

The Energy Imperative



Experts weigh in on how technology and innovation, investment, and collaboration have opened a window that can accelerate the role decarbonization plays in energy transition and transformation.

The transition to a lower-carbon global energy system is accelerating, but we are still in the midst of that evolution and energy leaders need solutions for today that help them de-risk projects, meet regulatory requirements and investor expectations, while also achieving their ESG goals.

To understand what leaders do differently, and the role prioritization plays in successful outcomes, we spoke with experts from a range of backgrounds — technology and innovation, regulatory and research, and production. They all agree, the time to act is now.



Collaboration is the path forward

The energy industry is currently undergoing a transformational shift toward a more sustainable and lower-carbon future. This shift requires collaboration, innovation, and a willingness to share ideas and information across the industry.

As we transition, one of the biggest risks to success are silos that stifle this collaborative spirit and prevent us from achieving our collective goals. Silos are where insight goes to die, and critical data and knowledge becomes inaccessible to those who need it most.

If we are to be successful in our transition to a lower-carbon energy system, we must work together to promote knowledge-sharing across the industry. This means fostering a culture of open communication and transparency within our organizations and promoting collaboration between different companies, government agencies, and stakeholders.

As a technology company that works in the energy industry, Computer Modelling Group plays

an important role in creating shared viewpoints for the benefit of all, and this special edition book is an example of how we carry that commitment beyond our software.

I recently had the privilege of sitting down with four leaders from across the energy industry to talk about energy transition and transformation, and what we can all do to enable success. Bringing together individuals with different perspectives and experiences allowed us to gain valuable insight from one another, and most importantly it provided the opportunity to explore new ideas by building off of each other's perspectives.

This kind of collaboration is exactly what is needed in energy today.

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The decarbonization journey ahead

Before he speaks, Charles Gorecki leans forward in his chair and catches the eyes of the other four energy leaders sitting in front of him. It's as if he's wondering what the technologist, energy producer, regulator, and industry association leader sitting around the table are going to say.

He's not quite smiling, but he looks optimistic as he begins sharing his thoughts about decarbonization with the other energy leaders who have joined the roundtable discussion.

"It's not a transition, it's a transformation," he declares, summarizing what he sees as the most accurate way to describe the current energy landscape.

"I'm going to throw my vote behind transition," counters one of the others.

"I think transformation is the right word," proclaims another.

"The other language I've heard that appeals to me is diversification," says another. "You're not going from one to another. You're actually just diversifying how we use energy."

The conversation focus turns to carbon capture utilization and storage (CCUS), a proven process that involves the capture of carbon dioxide from fossil fuel-emitting facilities. Several CCS projects are being deployed or planned across the energy industry in energy-producing regions to help the energy industry reduce its carbon footprint.

The roundtable participants from [Pathways Alliance](#), [Heartland Generation](#), [Computer Modelling Group \(CMG\)](#), the [Alberta Energy Regulator \(AER\)](#), and the [Energy and Environmental Research Center \(EERC\)](#) share updates on their work, and successes and challenges on the road ahead for CCS.

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Gorecki, who is the CEO of the EERC, has had these conversations many times over the last two decades, but this time, it's different.

"We're in a golden window to try to resolve the dilemma through CCS and energy diversification," Gorecki says. "We have the technology. We know how to do it. Many places have the framework set up. Support is there. The economic models are there."

So what's needed to finally test and make CCS successful at scale?

Final investment decisions from big operators, and public awareness are the critical next steps, Gorecki says.

"If it can't happen with today's regulatory environment, economic frameworks, and skills we have, it's not going to happen."

How the industry is moving CCS ahead in Canada

Decarbonization requires huge capital investment, including systems testing to ensure the technology's effectiveness. And it doesn't happen overnight, warns Wes Jickling, Vice President of Technology Development at Pathways Alliance.

The group that Jickling represents includes six of Canada's largest oil sands producers working to get to net zero from operations by 2050. The net zero plan includes three phases that roll out in the 2020s, 2030s, and 2040s.

Phase 1 involves building what Jickling calls the "world's biggest CCUS network" by 2030 — a project that carries a \$16.5-billion price tag.

The proposed project will include a carbon dioxide (CO₂) transportation line that links carbon capture facilities at oil sands operations to a storage hub in northern Alberta. This network will capture CO₂ and

transport it by pipeline where it will be stored up to two kilometres below the Earth's surface in deep geological formations.

The project takes lessons learned from similar projects in Canada, the Netherlands and Norway and then builds on them with a "made-in-Canada solution," Pathways Alliance says.

The CCUS network is expected to reduce net CO₂ emissions from operations by about 10 to 12 million tonnes per year by 2030 from 14 facilities, about half of the alliance's 22 million tonnes per year goal by the end of the decade.

It's an enormous undertaking that begins with engaging Indigenous communities, doing pre-design engineering work, and continuously changing and adapting through ongoing testing and investing.

"There are a lot of things that need to happen in sequence," Jickling says. "Regulatory approvals, engaging with Indigenous communities along that route — there are 20 — for their ongoing participation in those projects. So, again, that's really the focus now."



Jickling says the government's role and contribution, both federally and provincially, are also important to define and quantify.

"In other parts of the world it's massive support," he says. "In our country, at this point, it's not clear yet."

At the end of March, the Canadian government announced its 2023 federal budget that includes a new tax credit for clean electricity, but CCS did not receive as much support as some industry participants had hoped for.

"Some are likely to be disappointed by the lack of enhancement to the tax credit for carbon capture, utilization and sequestration," wrote Charles St-Arnaud, Chief Economist at Credit Union Central Alberta following the budget announcement. "This is likely to put further pressure on the provincial government to develop a complementary program."

Many Canadian energy companies were hoping for federal financial support and incentives for CCS to remain competitive against U.S. investment, and to meet climate change targets.

That still remains unclear, says James Millar, CEO of the International CCS Knowledge Centre. "The difference comes down to investment certainty in the U.S., versus the promise of investment certainty in Canada," he told Canadian Press.

What's happening on the innovation path to decarbonization

According to management consulting firm McKinsey & Company, technology and regulation will be the key to reducing CO₂ emissions, adding that "the challenges for CO₂ storage are primarily nontechnical [and are] a function of economic, legal, and regulatory challenges."

That said, while carbon capture has been discussed for more than 30 years, actual CCUS projects are still "first-of-a-kind" McKinsey says, and "many components have not yet been combined repeatedly at scale."

Technology will play a big role for regions who want to capitalize on emerging opportunities such as clean hydrogen, and emissions reductions, and investing in innovation is a critical step.

"Technology can help accelerate decarbonization efforts, taking this from a transition discussion to one about transformation," says Pramod Jain, CEO of CMG. "Computer simulation can help energy companies mimic and replicate the production process to be successful, mitigate risk, and ensure safety when it comes to managing carbon. Technology is the catalyst for transformation."

CMG has a long-standing history of being an innovator in the energy industry, and the company

has continued to invest in its technology platform so it can be used to support decarbonization.

Today, Jain says that his company is playing a role in approximately three-quarters of energy transition projects in Europe, largely around hydrogen and geothermal energy, while actively contributing to the majority of active CO₂ sequestration projects globally.

In the United States, the Inflation Reduction Act signed into law in 2022 offers incentives and tax

"Working in the subsurface is difficult because you're predicting something you can't see," he says. "That's where the combination of simulation, data science, and machine learning come together to give you a picture of what's below the surface, and it's done faster than by using just simulation alone."

Shana Boyd, Vice President of Energy Transition at Heartland Generation, points to another example of a carbon capture project with the company's

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credits that are spurring widespread interest from producers, investors, and developers looking to build CCS facilities.

Jain says CMG has already used CO₂ for enhanced oil recovery, and the company's expertise in reservoir engineering means it is now also able to help producers safely put CO₂ back in the ground.

Battle River Carbon Hub (BRCH), which would be Canada's first large-scale, 100% hydrogen-fired electricity generation facility.

Heartland Generation is one of the largest power generators in Alberta whose focus is on providing reliable power while supporting the transition to low-carbon electricity. BRCH will transition the company's legacy coal-powered infrastructure into hydrogen-fueled power using existing infrastructure at its Battle River Generating Station (BRGS).

The generating station was first converted to natural gas at the end of 2021 and the next step is switching to hydrogen as a clean fuel. BRCH will be an integrated project that captures more than 95% of the carbon with pre-combustion capture.

"Our BRCH project is an important step in driving the energy transition forward and advancing Canada's hydrogen industry," says Boyd.

Success with BRCH is made possible because of technology, investment, and testing to ensure the project is viable. And Boyd believes more focus needs to be placed on getting that message out.

"I think we do things better than what a lot of people think we do," she says. "I remember





listening to an academic panel at a conference and there was a gentleman there from Silicon Valley. He was looking at all of us saying: ‘You are crazy — you have a leading industry, leading innovation and technology, and you can demonstrate to the world that you’re doing this really well. Why aren’t you talking about it? Why aren’t you moving it forward?’” she recalls. “And we haven’t done that very well.”

Public engagement is about more than sharing updates

EERC chief executive, Charles Gorecki, believes transparent communication is important, but what’s more critical is communicating details that help the public understand the value of what is being done.

“We need to show the public the clear and present value to them personally,” he says. “The closer we can link value to individual people, the better off we’re going to be in preventing a not-in-my-backyard (NIMBY) mentality.”

Nimbyism describes an opposition mindset to proposed developments in a local area because they are perceived as being too close to one’s home, but if they were to take place somewhere else they are less of a concern. Gorecki believes hydrogen or carbon storage are more likely to be

embraced if the energy industry gets out in front of the public often and openly, and discusses opportunities and concerns.

“Talk about jobs, and what it does for a family’s livelihood, and what it will do for the community. Once you see the value of this closer to where you are, and how it’s part of a [larger set of activities], it helps to prevent nimbyism.”

Gorecki says a lack of transparency and sharing prevented CO₂ projects from taking place onshore in Europe, and geothermal opportunities saw setbacks in Switzerland specifically because of fear and a lack of trust in industry.

“I hope that others see the projects that happen in the United States and Canada and say, ‘Oh yeah, we can do this onshore too.’”

Without education and engagement about the role of energy in society, and the work being done to lower its carbon emissions, Gorecki says projects risk being stalled, or worse — shelved altogether. “Public engagement is key,” he says.

The best way to engage and inform the public is through using measurable data and transparency of the impact and results of a particular project, says Laurie Pushor, CEO of the AER.

“I think data offers a remarkable opportunity in this space,” Pushor says, adding that it’s one of the priorities for the AER, which deals with

every aspect of development, from application and exploration to construction and operation, to decommissioning.

With CCS, Pushor says the AER is focused on measurement, monitoring and verification, and ensuring the data is credible and trustworthy and can be used as a guidepost across the industry and potentially in other sectors.

“For the average person who doesn’t come from a geological background and doesn’t work as a reservoir engineer, the notion that one can understand what’s happening under the ground takes a little bit of convincing,” he says. “I think data and modern tools are going to be big assets. Transparency, and being forthright and providing as much information as possible, as well as giving people the best tool to consume knowledge or data in a format that makes sense to them is going to be critical.”

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Progress won’t come without meaningful collaboration between key stakeholders. The industry needs to engage with communities early in the process and work with government to help create the proper frameworks to develop and maintain the right energy solutions.

Pushor says that Alberta has the experience and innovation to drive collaboration and sustainability, and all stakeholders need to be present to “support and encourage that continued evolution.”

Why true collaboration is a game-changer for CCS

A major hurdle for the energy industry has historically been getting different stakeholders on board — including governments, investors, local communities, and the public — to prove the value of the carbon-reduction investments being made.

Companies also need to be open to collaboration with one another, the government, and local communities.

Jickling of the Pathways Alliance believes Canada is already doing this well, as the energy industry works more closely together than many other industries to find decarbonization solutions.

“You don’t see groups of massive publicly listed companies getting together, agreeing to mandatorily share intellectual property and technology with each other,” he points out, highlighting the oil sands alliance could serve as a template for other industries and governments.

“It’s a tremendous load, investment of time and energy, and just stick-to-it-ness to move things an inch, but I think it’s worth it,” he adds.

Another example is GELECO2, a partnership between 10 global energy operators to progress simulation software development for CO₂ injection into depleted oil and gas reservoirs and saline aquifers.

The first-of-a-kind joint industry partnership is managed by Kongsberg Digital and CMG who connected two of their respective software platforms with the goal of developing an intuitive controller program. The partnership has been called a “key for the success of future CCS projects” as it allows companies to model CO₂ injection in an integrated manner, not with isolated well and reservoir models.

The joint industry partnership will provide engineers and operators with the most comprehensive view of CCS systems that has ever been available, allowing operating companies to optimize well and facilities design, potentially reduce the number of wells required, and avoid dangerous operating conditions.

With 10 global operators participating, GELECO2 is an example of an open partner ecosystem aimed at collectively helping the industry reach net zero targets.

In Canada, that type of collaboration among energy ecosystem participants will be a critical step in making CCS successful.

Boyd of Heartland Generation says having open conversations with stakeholders is key — an approach the industry has embraced over the past decade, pointing to increased Indigenous engagement as a prime example.

“There’s an expectation to show up and build a relationship and seek value that is shared among the stakeholders. It shifts how we do projects



and, I think, we come up with better solutions,” she says.

“It’s about concentrating on finding the things that we can do most economically, to be clean, and tying those things together. Success is based not just on finding monetary value for one company, but for government, community, and society as a whole.”

What’s needed to capitalize on Canada’s CCS and decarbonization opportunities?

The roundtable participants look to one another again, thinking about final thoughts on what needs to happen to remove obstacles and create circumstances for success with decarbonization in Canada.

“The fiscal framework, relationships around the pipeline with the communities, the regulatory applications, and all the work that needs to be



completed — a lot of timelines merge in 2023,” says Wes Jickling of Pathways Alliance. “You can’t operate in a vacuum.”

Jickling believes regulatory approvals, community consultations, and design work need to “work like clockwork,” and this year it’s those tactics that should be the focus.

Laurie Pushor says the AER was anticipating a slower rollout of CCS hubs, but the province has already awarded 25 — with growing demand for pre-application meetings with proponents.

His advice to those in the energy sector looking for regulator approval: Get everything in order, now.

“I always say to potential applicants: You’re giving away a crucial decision to the regulator when you apply,” Pushor says. “So make our decision as easy as you can. If you come with that attitude, you’ve solved most of the issues that could come up. Otherwise you’re deferring to us to make a decision. If you come and apply and say, ‘Well, we’re good except for these 10 landowners,’ then you’re rolling the dice on how we’re going to decide on that application.”

For Shana Boyd of Heartland Generation, the moment is now to have all stakeholders come to the table to discuss and share learnings.

“We are the energy right now,” she summarizes,

highlighting the optimism of leaders who are focused on scaling success stories. “That’s what it feels like to me in 2023, and 2024 will be even more interesting because we should be seeing more final investment decisions. We have very few of those right now, so next year might be quite a different story.”

Charles Gorecki of the EERC echoes the thoughts of his colleagues, adding there is a great deal of momentum right now that should provide opportunities to all stakeholders.

“We have to do it now. This is our window. We have to get that final investment decision from big operators, and make sure the public understands the value of what we are doing,” he says, underscoring how important these steps are in successful outcomes.

And for CMG’s CEO, Pramod Jain, he sees a big opportunity for technology to enable collaboration and aid in decision making.

“The role of technology is critical,” he says. “It can create shared perspectives within an organization, facilitating effective decision-making and ultimately contributing to its success. I firmly believe that momentum is there, and with the right support all this can quickly turn into results. There is no better time to make an impact.” ■

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Published by Computer Modelling Group Ltd.

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