in in the upstream oil and gas industry, on the service side, as an oil and gas production engineer, and has firsthand experience working in several field-based jobs early in his career.

Carbon Captors Claim Victory: A Look Inside the 2024 CCUS & Carbon Credits Datathon

This wasn't your typical competition. The 2024 CCUS & Carbon Credits Datathon brought together over 80 participants from cities as diverse as Calgary, Edmonton, Winnipeg, Toronto, Austin (Texas), and Perth (Australia) in a high-stakes effort to tackle one of the world's most pressing challenges: transitioning to a net-zero future. Hosted by the SPE Calgary Section and Untapped Energy, this event was more than a test of skill–it was a testament to the power of innovation and collaboration.

A Real-World Challenge Brought to Life

Participants formed 16 teams to analyze real-world datasets, delivering 11 submissions that addressed complex problems in Carbon Capture, Utilization, and Storage (CCUS) technologies and carbon credit systems. Guided by five judges, each an expert in data, domain knowledge, or citizenship, teams proposed solutions that could shape decision-making in industries striving for decarbonization.

This wasn't just a competition; it was a platform for turning complex data into actionable solutions, bridging the gap between academic theory and real-world application.

Empowering Participants Through Bootcamps

Preparation for such a challenge is no small feat, which is why the event featured eight bootcamp sessions. These workshops, spanning topics from data analytics fundamentals to machine learning operations, equipped participants with the technical skills and creative confidence needed to succeed.

he bootcamps weren't just about tools–they were about mindset. Participants learned how to explore data meaningfully, collaborate effectively, and present solutions with clarity and impact.

Collaboration and Camaraderie

The Datathon emphasized community as much as competition. Over the course of two hangouts, participants shared ideas, built friendships, and found inspiration in the diversity of perspectives. These gatherings created a unique space for participants to step away from their screens, engage directly, and foster stronger connections.

The event proved that collaboration, even across time zones and disciplines, can lead to innovation. It wasn't just about winning–it was about the friendships and professional connections forged along the way.

And the Winner Is... Carbon Captors!

From this dynamic environment, one team rose to the top: Carbon Captors. Their innovative approach and well-structured solution impressed the judges, earning them the top prize.

Reflecting on the experience, Sarupa Debnath, Process Simulation Software Developer at Process Ecology and a member of the winning team, shared:

"The SPE/Untapped Energy Datathon was a great opportunity for our team, Carbon Captors, to tackle real-world carbon capture challenges. Collaborating with such a talented and diverse group was both intellectually stimulating and deeply rewarding. It was exciting to see how our ideas came together to create impactful solutions. Winning this competition has been a proud moment for all of us and motivates us to continue contributing to climate action through data science."

While Carbon Captors claimed victory, every team contributed unique insights, showcasing the transformative power of data science in addressing sustainability challenges.

A Legacy of Impact

The 2024 CCUS & Carbon Credits Datathon wasn't just an event–it was a movement. Participants left with new skills, deeper knowledge of emissions data, and fresh perspectives on sustainability. Beyond the numbers–80+ participants, 16 teams, 11 submissions, 8 bootcamps, 5 judges, and 2 hangouts–the event created immeasurable friendships and a shared commitment to tackling global challenges.

The Datathon also demonstrated how accessible and impactful data science has become. Whether a beginner or a seasoned analyst, every participant had the opportunity to contribute meaningfully, proving that collaboration and curiosity are as important as technical skill.

Gratitude to the Sponsors

The 2024 CCUS & Carbon Credits Datathon was made possible through the generous contributions of its sponsors, including North West Capital Partners Inc., Obsidian Engineering, and Revolution Data Platforms.

Their support not only ensured the event's success but also highlighted the importance of collaboration between industry and innovation-driven initiatives. Sponsors played a vital role in creating an impactful experience for participants and advancing the conversation around sustainability and data science.

Ian McGregor, founder, president, chief executive officer and chairman of North West Refining, gave an inspiring keynote at the Datathon Closing Ceremony.

Looking Ahead

As the Datathon closes, its impact continues. The participants, organizers, and sponsors have shown that when data, creativity, and collaboration intersect, the possibilities are limitless.

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