

HEAVY OIL & OILSANDS

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GUIDEBOOK XI

11

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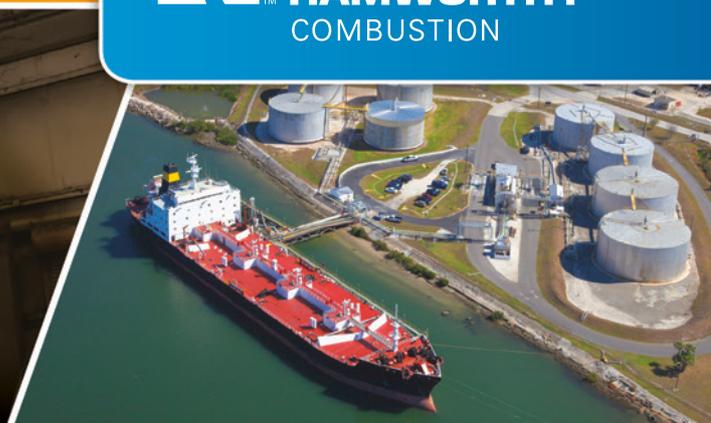
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INTRODUCTION

- 4 WELCOME FROM:**
- Government of Alberta
 - Government of Saskatchewan
 - Canadian Heavy Oil Association

- 5 EDITOR'S NOTE**

ECONOMICS

- 6 WHERE DO WE GO FROM HERE?**
- The oilsands is taking a major hit in a perfect storm of high costs, low prices, environmental impacts and social licence
- By Deborah Jaremko*

- 9 HEAVY HITTER**
Steve Williams, president and CEO, Suncor Energy

- 11 HEAVY HITTER**
Steve Laut, president, Canadian Natural Resources

- 12 HEAVY HITTER**
Rich Kruger, president and CEO, Imperial Oil

OPERATIONS

- 14 SURVIVAL STRATEGIES**
- Oilsands companies respond to low prices with cost-cutting measures and renewed focus on maintenance
- By Jim Bentein*

- 16 HEAVY HITTER**
Rob Peabody, CEO, Husky Energy

TECHNOLOGY

- 18 GETTING MORE FOR LESS**
- Incremental technology gains can drive efficiency and cut costs, but they also require investment during a tough economic climate
- By JWN staff*

- 22 HEAVY HITTER**
Harbir Chhina, executive vice-president, oilsands development, Cenovus Energy

SUPPLY CHAIN

- 24 BEATING BUDGET**
- Strong collaboration between supply chain stakeholders helped the Christina Lake optimization project stay within the lines
- By Joseph Caouette*

- 27 HEAVY HITTER**
Chester Nagy, president and CEO, Plains Fabrication

- 28 HEAVY HITTER**
Mike MacSween, executive vice-president, major projects, Suncor Energy

- 29 BREAKING THE CURVE ON CAPEX**
- Driving down the cost per barrel of thermal oilsands supply key to competing on a global basis
- By Darrell Stonehouse*



27

GOVERNANCE & REGULATION

- 33 SUSTAINABILITY, RESTRUCTURED**
- Alberta adds environmental monitoring to the suite of practices under the gun to deliver better performance for heavy oil

- 34 CHANGING THE RULES**
- Three key oilsands and heavy oil directives are up for revision, changing the investment landscape
- By Lynda Harrison*

- 36 HEAVY HITTER**
Jim Carr, Canada's Minister of Natural Resources

MARKETS

- 38 RUNNING OUT OF TIME**
- Ottawa and Alberta are seen to be taking the right steps to build support for market access, but pipeline investors won't wait forever
- By Deborah Jaremko*

- 41 HEAVY HITTER**
Russ Girling, president and CEO, TransCanada

- 42 INFOGRAPHIC**
Canadian crude movements to the U.S. 2015

- 43 HEAVY HITTER**
Al Monaco, president and CEO, Enbridge



ENVIRONMENT

- 45 HEAVY HITTER**
Rachel Notley, Premier of Alberta

- 46 TOMORROW'S OILSANDS**
- What the oilsands industry looks like in an increasingly low-carbon future
- By Carter Haydu*

- 50 EIGHT NEW GHG REDUCTION TECHNOLOGIES THAT COSIA WANTS YOUR HELP COMMERCIALIZING**

Welcome from the Premier of Alberta



On behalf of the Government of Alberta, it is my pleasure to welcome readers to the *Heavy Oil & Oilsands Guidebook XI*.

Alberta is truly fortunate to be bestowed with such an abundant source of energy wealth. Heavy oil and oilsands production is an integral part of both the Alberta and Canadian economies. Thousands of people across our country are employed in this promising sector. Indeed, the world is going

to need heavy oil and oilsands to meet its energy needs well into the future.

Our challenge, and opportunity, is to continue to develop this resource in an environmentally and socially responsible manner. We must build on strategies already in place, such as Alberta's Climate Change Leadership Plan, and we must continue to innovate not only in our technologies, but also in the way we

approach development. Although the global market is focused on oil, we can also use some of our oil here in Alberta to develop downstream industries. Alberta's new Petrochemicals Development Program is one such example.

As the global energy market continues to change, we need to set ourselves apart and develop that edge that makes Alberta and Canada not only a supplier of choice for oil, but also a source of skills and solutions—this guidebook supports those efforts.

Thank you to *Oilsands Review* and the Canadian Heavy Oil Association who have produced this essential publication.

Rachel Notley
Premier of Alberta

Welcome from the Government of Saskatchewan



As the global petroleum industry navigates ongoing multi-year price lows and a significant market downturn, Saskatchewan's position as a low-cost, opportunity-rich jurisdiction is ever more pronounced. Regardless of market trends, Saskatchewan's resource advantage is considerable: 56 billion barrels of initial oil in place and 1.2 billion barrels of remaining recoverable reserves.

Nearly half of those total remaining recoverable reserves are heavy oil. Husky's continuing confidence in Saskatchewan's heavy oil resource is driving three new thermal heavy oil projects near Lloydminster in 2016 that will add 24,500 bbls/d. Husky has long been one of the largest oil producers in Saskatchewan, and their ongoing commitment to the province is welcomed.

SAGD is gaining new traction in relatively small-scale operations as an enhanced oil recovery technology. Current recovery rates under primary production methods are approximately five per cent of oil in place; with SAGD projects fully implemented, however, recovery rates are expected to increase to as much as 50 per cent of oil in place.

This is the kind of innovative approach—enhanced technology married to geological advantage—that helps make oil and gas the largest contributor

among primary industries to Saskatchewan's real GDP, accounting for an estimated 15.1 per cent of the total. Oil, gas and related revenues, including Crown land sales, for the 2014-15 fiscal year were \$1.5 billion. Industry investment in new exploration and development in 2014 was \$6.7 billion.

Naturally, industry does not commit its dollars lightly at this scale. In the search for investment opportunities, Saskatchewan is at the top of the list as the number two oil producer and number three gas producer in Canada, and remains the number one preferred investment location for Canada's conventional oil producers.

We are known—not just within Canada, but internationally—as a jurisdiction of choice for companies looking to invest their dollars in existing and future opportunities that make sense. Certainly, commodity market volatility has had a significant effect on economic activity here and elsewhere. Markets inevitably correct, however, and Saskatchewan is well prepared for when prices turn.

Hon. Bill Boyd
Minister of the Economy

Welcome from the Canadian Heavy Oil Association



For the past 10 years, the *Heavy Oil & Oilsands Guidebook* has been a collection of valuable materials, offering a state of the industry report for those of us entrenched in industry and for those watching us closely. In this 11th edition, one that comes in a year where context and direction are of the utmost importance, readers will find content that is sure to give insight and understanding. On behalf of the Canadian

Heavy Oil Association (CHOA), ourselves entering our 30th year, I would like to welcome you to the publication.

Global forces have forced our industry into winter hibernation. Although we have been deeply affected by the combination of geopolitics, economics, societal values and technological advancements in other sectors, many parts of our industry continue to weather the challenges.

Like a mature tree, this industry has deep roots. Although winter has a tendency to slow growth, spring, in all of its muddy glory, will inevitably come upon us. Industry leaders take a number of shapes. From the figureheads that

lead whole organizations to those that lead continuous improvement on the front lines, those leaders have navigated the perennial cycle a number of times and their vision and wisdom are of intrinsic value.

As spring grows ever closer, we take pause to acknowledge that the seeds for new growth have already been sown. In some cases, those seeds have already sprouted, taking hold in areas where the right conditions exist. Many ideas and technologies taking root at this time in the cycle need to be nurtured and brought along carefully; a role that the CHOA has acknowledged as important and therefore a role that we will seek to emphasize.

With great optimism, I look forward to the coming years. We will surely look back with a sense of pride and accomplishment as those seeds and sprouts grow to be healthy, strong contributors to our industry. The CHOA is proud to be a part of such a distinguished publication, and we thank you for weathering the winter with us.

Stephen Arseniuk
CHOA president, 2015-16



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When leading industry analyst Jackie Forrest said at an event this spring that “not in my career has the growth in the oilsands been so uncertain,” it couldn’t have resonated with me more.

I’ve been covering the oilsands for almost 15 years, and while it’s never been possible to talk about the industry without addressing its challenges in the same breath, it was always clear before that the future was bright. Today, the oilsands is inside what a colleague of mine recently called hurricane-force headwinds—and there is no shelter.

There is so much oil in the world that its price has plummeted, but the costs to produce bitumen remain high. So high, in fact, that new growth projects have screeched to a halt. Canada is losing control of the regulatory process for major pipeline projects, and investors aren’t going to wait for it to get figured out.

The cost to comply with carbon reduction policies is rising, and while that may ultimately help the industry with market access, it does add to the price of entry in an already difficult investment climate. Canada must compete with other global plays—particularly light tight oil in the U.S.—and every nickel should be held hostage.

That’s the bad news. What’s the good news?

I keep hearing people say that “hope is not a strategy.” I agree: it’s not. However, hope needs to be seamlessly integrated into any strategy that is going to be successful in propelling the oilsands toward continued growth. I think this premise is summed up well by a quote from the movie *When Harry Met Sally*: “You’re supposed to make decisions based on what you do, not on what you don’t.”

I do want the oilsands industry to be successful, and I do want it to have lower environmental and economic costs. I think you do, too. The good news is that we have some of the smartest people in the world on the problem.

Calgary is the best place in Canada to do energy research, says Joule Bergerson, assistant professor with the University of Calgary’s Schulich School of Engineering.

“I came from the U.S., where the energy industries that I worked with actually weren’t the places where the really smart graduates go. In Alberta, I find that there is a really dynamic group of really smart people, and so when you surround yourself with those people and the challenges that are being faced, I think you have a really exciting combination.”

Some of the solutions to the oilsands industry’s problems will come from academia, some from industry, and others from some combination thereof, but they are coming. Hope is a strategy—provided it is backed by the steel force of practical action.

Deborah Jaremko | djaremko@jwnenergy.com

WHERE DO WE GO FROM HERE?

The oilsands is taking a major hit in a perfect storm of high costs, low prices, environmental impacts and social licence

BY DEBORAH JAREMKO

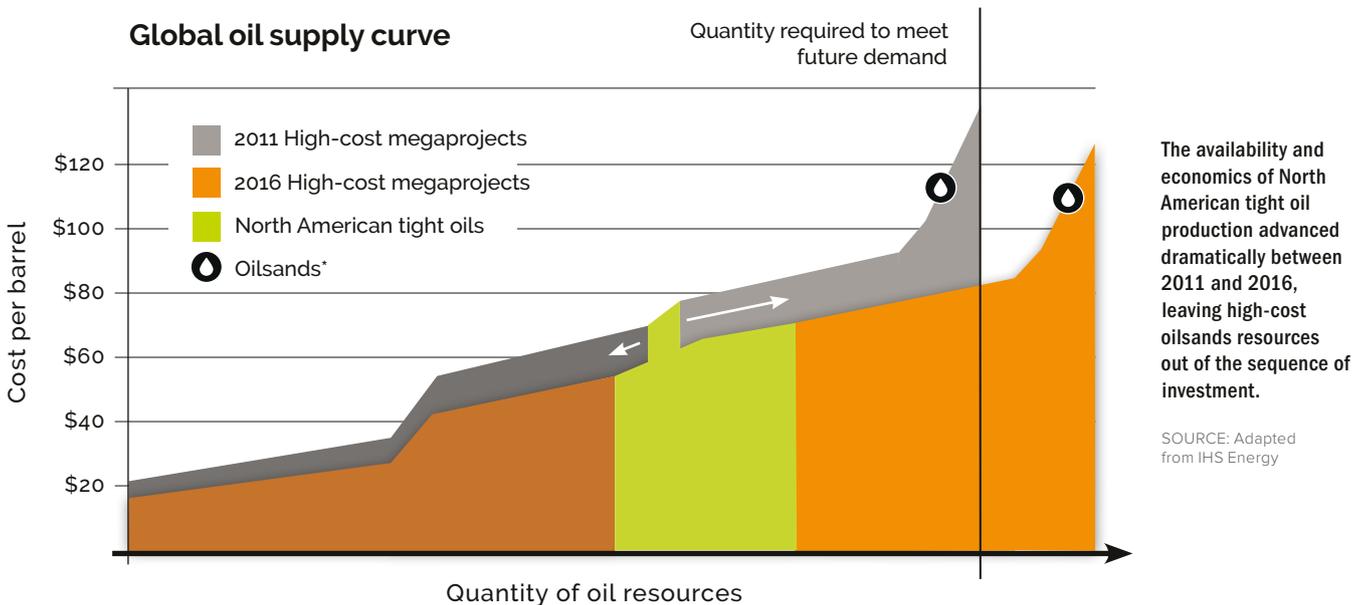
Amidst the screeching halt of new project development, the concerns over the cost of climate regulation and the continued delay in new market access, the biggest barrier between the oilsands and a future of continued growth is its competitiveness with other global plays—or lack thereof.

That’s the view of Peter Findlay, vice-president and energy lead of PwC Canada’s business modelling group, in a report he authored earlier this year for the Oxford Institute for Energy Studies.

“If operators could only find a way to make supply costs more globally competitive, the reserves are practically inexhaustible,” reads the report, titled *The Future of the Oil Sands*.

“It seems that the more production barrels that come online from the massive heavy oil basin, the more headwinds arise that operators must overcome to deliver a return to increasingly impatient investors who have little to show from their investments in the past decade, even before the oil price rout.”

Findlay noted that the break-even cost for greenfield oilsands projects in 2014 was three to four times more expensive per barrel than it was in 2003, even after adjusting for inflation.



*Oilsands project costs exist on a spectrum but generally are on the high end of oil production plays globally. Positioning intended for illustrative purposes only.

All that's left: Remaining new oilsands projects under construction

OPERATOR NAME	PROJECT NAME	PHASE NAME	TECHNOLOGY DESCRIPTION	STATUS	CAPACITY	YEAR PRODUCTION START	
Brion Energy Corporation	Mackay River	Phase 1	SAGD	UC	35,000	2015	Reportedly mechanically complete; steam injection to begin summer 2016
Canadian Natural Resources Limited	Horizon	Phase 2B	Mine/Upgrader	UC	45,000	2016	Early Q4/2016 commissioning
Cenovus Energy Inc.	Christina Lake	Phase F	SAGD	UC	50,000	2016	First oil expected Q3/2016
Cenovus Energy Inc.	Foster Creek	Phase G	SAGD	UC	30,000	2016	First oil expected Q3/2016
Japan Canada Oil Sands Limited	Hangingsone	Expansion	SAGD	UC	20,000	2016	Q3/2016
Canadian Natural Resources Limited	Horizon	Phase 3	Mine/Upgrader	UC	80,000	2017	Q4/2017
North West Upgrading Inc.	Redwater Upgrader	Phase 1	Upgrader	UC	50,000	2017	Q3/2017
Suncor Energy Inc.	Fort Hills	Phase 1	Surface Mining	UC	160,000	2017	First oil expected Q4/2017

“Drastic improvements to operating efficiency, capital effectiveness, supply chain management and overhead costs are needed to be economically attractive in a lower price environment.”

Ian Gates, head of the department of chemical engineering at the University of Calgary's Schulich School of Engineering, says the oilsands needs to find a way to be competitive and resilient in a carbon-constrained and lower-growth world. That means reduced costs for labour, materials and processes, lower environmental impacts and greater efficiency. Gates says the industry also needs plug-and-play operations to lower the entry point for producers, new markets and new products.

“We can't deny that we are a dirty oil—we produce more carbon dioxide per unit than other ones—but we can clean that up,” Gates said at a dinner event held by Schulich in March focused on the future of the oilsands. “This is a global competition. This isn't Alberta versus another province, this is Alberta versus the world, and their intention is to put us out. It's tangible innovation that we need to start thinking about. Saying it is not enough.”

Gord Lambert, who recently retired as Suncor's executive adviser of sustainability and innovation and who served on the Alberta government's climate change advisory panel, says the oilsands has different needs in the short versus the long term.

In Lambert's short-term to medium-term view of the innovation challenge, industry needs:

- Enhanced steam to oil ratio performance improvement at an accelerated pace on existing SAGD projects;
- Energy system design innovations, including waste heat recovery and use, new regional energy and water systems and forensic metering;
- In the next 10 years, the development and commercial deployment of Generation 3.0 technology for in situ production (50–70 per cent net greenhouse gas [GHG] reduction); and
- Tailings technology development to speed reclamation of mined oilsands tailings to a solid trafficable surface ready for reclamation.

Over the longer term (now to 15–20 years), Lambert says the industry needs to:

- Generate fuels derived from oilsands that are equally or less GHG-intensive relative to North American and global conventional alternatives (net atmospheric benefit or no net increase in atmospheric GHGs);
- Transform technologies for energy value creation from production to end use (economic diversification);
- Apply direct conversion of petroleum in an oilsands reservoir to hydrogen or electricity; and
- Integrate energy systems (oil/gas/power) with ultra-low energy input and emissions (potentially mediated through microbial organisms).

Without cost reduction and technological change, the industry is at risk not of shut-ins, but of entering into what Lambert calls a “harvest-type scenario” with no growth.

“If this drastic price drop was not enough, oilsands has its own special headwinds,” says Jackie Forrest, vice-president of energy research with ARC Financial. ARC reports that 17 major oilsands projects were deferred in 2015.

“Not in my career has the growth in the oilsands been so uncertain,” she says. “What oilsands has to do is find a way to get down the cost curve to find a way to get closer to the tight oil, to get back into the sequence where it makes sense to invest in the oilsands.”

Forrest says the installed base of oilsands capacity, which continues to grow as certain major projects near completion, is the silver lining of the current situation.

“By the time we get out to 2020, we'll have about three million barrels of oilsands production per day in this province. That is the same amount of production as the country of Kuwait,” she says.

“Just to keep that production functioning, those facilities working, we're going to need in the range of \$13 billion each year. People say oilsands doesn't decline but I think that it does decline if you don't invest—you've got to add new well pairs, you've got to extend your mine face. Investment has to be made just to keep that going. It's not the \$30 billion of spending the oilsands has been doing, but at least it's something.”

Forrest expects that even if the price of oil returns to more robust levels, investors will be much more cautious when considering oilsands projects. 📌



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STEVE WILLIAMS

President and chief executive officer, Suncor Energy



When Steve Williams took over from Rick George in May 2012 as leader of Suncor Energy, the prospects for the oilsands industry—and its most high profile company—were bright. Four years later, the sector is in the midst of a crushing downturn and a steep uphill battle for future competitiveness in an energy marketplace focused on lower costs and lower impacts.

But Williams, a graduate of Harvard and Oxford who worked for Esso and Octel before joining Suncor in 2002, says Suncor will pull through this period and out the other side even stronger.

“While we certainly haven’t welcomed the lower-for-longer prices, we at Suncor see this period more as an opportunity than a threat,” Williams told the audience in February at CERA Week in Houston. “Our goal is to use this time to build an even stronger company—a competitively advantaged company that is poised to benefit significantly when oil prices recover.”

It hasn’t been an easy time for Suncor’s employees or contractors. While the company continues to barrel through with construction of the \$18-billion Fort Hills mine, it has pulled back on essentially all other oilsands growth spending. It has also reduced its headcount by 1,900

people, including the redeployment of about 250 personnel from other divisions primarily to Fort Hills.

“We almost doubled what we set as an objective at the beginning,” Williams told analysts during the company’s fourth quarter conference call in March.

“That’s an indication that it wasn’t about a numbers target, it was about really working on our underlying business processes to become more productive. We had been investing for a few years on systems that would help us do that, and we were able to take full advantage of them in 2015.”

Suncor decreased its operational spending by approximately \$1 billion between 2014 and 2015, from over \$9.5 billion to \$8.6 billion. Williams says the company anticipates a further \$500 million drop this year.

“The process of driving out costs is relentless and continuous,” he says. “Whilst I was very pleased at our accomplishments on the cost management side, it’s very clear to me that the job is not done. In fact, I’m not sure the job of cost management is ever done.”

Nor is the journey to and sustenance of top-tier reliability. Suncor has recently made key strides in improving performance at its oilsands base plant,

achieving upgrader uptime over 90 percent in 2015. Now Williams says the company will take that experience across the road to the Syncrude project, of which Suncor is the lead owner following its \$6.6-billion acquisition of Canadian Oil Sands.

“With a 49 per cent ownership stake, Suncor will devote experienced personnel to work closely with the operator to drive major performance improvements and realize significant long-term added value,” Williams says.

The oilsands industry is at its heart a long-term play, and Williams believes that taking the right steps with climate policy and innovation will ensure its successful future. Last fall he stood with a group of fellow oilsands executives and environmental leaders as Alberta Premier Rachel Notley announced her government’s new climate strategy, which increases the price on carbon emissions and puts a cap on CO₂ from the oilsands.

“We believe the plan has tangibly demonstrated that leaders in the environmental community and the oilsands industry can work together,” he told CERA Week. “It will change the way we talk about climate change, resource development and infrastructure.”

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STEVE LAUT

President, Canadian Natural Resources



When Steve Laut was appointed president of Canadian Natural Resources in 2005, the company had just pressed “go” on the Horizon oilsands megaproject. This integrated mine and upgrader operation helped rocket the company from a relatively small operator to one of the oilsands industry’s most significant players.

A 25-year veteran of Canadian Natural, under Laut’s leadership over the last decade the company commenced operations at Horizon, grew production at its Primrose in situ project, successfully delivered a new SAGD project at Kirby and sanctioned a major expansion at Horizon as well as a new stand-alone bitumen upgrader. In recent years, Canadian Natural has been one of the biggest spenders in the oilsands, and it is the only company currently putting its money behind building upgrading capacity in Alberta.

Trained as a mechanical engineer at the University of Calgary, Laut worked as a reservoir engineer and production engineer for Peco Petroleum, Petro-Canada, Dome Petroleum and Unocal before joining Canadian Natural as senior exploitation engineer and earning progressively senior positions.

With discipline and prudence as the bedrock of its business approach, Canadian Natural has been following its own advice as the industry navigates a massive downturn.

In early 2015, Laut warned that oilsands producers and suppliers had to start cutting costs aggressively or succumb to a “death spiral.” By year’s end, the company had carved \$3.2 billion out of its 2015 budget, in what Laut calls “a methodical and structured manner” that is expected to prove sustainable. It also has a tight grip on its 2016 budget, keeping it below \$5 billion by lowering cost structures at all levels.

Canadian Natural is, however, maintaining a \$2.1-billion commitment to complete its Horizon 2B expansion in 2016. Phase 3 will require another \$1.2 billion in 2017 to reach completion before the end of the year. The project is targeting total production volumes of 250,000 bbls/d of synthetic crude oil with operating costs below \$25/bbl, continuing a downward trajectory from quarterly operating costs of \$28.61/bbl in the fourth quarter of 2015—nearly 25 per cent lower than the previous year.

“Canadian Natural is totally focused on value growth and economic growth,” Laut says. Last year, average production increased eight per cent despite slashed capital program spending and staff cuts.

Compounding the challenges of the low price environment, the industry has had to adapt to regulatory changes.

Canadian Natural was one of four companies that supported the Alberta government at its announcement of an overall carbon emissions limit for the oilsands industry and a new carbon pricing regime. The group says they are seeking ways to make tackling climate change less adversarial.

Laut says technological innovation is essential if greenhouse gas emissions are to be comprehensively reduced and wants the program used to fund new technology. Canadian Natural identifies itself as a leader that develops technologies or adopts proven new technologies quickly. Laut notes Canadian Natural has reduced greenhouse gases at Horizon by 18 per cent over the past two years and is spending \$1.3 billion there to capture CO₂, shrink its tailings ponds and rein in energy consumption. ■



RICH KRUGER

President and chief executive officer, Imperial Oil

Through the ups and downs of oil market economics, Imperial Oil's strategy is not to flinch. It's also to innovate and drive efficiency through new technology.

For more than five decades, the company has been driving a powerful position in the heavy oil and oilsands industry, and Rich Kruger intends to stay the course.

Kruger is relatively new to Imperial Oil, having been appointed president and chief executive officer in spring 2013. But he spent decades moving through the leadership ranks of ExxonMobil, Imperial's majority owner, which also holds close to that sturdy, steady culture.

Q: Imperial has been successful in reducing its overall cost structure since the oil price collapse. What impact do you think these cost reductions will have on the oilsands supply chain?

Our strategy is to capture cost savings and efficiencies that can be sustained for the long term. Working with our contractors, we initially focused on price: voluntary reductions, rebidding and procuring in different ways. Thereafter, we significantly shifted our efforts toward partnering with contractors to bring about productivity improvements.

We've taken some of our Alberta contractors to elsewhere in ExxonMobil's world and shown them ideas for improvements. Doing this can result in productivity improvements that will benefit all of industry, making our contractors healthier and more competitive, both in the current environment and in the future.

We believe many of our cost reductions and other improvements will be structural in nature. What we are trying to do is implement cost efficiencies in the most sustainable way for the long-term health and well-being of the business.

Q: In the oilsands, Imperial is shifting from a period of unprecedented growth to one of optimizing the efficiency of its production. How is the company working to successfully transition?

Over the past several years, we have gone through a period of significant growth, particularly in the upstream. Our priority now is ensuring we get the full value of those recent investments, focusing on base business operating fundamentals and delivering significant cost reductions in a challenging business environment.

In our focus on the fundamentals, safety remains the key priority. That

never changes, no matter what environment we're operating in. Our objective is a workplace where nobody gets hurt, and in 2015, we achieved best-ever performance on our journey.

Q: Greenhouse gas emissions reduction will be a central policy concern for the Albertan and Canadian governments in the near term. How does Imperial view the future of the oilsands in a lower-carbon world?

Imperial believes the risk of climate change is real and that responsible actions are warranted. We are taking action by reducing the emissions of our operations by increasing energy efficiency, investing in cogeneration and using breakthrough technology at our Kearl oilsands mine. We are also developing next-generation technologies that will improve oilsands production efficiency and minimize the environmental footprint associated with our operations by reducing water use and greenhouse gas emissions.

Imperial is also moving forward with plans to apply solvent-assisted SAGD to a suite of potential in situ projects, including Aspen and the Cold Lake Grand Rapids Formation and potentially Corner and Clyden. ■

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SURVIVAL STRATEGIES

Oilsands companies respond to low prices with cost-cutting measures and renewed focus on maintenance

JIM BENTEIN

Cost cutting has become a fact of life in the world of sub-\$50 oil, with producers focused on minimizing payrolls and maximizing value from fixed assets. With no price increases expected in the near future, companies are now counting their pennies more closely as they look for new ways to drive costs even lower by optimizing their existing assets.

Kevin Birn, a director at IHS Energy and author of a report looking at the competitiveness of the oilsands in the current depressed market, thinks producers will find more ways to trim costs beyond staff reductions. There have been about 45,000 workers laid off in the last year in the Canadian oil and gas industry.

"I think it's reasonable to expect further cost reductions," he says. "The question will be how much is temporary, and how much is structural?"

Released in December, *Oil Sands Cost and Competitiveness* concludes that oilsands producers were

better prepared for the oil price collapse than many observers had expected. Birn says that producers were focused on capital and operational cost reductions even before oil prices plunged, which helped them better respond to the price shock.

"There is this misconception about oilsands because people call it high cost and write it off," he says. "The reality is, oilsands [is] medium and high cost."

Birn says that oilsands plant operators have reduced their operating costs in the last year by as much as 20 per cent. For example, Suncor Energy is targeting operating costs of \$27–\$30/bbl at its operations—and is aiming to reach similar levels at Syncrude Canada's operations. Costs on that project have been between \$38/bbl and \$45/bbl.

Some of those cost reductions have come from trimming field workers. Suncor and other oilsands producers have cut back on the number of fly-in workers they employ and using more local workers, who require lower transportation costs.

In 2015, break-even prices for oilsands projects fell by about US\$10/bbl. IHS believes mines with upgraders need between \$30/bbl and \$40/bbl to cover their operating costs. On average, existing SAGD plants need between \$20/bbl and \$35/bbl.

One little-noticed factor in these cost reductions was the greater utilization of existing plants and equipment. In accounting parlance, those are known as fixed assets.



FirstEnergy Capital expects that oil sands producers will extend their spring maintenance cycles or take on more maintenance to help reduce cash losses and supplies from the field.

“Oilsands facilities never run to 100 per cent of name-plate capacity,” Birn says. “But many oil sands plants were seen to have run at capacity or over [in 2015].”

As a result, productivity per worker at many of those plants was greatly improved.

However, while operational costs have been reduced by 10–20 per cent, IHS estimates that capital costs in 2015 dropped by only about six per cent. That’s because some key equipment is priced in U.S. dollars, which leaves less room for cost cuts.

Low oil prices are forcing operators to take a knife to all costs, but Birn believes that discipline won’t end after oil prices recover. In fact, he thinks the industry can do even better.

“I was quite skeptical [about the industry’s ability to trim costs] when I started this report,” he says. “But I think it’s reasonable to expect further cost reductions.”

At first, the lower crude prices were a motivating factor that led to more rapid cost reductions, but “now it’s the focus of everything they do,” Birn says.

Better productivity has been key, as less experienced field workers are sent packing. Being able to gain greater use of equipment has also been a factor, and he expects that to remain the case even after oil prices rise.

“The industry of tomorrow will not be like the industry of the past, where it was necessary to build more infrastructure to produce more oil,” he says. “Instead, you can grow production with what you have.”

When oil prices recover, IHS sees new capital investment concentrated in the expansion of existing SAGD projects. It doesn’t see new greenfield projects being built until prices move up significantly. According to the company’s estimates, a new 100,000-bbl/d oil sands mine

in 2015 would have required a WTI price between \$85/bbl and \$95/bbl to cover supply costs. By comparison, a new SAGD project would need a price of between \$55/bbl and \$65/bbl to produce 30,000 bbls/d.

Because producers can leverage existing project infrastructure, SAGD plant expansions can cost as much as \$10,000 less than a mining project for each barrel per day of capacity. Mine expansions simply don’t enjoy the same economics because meaningful capacity additions require new facilities be built.

The oil sands sector will need to compete with other sources of supply for new capital when prices recover, but Birn believes it can succeed.

“At the end of the day, the oil sands represents a tremendous resource, located in a politically secure area and next to the largest crude oil market in the world,” he says.

And plants need to be maintained, which creates ongoing economic activity in Alberta’s hard-hit oil and gas industry.

Melloy Industrial Services, a division of construction giant PCL, continues to benefit from its involvement in the maintenance, repair and operations (MRO) space. In fact, the coming year will actually be busier for MRO specialists than 2015, says Roger Keglowsch, senior vice-president for heavy industrial with PCL.

“We have some major turnarounds in 2016 and we’re already planning for 2017,” he says, adding that there was a tendency to do less MRO work when oil prices were higher “because you want to be producing oil.”

Far from reflecting the doom and gloom seen elsewhere in the Alberta economy, Melloy is expecting a 10–15 per cent increase in business this year, Keglowsch says.

“It’s business as usual,” he says. ■



ROB PEABODY

Chief operating officer, Husky Energy

For more than 75 years, Husky Energy has been a major player in Canadian heavy oil development, but as chief executive officer Asim Ghosh recently said, it's not your father's heavy oil development anymore.

As chief operating officer, Rob Peabody is tasked with delivering results in growing production, controlling costs and increasing reserves—all of which Husky is currently achieving.

Amidst the painful current slump in oil prices, Peabody says the company needs to put the health of the balance sheet front and centre, matching its capital program with its operating cash flow rather than incur new debt.

"Ultimately, to take advantage of the upturn in the cycle when it finally comes, you have to be there," Peabody told the recent CIBC Whistler Institutional Investor Conference.

"We believe that unless you're extremely prudent through this, if you get the call wrong you might put your company in danger. We're not going to do that."

It's a company that has heavy oil in its foundations.

Husky's primary production operations are now complemented by a growing slate of thermal heavy

oil projects, as well as a growing position in oilsands SAGD. Since 2012, Husky has started up four new Lloydminster SAGD projects, with three more expected to start producing this year. Husky even sanctioned a new facility in late 2015, going against the wave of project cancellations sweeping the industry.

The company has also achieved key milestones in the oilsands, starting up its 60,000-bbl/d Sunrise SAGD project last year, as well as improving performance at its Tucker SAGD project.

Over the past five years, Husky has been reducing its sustaining and maintenance costs through structural changes. The goal is to ensure the cost reductions are sustainable.

At the company's 2016 production guidance and capital expenditure program conference, Peabody described Husky as transforming itself from a business with a large number of small plays into one with a focus on fewer, but more material, plays.

"Ultimately, we see a business of similar size to the one we have now, but requiring only about one-third the capital to sustain production," he said.

The company says that 40 per cent of its overall production base is expected to come from

low-sustaining-capital projects (including non-Sunrise thermal oil output) by the end of 2016, compared to just eight per cent in 2010.

Sunrise had a successful startup late last year and is currently delivering just under 18,000 bbls/d. Steaming is underway on 55 well pairs, with about 46 wells gradually being brought on production. With low sustaining capital requirements and a forecast life of more than 170 years at 60,000 bbls/d, Sunrise is on track to deliver steady, reliable production for a very long time, according to Peabody.

At Tucker, where production has trailed well below 30,000-bbl/d nameplate capacity since start-up in 2006, Husky made great strides in 2015.

A new sustaining well pad increased SAGD production to 15,000 bbls/d in the second half of the year, compared to average production of about 10,800 bbls/d in 2014.

Steaming has started into a new formation at the project, and as a result Husky expects that Tucker production will increase toward 20,000 bbls/d in the second half of 2016.

The company says it also lowered its Tucker thermal unit operating costs by more than 55 per cent over 2015. ■

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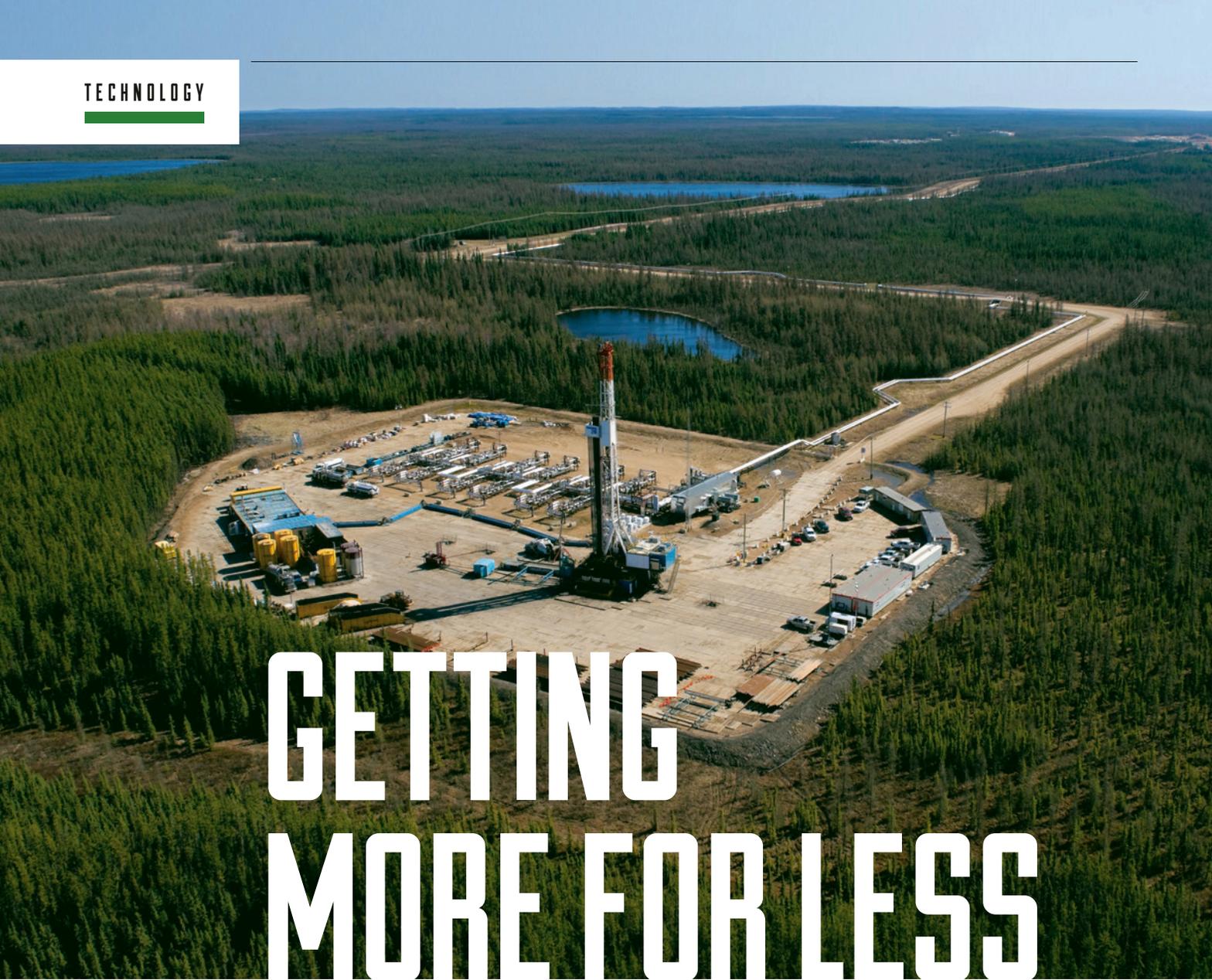


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GETTING MORE FOR LESS

Incremental technology gains can drive efficiency and cut costs, but they also require investment during a tough economic climate

JWN STAFF

As the in situ oilsands sector enters the second half of the decade, the conditions under which it operates could hardly have changed more in just five years.

The start of the 2010s saw the international price of oil over \$70 and rising, high hopes for new pipeline capacity to carry product to new markets and only slight costs on emissions, leading to a boom in the sector. But by mid-2014 mounting supply—resulting in large part from the rapidly expanding light, tight oil sector in the U.S.—and tanking oil prices brought the boom to an abrupt halt. As prices plummeted, new uncertainties also emerged as proposed pipelines were delayed and added carbon costs were introduced.

The bottoming out of the oil price cycle has made producers painfully aware of the high costs of oilsands production and exacerbated the need to improve efficiency. A number of incremental technologies are finding success, but the current market—where producers are



MEG Energy has been particularly successful implementing a SAGD optimization program at its Christina Lake project, lowering costs and increasing production.

barely generating cash flow—is not encouraging big shifts in operational strategy.

That's fine, if you're just talking about keeping the lights on at existing oilsands facilities. If the industry wants to grow, it has to change—particularly in the context of a new climate regime in Alberta that caps oilsands greenhouse gas (GHG) emissions at not much higher than they are today.

A 2015 study from the Canadian Energy Research Institute (CERI) says that advances in efficiency hold the key for a promising oilsands future. Its report, *Oil Sands Industry Energy Requirements And Greenhouse Gas Emissions Outlook (2015-2050)*, finds that the application of technology can enable ongoing oilsands production as well as production growth while meeting GHG emission targets.

Under an increased energy efficiency scenario, CERI forecasts that oilsands production will continue to grow from about 2.3 million bbls/d today to 4.55 million bbls/d by 2050. With the help of technology, this production growth will come with a 29.5 per cent decrease in cumulative energy used compared to the business-as-usual scenario and a 28.7 per cent decrease in cumulative GHG emissions.

These new technologies include solvent and methane co-injection, high-temperature electric submersible pumps (ESPs), flow control devices and vacuum insulated tubing (VIT).

Heat transfer

ConocoPhillips Canada led the way on ESPs and VIT last year at its 118,000-bbl/d Surmont 2 SAGD facility, the largest ever built in Alberta. The project, which ConocoPhillips shares 50/50 with Total E&P Canada, achieved first oil production last September. It is one of a number of major projects that were in flight before the crash in oil prices that has been continued to completion because of the momentum its owners had already invested.

ConocoPhillips started testing the viability of VIT at Surmont 1 as a way to use heat more efficiently as it travels from the plant through the pad to the reservoir. The results were encouraging enough that VIT became a core feature of Surmont 2, where the technology will achieve its widest commercial application to date in the sector.

"We are using vacuum insulated tubing in all of our injector wells," Kate Easton, who serves as ConocoPhillips's director of Canada's Oil Sands Innovation Alliance, told *Oilsands Review* last fall. "It's basically insulating the steam pipe as it goes into the ground so there is no heat lost. The steam all reaches the reservoir with as much heat as possible."

Operators typically generate 80 per cent steam in once-through steam generators or drum boilers. The hot water portion is stripped out and the pure steam is transported up to five kilometres in insulated pipes to the wellhead and down into the reservoir. Various cooling factors, like water-saturated formations, draw away heat as the steam

travels to its destination. By the time it reaches the toe of the well, it can be mostly hot water, leaving reserves at the end of the well largely untapped.

Also capitalizing on past testing at Surmont 1, ConocoPhillips opted to include flow control devices on its SAGD wells to reduce energy use and corresponding costs. About 30 per cent of the wells at Surmont 2 will make use of the technology, Easton said.

Both VIT and flow control devices come at a premium to conventional SAGD development, but she said that the benefit will come over the longer term.

"They have a capital cost to install them; they cost more than just doing a regular well, but we've done the homework and we believe that the energy savings should be worth the cost."

Pumping up the volume

Some producers have cited the electric submersible pump (ESP) as one of the most significant technological improvements to the SAGD process to date, helping to reduce the steam to oil ratio (SOR) and therefore energy use and cost. Suppliers are working hard to produce ESPs that can operate at higher temperatures, which Ken Friesen, general manager of GE Oil and Gas Canada, says is all about equipment reliability.

GE, which recently released its third-generation high-temperature ESP, has a multi-generational plan over two years to increase the temperature rating and increase ESP life expectancy. "We're looking at changing some of the components of the ESP with different materials so the end result would be more up time, more reliability, lower maintenance and replacement costs and more production," Friesen says.

At the same time, GE is coupling ESP technology with data and analytics on the performance of its components to understand if there are issues in predicting failures. Ultimately, the company is working toward supporting fully optimized SAGD plants where data and analytics play a central role in operations. This would enable facilities to be centrally operated, so there would be no requirement to have operators on site every day taking hand measurements of oil emulsion, for example.

Co-injection boost

Recent years have brought advancements in technologies such as solvent-assisted SAGD (SA-SAGD), non-condensable gas injection, infill or wedge wells, and tighter well pair spacing, according to Jared Wynveen, associate with McDaniel & Associates Consultants. "A ton of new technologies are being developed right now that are on the cusp of commercialization, but the two with broadest applicability are solvent-assisted steam assisted gravity drainage and methane co-injection with infill wells," Wynveen said last fall. →



The key to both is that by reducing SOR, companies increase the effective capacity of their plants. SAGD projects are almost never limited by the bitumen capacity itself, but rather the water, water treatment and steam-generation capacity. Therefore a 30 per cent decrease in SOR is a 30 per cent uplift to the project capacity, which is how companies like MEG Energy operate projects far above nameplate capacity.

The beauty of co-injecting non-condensable gas with steam is that it requires no new facilities since the natural gas supply is already piped onto the site to fuel steam generators, and only small volumes are required for injection. In terms of capital spending, all that has to be added is the plumbing to mix the methane and steam before injection.

Enhanced modified steam and gas push (eMSAGP) is the term MEG coined for its use of gas co-injection with steam in conjunction with infill wells. As the steam condenses back to a liquid state when it cools, the pressure declines. Co-injecting trace amounts of a non-condensable gas, like methane, with the steam helps keep consistent pressure in the reservoir, and the use of non-condensable gas frees up steam capacity to be redeployed into predrilled wells, providing a very efficient way of adding low-cost barrels, MEG says.

MEG has reduced its capital spending due to the downturn—a planned \$328 million in 2016 compared to \$1.8 billion in 2014—but it continues to invest in efficiency through new technology. The company says that 20 per cent of its 2016 spend will be directed toward productivity gains associated with eMSAGP and positioning for future growth.

PHOTO: CONOCOPHILLIPS CANADA

Nsolv's pure solvent in situ technology gains momentum with \$13-million grant from the Government of Canada

Nsolv, a small company that has been operating a pure solvent technology pilot on a Suncor lease for nearly two years, is stepping closer to commercial production. That's thanks to a new \$13-million grant from Sustainable Technology Development Canada (SDTC).

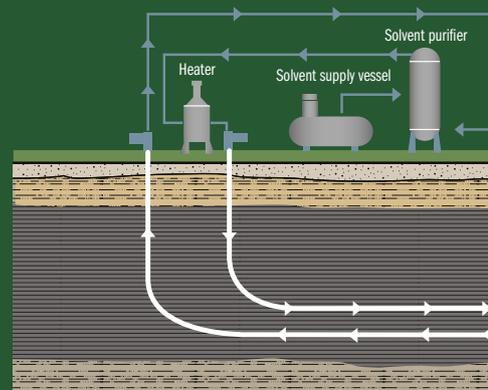
Nsolv chief executive officer Joseph Kuhach admits that the grant, while substantial, is not enough in itself to fund a commercial operation. However, it provides important momentum to a technology that could actually change the oilsands game.

"Even with the cost savings over SAGD of around 40 per cent, you're still talking about quite a substantial investment to go forward with a project.... This is a bit of a boost to help us get over that next threshold," Kuhach says.

The pilot has so far produced about 85,000 barrels of partially upgraded bitumen.

"SDTC has a very rigorous process as far as identifying technologies that they think are truly going to be game changing. They've had a chance to digest our pilot results

N-SOLV BITUMEN EXTRACTION



Source: Nsolv



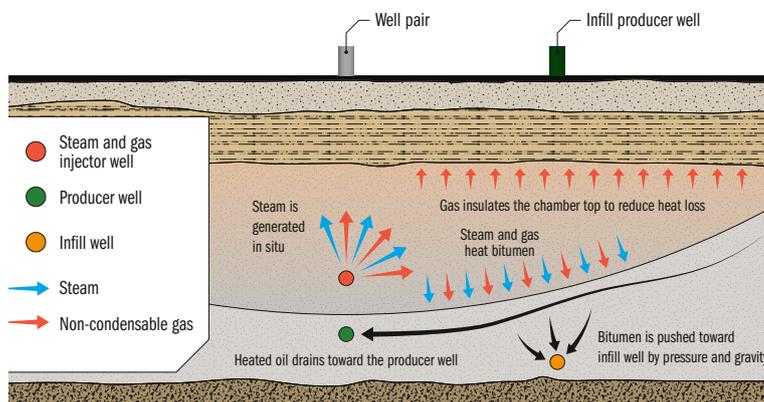
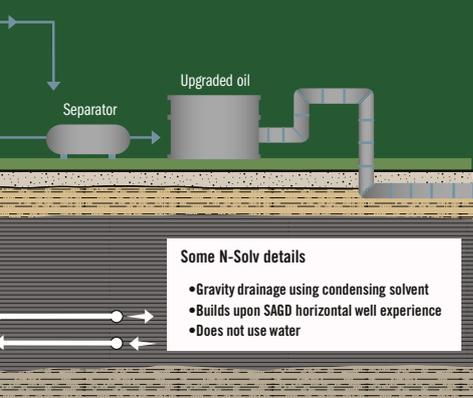
and look at our application for additional funding. While it doesn't get us all the way there, we have the technical endorsement from them and we have the confidence to sink another \$13 million into our technology going forward."

Nsolv says it is in the process of finalizing a partnership to construct a commercial-scale facility with a major heavy oil producer. Kuhach says it's hard to finalize the timeline at this point, since a number of factors, including market conditions, will come into play. He says that the collapse in oil pricing over the last 18 months has been "a bit of a double-edged sword" for these technology developers.

"I'd say that on balance it is positive, because if we go back to when oil prices were \$90–\$100, the industry was making so much money doing what they'd always done that they didn't really consider alternative ways to do things smarter, to do things cheaper, because it was something new. When oil prices dropped into the \$50 range, we really started to see a lot of traction pick up in our conversations," he says.

"The other side of that sword has been as oil prices had dropped below \$30, companies were really focusing on keeping the lights on. Folks were kind of in a panic. [Now] there is some cautious optimism."

Kuhach adds that even in a \$30–\$40 price environment, Nsolv operations would make money.



Non-condensable gas co-injection is seen as one of the most broadly applicable SAGD enhancing technologies available today.

Cenovus Energy says it has used methane co-injection on six wells at Christina Lake and 15 wells at Foster Creek, while Suncor began co-injecting natural gas with steam on three maturing wells at its MacKay River SAGD project in 2012 and has since received approval to expand co-injection to more wells.

Solvent extraction

SA-SAGD, meanwhile, can increase productivity by 30 per cent per well pair, improve the SOR by 30 per cent and create a 20 per cent uplift in recoverable volumes per well pair, McDaniel & Associates estimates.

Several companies, including Cenovus Energy, Suncor Energy, Imperial Oil, ConocoPhillips, Connacher Oil & Gas, Laricina Energy and Athabasca Oil Corporation, have reported success with solvent co-injection. In 2012, Cenovus even gave the go-ahead to its Narrows Lake project, a 45,000-bbl/d SAGD facility that would incorporate solvent co-injection on a commercial scale. But as the company looks to crack down on costs in the face of weak oil pricing, the 2017 start-up for the first phase at Narrows Lake has been replaced with a TBD.

Cenovus has said that Narrows Lake would be the third project to be restarted once conditions improve, after expansions at its existing Christina Lake and Foster Creek SAGD facilities.

Connacher, which has been successfully piloting its SAGD+ solvent co-injection process since 2011, had planned commercial operations at the Algar SAGD project in 2015. But now heavily indebted Connacher is undergoing a strategic review of its capital structure.

In a move confirming the long-term positive view on the oilsands, and solvents in particular, this spring Imperial Oil filed a new regulatory application for a \$2.2-billion SA-SAGD expansion at its Cold Lake in situ project. The company says that construction could begin in 2019.

IMAGE: MEGENERGY

HARBIR CHHINA

Executive vice-president, oilsands development,
Cenovus Energy



When Harbir Chhina speaks about SAGD, people line up to listen.

Chhina, who was born in India and moved to B.C. at ten years old, graduated from the University of Calgary with a bachelor of petroleum engineering and cut his teeth at the Alberta Oil Sands Technology and Research Authority. He is recognized as being instrumental in the initial application of SAGD on a commercial basis.

Today he is the beating heart of the evolution of SAGD with Cenovus Energy, the largest operator of the technology and one of its key innovators, as the industry looks for game changers.

IQ: How is Cenovus revisiting its plans based on the current oil price environment?

We need to redesign the oilsands to be profitable in a \$50-WTI world, and in order to achieve that we think we need to achieve “30-30-30.” We need to achieve a 30 per cent reduction on capital, 30 per cent reduction in operating costs and 30 per cent reduction in [general and administrative] and indirects. Our company is well positioned to achieve that.

Once we achieve our 30-30-30, I think we’re going to have to move toward a 40-40-40 number to be

competitive because we’re competing with light tight oil now, whereas before we were competing with the rest of the world.

IQ: Alberta’s new cap on oilsands emissions effectively sets the boundaries for growth using current production technologies. How close are in situ oilsands producers to achieving technological change that is meaningful enough to enable continued expansion?

It was really good to see our industry being represented with government and environmental organizations when the climate policy was announced. I think that is a huge step forward, and that is saying that “yes, we understand the public’s concern, and we’re going to address that.” We’re going to address it with technology, and I think that we will get there. I think about things such as solvents. Our strategy historically has been to look at all solvents from C1 to C7, and what we see in this environment is that propane is almost free. We’re actually looking at doing something called lean propane—normally we put 10–12 weight per cent solvent with the steam; here we’ll be looking at something in that 3–5 per cent range,

and really the biggest cost there is only going to be trucking.

We’re adjusting according to the commodity prices of these solvents, and I think that is going to be the future.

Historically, we’ve always focused on the downhole stuff, but now we’re focusing on the surface stuff. We think on new projects like Telephone Lake we can actually reduce our footprint by as much as 50 per cent, which means it will be easier to modularize. We’re looking at a plug-and-play concept similar to the offshore LNG plants. Reducing the size will reduce the escalation risk on these projects going forward. Not only is that going to reduce our costs substantially, but it’s also going to reduce our environmental footprint.

I think the other thing in achieving these emissions targets is collaboration. There is a lot more collaboration going on, and it’s not just through COSIA [Canada’s Oil Sands Innovation Alliance]. I think that is a must to help move technology forward at the pace we’re going to need it.

We don’t have a production target anymore in oilsands; we have an emissions target. That is something that we can do something about by investing dollars in technology right now and coming out with game changers. 🐾



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At 140,00 bbls/d, Cenovus Energy Christina Lake is one of the biggest SAGD projects in the oilsands. The recently completed optimization adds a further 22,000 bbls/d to nameplate capacity without a major new capital project.





BEATING BUDGET

Strong collaboration between supply chain stakeholders helped the Christina Lake optimization project stay within the lines

JOSEPH CAQUETTE

Plan early. Build on past successes. Develop strong collaborative relationships. These are just a few of the lessons to be learned from Cenovus Energy's Christina Lake optimization project, which was completed on time and under budget in the fourth quarter of 2015.

On time and under budget are not phrases that come easily in the oilsands industry, but companies are working together to change that.

Christina Lake is one of the biggest SAGD projects in the industry, with current nameplate production capacity of about 140,000 bbls/d. Cenovus's latest expansion, Phase F (50,000 bbls/d), is on track to produce first oil later this year.

The optimization project adds 22,000 bbls/d of gross productive capacity, with volumes ramping up over 2016.

According to Colin Gouthro, project manager with Cenovus, much of the optimization's success can be traced to efforts to engage early on with contractors and vendors on issues related to constructability and operability. Given that Christina Lake is an active project, the early planning stages needed to involve multiple disciplines to ensure production could continue safely and efficiently as

the operations and construction teams dealt with crowded shared workspaces.

The value of multi-disciplinary front-end planning can be seen in how the project handled "hot tapping." This process—involving the installation of new piping connections on an active line—was a necessity if operations at Christina Lake were to continue throughout the optimization, but working on hot lines is also challenging and potentially dangerous. To help mitigate potential issues, key safety and operational personnel were brought in early on to work with the suppliers, construction crew and commissioning team to reduce the number of hot taps required.

"This level of engagement was maintained throughout the project," Gouthro says. "The engineering firm, suppliers and contractors functioned as an extension of the Cenovus team."

The company also looked closely at how it managed the shiftwork, which was split between a nine-day main shift and a five-day back shift. Work was planned so that trades would not be tripping over each other—or worse, standing around waiting for another group to finish its job. For example, the building crew might put together the structure during the nine-day shift, and then the piping contractors →

would come in for a five-day stint. Going with a smaller scale back shift added some indirect costs, but the productivity increases and cost savings from the main shift more than compensated, Gouthro says.

Thorough planning opened up a number of avenues for cost savings on the project. Commonly, scaffolding is one of those areas where projects—and the Christina Lake optimization is no exception here—can save time and money simply by bringing together contractors to look more closely at what is needed to do the job. In the case of Christina Lake, one of the electrical contractors found significant savings on scaffolding simply by talking over the issue with the scaffold contractor and construction management team.

“Planning the work, collaboration and asking the right questions were key factors in this success,” Gouthro says. “In the end, we were able to do the work safely, with less scaffolding, helping to reduce costs.”

Now five phases into its development, Christina Lake has a wealth of engineering and fabrication knowledge that it could draw upon during the optimization. As a result, the company built on work from previous phases and used standardized designs for the heat exchangers, pumps and pressure vessels.

And if Cenovus was familiar with the equipment, it was equally familiar with the companies supplying that equipment. Over the years, the company says it has established strong working relationships with a number of smaller, local contractors, which opens up the opportunity for a more flexible approach to construction management. Trusted suppliers providing standardized equipment—those that had proven their ability to deliver high-quality results on time during previous jobs, in other words—could focus more on their work because Cenovus needed to do fewer check-ins and inspections with these providers.

Established relationships between the owner and contractors can pay dividends in other ways as well.

“At Christina Lake, we have been fortunate to have been in a constant state of expansion over the last several years,” Gouthro says. “This has given us the opportunity to attract and maintain a consistent suite of contractors, which in turn has given us the opportunity to grow and solidify our safety culture.”

Advice that works for couples in love applies just as well to companies in contract: healthy communication is the foundation of any strong relationship. According to Gouthro, Cenovus has committed to working with its suppliers to understand their cost structures. The company also has made an effort to gather feedback from contractors on their own challenges, because good communication is about more than talking—it’s about listening, too.

“Ultimately, it all comes down to asking ourselves and our partners what can we do differently to improve our execution and to achieve savings in a collaborative way,” Gouthro says. 🍷

“ULTIMATELY, IT ALL COMES DOWN TO ASKING OURSELVES AND OUR PARTNERS WHAT CAN WE DO DIFFERENTLY TO IMPROVE OUR EXECUTION AND TO ACHIEVE SAVINGS IN A COLLABORATIVE WAY.”

—Colin Gouthro, Christina Lake optimization project manager



PHOTO: CENOVUS ENERGY

CHESTER NAGY

President and chief executive officer,
Plains Fabrication



Few understand how much the oilsands industry is hurting better than its suppliers—the companies that can get pneumonia when producers catch a sniffle. Chester Nagy has been through a challenging downturn before and made it out the other side with a new company to start again.

Nagy grew up working in his dad's Calgary machining and welding facility and earned his welding ticket at 18. In his 20s, he had his first tough lesson as a business owner in the 1980s downturn, before regrouping and starting Plains in 1988. Nagy is a key figure in PAAD (Productivity Alignment and Delivery), a group of owners, engineering, procurement and construction (EPC) companies, and suppliers collaborating to improve industry productivity.

Q: How is Plains absorbing the significant cost cuts expected by oilsands producers? How is the supply chain affected by cuts?

Eighteen months ago, we had about 200 people. We've laid off roughly 140. A lot were with our company the full 28 years and 39 people for over 10 years. It's been a tough go.

Fabricators don't deal directly very often with the end users, but usually with EPCs who are paid for every hour they spend. We're lump sum, so their extra changes cost us time. I understand what producers are trying to do, but Canadian fabricators aren't a high enough profit business to take the 15 per cent or more price cut producers expect.

The PAAD group knows better productivity has to be achieved together. At Plains, customers and suppliers have been part of our success for years. We know Plains does a great job, but when it's price versus cost—because lowest price is not always lowest cost—it can cost producers tens of thousands of dollars to analyze 20 bids and choose one. There's waste all around. For instance, if they choose a difficult construction method, that's waste.

Q: Given the decrease in activity in Alberta and the lower Canadian dollar, do Canadian suppliers have the opportunity to take market share from foreign competitors?

In its wages and thought processes, the Alberta industry wasted money

when the price was between \$70 and \$100 per barrel, so foreign companies could come in. We could regain some of that, but it's a double whammy. Right now we're bidding on an exact repeat of a job we did six months ago. Half the components come out of the U.S. and our cost has jumped by 40 per cent.

If national and international competitors had the same inspection, environmental and safety requirements we have, that's an even playing field, but I know for a fact it's not. We would do the same job—same quality—20 years ago, 20–25 per cent faster then. Now because of lack of trust throughout the industry, over-engineering and inspection are slowing productivity down.

Q: How is Plains managing as oilsands producers shift focus to operational performance from sanctioning new projects?

We're bidding on repair and optimization work, and we've had some approaches from other industries. We have a good reputation in new fabrication and we know we have to do this, but adapting takes time. ■

MIKE MACSWEEN

Executive vice-president, major projects, Suncor Energy



In recent years, the major projects group at Suncor Energy has been a centrepiece of growth in the oilsands sector. Since 2013, Mike MacSween has been the man in the driver's seat.

There aren't many major projects proceeding in the oilsands industry right now, with the exception of some big standouts like Suncor Fort Hills. At \$18 billion, it's a major endeavour in size and scope. It's also one of the only projects keeping people busy.

Before joining Suncor 20 years ago, MacSween worked for Betz Process Chemicals and Shell Canada. At Suncor, he has carried a variety of leadership roles, including vice-president, upgrading; vice-president, strategy and development; and senior vice-president, in situ.

He says that improving productivity is now more important than ever.

IQ: You are a public champion of the Project Alignment and Delivery (PAAD) initiative, which is working to improve the productivity and cost performance of project execution in Alberta. PAAD was conceptualized and formed when prices were much higher and there was significantly more activity in the province. How has the changed price environment affected dynamics for PAAD?

Finding ways to manage project costs has never been more important. PAAD aims to improve project execution capabilities and does this by helping companies identify and address productivity gaps, maximize resources and be more efficient—all important priorities regardless of the price of crude. Our biggest challenge is leveraging the resources we have available. It takes a holistic approach and [it] takes multiple parties. It is an important part of our future collectively.

To our benefit, capturing opportunities for companies today will help set the stage for process improvements when activity ramps up in the future.

IQ: Market consensus seems to be that improved productivity for projects overall is reliant on early contractor involvement, but this doesn't always happen. What gets in the way?

The historical approach to project development. It's something that we're working to change. The supply chain is more complex than just one input. That's why we're looking at the entire value chain. We're working with our partners to recognize the opportunities of early contractor engagement.

The approach requires companies to operate differently. It's not always comfortable, and [it] requires courageous leadership, but there are clear benefits to adopting an inclusive versus an independent approach.

IQ: How will PAAD bring companies together to share information about some of their most competitive information, i.e. their capital and operating costs?

As a region, we're in this together. We are all players in a global commodity game, and [we] must be competitive on costs. It's no longer good enough to be the best in our own backyard, and we'll only realize the value of our natural resources if we can effectively and efficiently execute the projects necessary to access them.

The right players are at the table, and we're willing to share information to help improve the entire chain as it will have a positive impact on us all.

In previous cycles, there have been examples of companies coming together, such as the North Sea in the 1980s. There is precedent behind the benefits of collaboration, and now is the time for us to work on it here in Alberta's oilsands industry. ■



Capital spending in the oil sands has dropped off dramatically since the price of oil began to fall two years ago. Project capital costs need to come down significantly for new projects and new expansions to proceed in a lower-for-longer market.

BREAKING THE CURVE ON CAPEX

Driving down the cost per barrel of thermal oil sands supply key to competing on a global basis

DARRELL STONEHOUSE

Oil sands supply costs need to come down dramatically if the industry expects to compete for capital with other petroleum basins around the world.

How much?

"We need to redesign the oil sands so that we can make a nine per cent return at \$40–\$50 WTI," Harbir Chhina, executive vice-president, oil sands with Cenovus Energy, said at a Canadian Heavy Oil Association conference in November.

What this translates to on the ground is a 30 per cent cut in costs across the board, Chhina said.

While general and administrative costs are being dealt with through lay-offs, wage cuts and reduced executive compensation, efforts are underway to get other costs

down as well. The process of designing and building SAGD facilities is being reworked to cut engineering, materials and labour costs. Producers are piloting new technologies to cut operational costs.

All these cost-cutting measures will hit many companies and workers serving and supplying the oil sands hard. Those that can adapt, however, should survive and prosper.

Building a better SAGD facility

The cost of building SAGD facilities has skyrocketed over the past decade, Chhina said.

"Thirteen years ago, I would have told you my finding and development costs were \$3/boe. Today, they are \$13 and struggling to get back to single digits," he said. →

To lower costs, new SAGD facilities are being designed to eliminate over-capacity issues, said Craig McInnis, manager of the field development program at Cenovus. In the past, the company had designed its modules based on peak production from some of its best pads and that resulted in the over-capacity issue.

It has now instituted what it calls a zero-based module, or ZBM.

Zero-based design means beginning from scratch, without preconceptions or existing models as guides, and designing for realistic production curves.

The outcome of the company's ZBM process at Cenovus' recent expansion projects was a 59 per cent reduction in piles, 56 per cent reduction in piping, 79 per cent reduction in bolt ups, 50 per cent reduction in insulation, 83 per cent reduction in valves, 58 per cent reduction in instruments and it has virtually eliminated field welding, said McInnis.

The modules are light, easy to fabricate and shippable within Alberta, he added.

Cenovus had a target to reduce the cost of its modules by 60–70 per cent. Estimates late this fall are that it currently is at 50 per cent reduction and that's before fabrication has begun, he said.

A second approach being used across the industry to cut costs is replication.

Mark Connacher, director of well pad development with Suncor Energy, said that two-thirds of all capital spending over the life of a SAGD project is on well pads and infrastructure. To address these costs, Suncor is applying a "design one, build many" approach with EPCM partner Wood Group Mustang. Costs, which were previously more than \$4 million per well pair and as high as \$9 million per well pair, are now in the range of \$2 million per well pair.

According to analysis earlier this year from Peters & Co., the industry average ranges from \$8 million to \$14 million per well pair.

Surviving in a shrinking oilsands marketplace

While efforts to cut capital costs and operational costs mean a significant decline in the amount of work available to contractors, there are opportunities available.

One area with potential growth is processes and technologies that increase worker productivity. A number of studies claim workers on oilsands facilities spend as little as 30 per cent of their time on the tools. The rest of the time is spent waiting for materials or equipment.

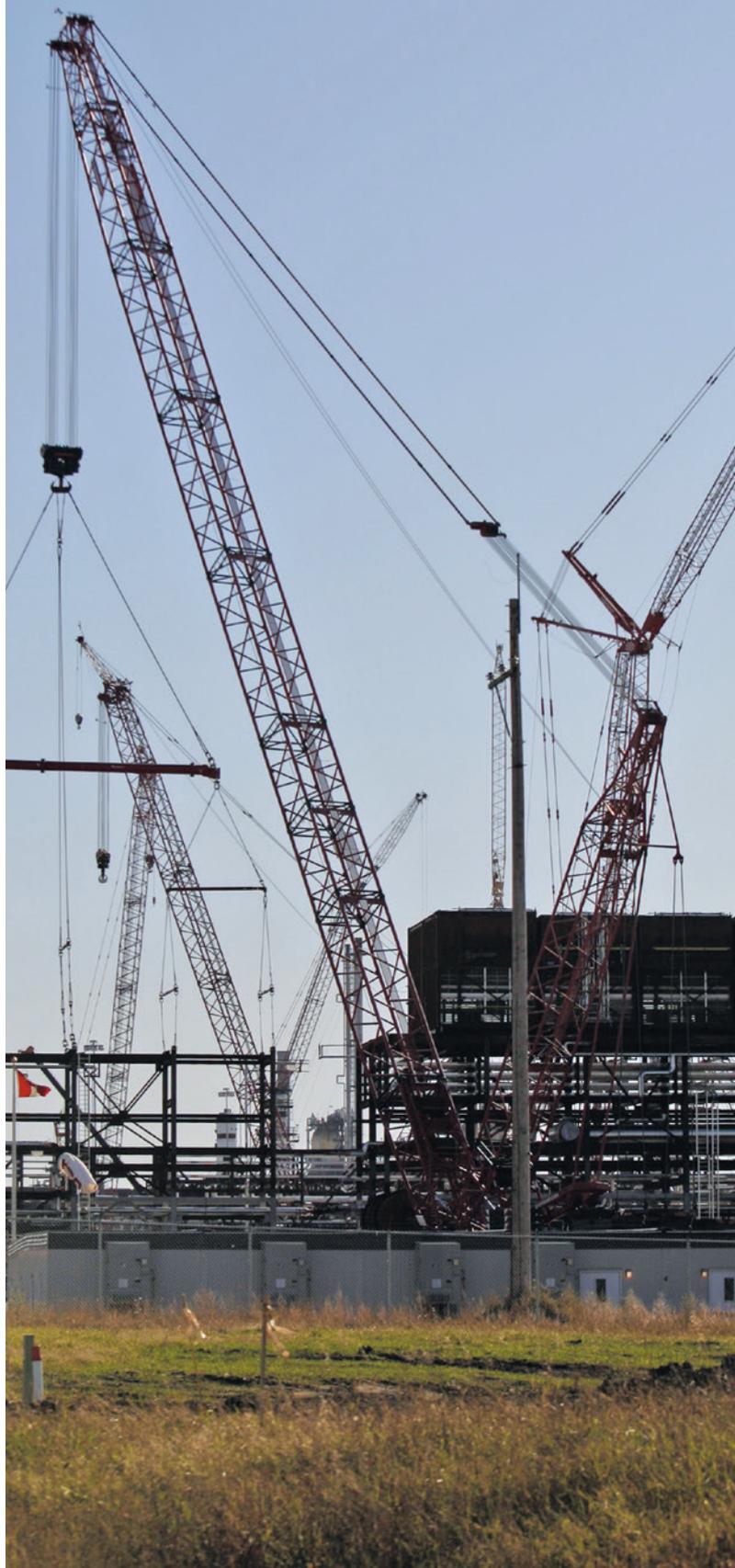
"That's a significant portion of the project's budget when you think about labour making up 40 per cent of that budget, and materials is a large constraint to being productive at the workforce," says Josh Girvin, Senior vice-president of product management at Birmingham, Ala.-based Atlas RFID Solutions.

Girvin says technologies like radio frequency identification tags (RFID) that allow developers to keep track of materials can improve worker productivity.

Kiewit Energy Canada, a subsidiary of Kiewit Corporation and a major industrial contractor based in Calgary, was an early adopter of RFID track-and-trace technology.

The system reduced a typical materials team in its pipe, spool and laydown yard of 12 crew members, three forklifts

Oilsands modules being placed at Shell's Scotford Upgrader expansion in 2008.



and three supervisors—who were spending more than 40 per cent of their time searching for spools—to three people, one forklift and half a supervisor's time.

But the most important thing is the company hasn't lost a spool since, said Bertulli.

"The most valuable thing we found, in the case of Kiewit in the application of the RFID tags, was in eliminating our problem with keeping track of these spools: the nature of what they are, what they look like, how they're handled and the conditions they endure when they are in these laydown areas," he said. "The sheer number of man hours it can take to do it without some kind of technology like this is extremely expensive and there certainly is a very real return on investment."

Fabrication yards are another area where worker productivity can be improved. Cenovus is collaborating with suppliers to improve productivity.

Suppliers talk about shop utilization of between 40 per cent and 60 per cent and, said McInnis, this is "absolutely scary."

"When you think about all the infrastructure that's required in a shop, all of the people they have available to do work and they're simply not able to put that infrastructure and those people to work effectively because they have all of their drawings either tied up in engineering houses, in drawing reviews, revisions and resubmissions, and rework in their own engineering shops, making changes, readjusting their bills and materials, trying to source material—you name it."

A key aspect of the company's philosophy is don't change what the fabricators have done.

"Allow the fabricators to optimally fit the fabrication of your equipment into their work cycle, and if that means waiting two months to have your equipment fabricated, wait two months to have your equipment fabricated," McInnis said. "Just make sure you have those discussions up front and make sure that's built into your integrated schedule from the beginning to the end."

Technologies that cut operations costs are also in demand.

Two examples, vacuum insulated tubing (VIT) and flow control devices, were built into ConocoPhillips' Surmont 2 expansion.

"We are using vacuum insulated tubing in all of our injector wells," ConocoPhillips' Kate Easton said. "It's basically insulating the steam pipe as it goes into the ground so there is no heat lost. The steam all reaches the reservoir with as much heat as possible."

"VIT acts like a vacuum-sealed Thermos," said Eric Klotz, business development manager for VIT manufacturer ANDMIR Group Canada.

Also capitalizing from past testing at Surmont 1, CPC has opted to include flow control devices on its SAGD wells. Easton expects the devices will, like VIT, help with energy efficiency and the corresponding costs.

Easton explained that "in the reservoir, it's not all the same. Sometimes it is really easy to get the steam in and sometimes it is really hard. We put flow control devices in the well, and it helps distribute the steam evenly so that we can most efficiently recover the oil and use the steam energy."

Easton said that flow control devices have been installed in about 30 per cent of the wells at Surmont 2. 

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SUSTAINABILITY, RESTRUCTURED

Alberta adds environmental monitoring to the suite of practices under the gun to deliver better performance for heavy oil

Alberta's government hasn't just introduced climate policy with teeth in order to bolster the province's position as a responsible and sustainable energy producer—it has also added sweeping changes designed to make sure the results follow through.

AEMERA—the Alberta Environmental Monitoring, Evaluation and Reporting Agency—has failed, the government says. That body, which was established in 2014 to jointly monitor oilsands development along with the federal government, is being disbanded following a scathing independent review.

“The review concluded that despite best efforts, AEMERA was a failed experiment in outsourcing a core responsibility of government to an arm’s-length body, and that Alberta should consolidate its environmental reporting capacity within the department of Environment and Parks,” says Environment and Parks Minister Shannon Phillips.

“The report identified that the break-up of scientific functions between AEMERA and Environment and Parks led to [the] fragmentation of scientific capacity and that critical dollars were being diverted away from monitoring and science to overhead and administrative duplication.”

AEMERA is being replaced by the ministry's new Monitoring and Science Division.

Phillips says that the new model the province brought forward ensures government is directly accountable for environmental monitoring, and that issues and gaps in monitoring are responded to immediately.

“It will eliminate fragmentation of scarce scientific capacity and costly administrative duplication,” she says. “We are taking the best elements of AEMERA that supported independent scientific monitoring and improving upon them.”

Alberta's new climate policy is designed to incent oilsands emissions reductions

Alberta's government has announced it will impose a sweeping carbon tax in the province by 2018 that will apply to everything from gasoline purchases to oilsands emissions. However, oilsands projects that emit more than 100,000 tonnes of CO₂ will be subject to what the government is calling a performance-standard approach.

Although the guidelines have yet to be set by the province, a report by the Alberta Climate Leadership Panel recommends applying the tax on large oilsands emitters based on the top quartile performance, meaning 75 per cent of emitters will be paying more than the top 25 per cent.

“This means operations with higher emissions intensity will have to do more to comply under the new approach, and it incents investment in technology to reduce emissions. The performance-standard approach will also support improved transparency and benchmarking of performance across jurisdictions,” says Alberta Environment spokesman Jason Maloney.

The panel estimates this approach would approximately double overall compliance costs compared to what producers paid in 2015 if no improvements to facilities were made. Facilities with higher emissions intensity could pay as much as \$4.50/bbl, while most sites would pay \$1/bbl or lower.

CHANGING THE RULES

Three key oilsands and heavy oil directives are up for revision, changing the investment landscape

LYNDA HARRISON

Regulatory changes on everything from tailings management to gas conservation could be in store for heavy oil and oilsands producers in the near future.

The Alberta Energy Regulator (AER) is currently reviewing feedback on several draft directives and considering what, if any, changes should be made. However, because each directive is in draft form, the AER cautions that it would be speculation to state what will be changing or when the directives will be released.

Tailings management

On March 13, 2015, the Government of Alberta released the *Tailings Management Framework for Mineable Athabasca Oil Sands (TMF)*. As a result, the AER suspended *Directive 074: Tailings Performance Criteria and Requirements for Oil Sands Mining Schemes* to develop new requirements for tailings management that align with the Lower Athabasca Regional Plan.

The *TMF* gives both the AER and industry objectives for managing existing and new fluid tailings volumes and represents an evolution in how industry, the AER and government manage tailings accumulation and risk. The directive is intended to promote innovation to ensure fluid tailings volumes are appropriately managed from the start of mining operations.

The *TMF's* main objective is to minimize fluid tailings accumulation by ensuring that fluid tailings are treated and reclaimed progressively during the life of a project.

All fluid tailings associated with a project should be ready to reclaim within 10 years of the end of mine life, the *TMF* says. Performance monitoring requirements will be put in place to keep industry on track and ensure that those results are clearly reported to Albertans.

The *TMF* states that its definition of fluid tailings will be refined during the implementation of the policy.

Canada's Oil Sands Innovation Alliance (COSIA) has conducted a technical analysis and proposed a set of practices to replace the definition and determination of fluid tailings volume. These guidelines have been accepted by the AER as aligned with the *TMF*.

Deployment of Suncor's TRO tailings reduction technology.

Shallow SAGD

In October 2015, the AER released its *Reservoir Containment Requirements for Steam Assisted Gravity Drainage Projects in the Shallow Thermal Area of the Athabasca Oilsands Area* and accepted feedback until the end of the year.

In early 2014, the AER delayed the regulatory process for five SAGD project applications in order to develop this policy, due to the risk to safety of operating SAGD at shallower depths.

The directive provides requirements for the containment of injected steam and heated reservoir fluids within the Wabiskaw-McMurray deposit at SAGD projects in a designated shallow thermal area surrounding Fort McMurray.

The requirements relate to caprock criteria and maximum operating pressure, but not to the wellbore aspects of fluid containment since these are addressed in other AER directives (013, 020 and 051).

The shallowest in situ bitumen resource in the Athabasca Wabiskaw-McMurray deposit is adjacent to the surface mineable area. In this area, the overburden may consist of the Clearwater Formation, the Grand Rapids Formation and Quaternary strata.

The Clearwater Formation has been demonstrated by existing SAGD projects to have caprock that can effectively contain injected steam and heated reservoir fluids. However, the Quaternary strata and Grand Rapids Formation have not been demonstrated to have effective caprock.

The Clearwater caprock may be partially or completely eroded at depths shallower than 150 metres; therefore, the shallow thermal area is defined as where the net bitumen pay in the Wabiskaw-McMurray deposit is greater than zero and the Lower Clearwater shale is either shallower than 150 metres at its base or completely eroded.

The Lower Clearwater shale is the deepest caprock overlying the Wabiskaw-McMurray deposit that meets the criteria. The AER says that requests to calculate the maximum operating pressure at the base of other geological units will be considered at the project application stage.

However, the Lower Clearwater shale must still be present and meet the above criteria unless the applicant can demonstrate an equivalent caprock is present.

To facilitate the demonstration of equivalent caprock, the AER is prepared to consider approving appropriate-scale field tests where the operations can be performed safely. Applications for such tests would be reviewed on a case-by-case basis.

Operators wanting to apply for larger-scale projects after smaller-scale tests have been completed would be required to address the appropriate upscaling of field tests.

Bitumen storage tanks at the Shell Peace River oilsands project.



Emissions in the Peace River region

On Oct. 8, 2015, the AER released *Requirements for Hydrocarbon Emission Controls and Gas Conservation in the Peace River Area*, a draft directive for public feedback.

The AER says it is now reviewing responses as it works on finalizing the document. The draft sets out the regulator's requirements for addressing odours and emissions generated by heavy oil and bitumen operations in the Peace River area of Alberta.

For the Peace River area, these requirements are intended to reduce hydrocarbon emissions that contribute to odours and increase the conservation of gas resources. This has become an issue in the region in recent years, with some community members moving away and selling property based on their concerns.

The directive includes requirements to eliminate routine venting and effectively eliminate non-routine venting; reduce non-routine flaring; conserve nearly all casing gas and tank-top gas; reduce fugitive emissions; minimize odours from truck loading, truck unloading, tank cleaning and de-sanding activities; and participate in a regional ambient air monitoring program.

The directive applies to all AER-regulated facilities associated with heavy oil and bitumen operations in the Peace River area regardless of whether the facility is exempt from the licensing requirements in *Directive 056: Energy Development Applications and Schedules*. Where a conflict arises, the requirements in this directive prevail over others unless otherwise noted by the AER.

Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting remains in effect. This updated directive helps AER inspectors identify non-compliances and issue enforcement actions for offensive off-lease hydrocarbon odours.

The AER has launched the Peace River Performance Dashboard to show progress in reducing flaring, venting and incinerating and increasing gas conservation in the area. ■

A shallow SAGD well at the Joslyn SAGD project north of Fort McMurray, which was decommissioned following a blowout in 2006.





JIM CARR

Canada's Minister of Natural Resources

When the Liberal Party swept to power in the 2015 federal election, a new caucus of leaders took the helm of Canadian government, including the management of the country's heavy oil and oilsands industry.

As the country's new minister of natural resources, James Carr faces the daunting challenge of shepherding the industry through the current downturn, through new markets and into a structurally different global market, where competitiveness hinges on lower costs and dramatically reduced environmental impacts.

Carr has been a business and community leader in Winnipeg for more than 30 years, during which time he was the founding chief executive officer of the Business Council of Manitoba and founding co-chair of the Winnipeg Poverty Reduction Council.

IQ: How is the federal government working to ensure the oilsands industry remains attractive for investment?

Canadian and foreign investments are needed to develop Canada's oilsands, and the Government of Canada is working to maintain and expand an open investment climate, which is critical to jobs and economic growth.

Without the confidence of Canadians, [new pipeline] projects will

not move forward. We are working on important reforms to regulatory agencies to restore public confidence in the regulatory system. Canadians must be able to trust that their government will engage in appropriate regulatory oversight.

With the government's announcement in January of an interim plan for major projects, we have demonstrated to Canadians and the world that protecting the environment and growing the economy are not incompatible goals. Our future success demands we do both.

We have taken a major step towards restoring public confidence by announcing principles for making better evidence-based decisions on major resource projects.

At the same time, we're ensuring that proponents of projects already under regulatory review, and investors in those projects, have greater certainty about the timelines for decisions.

Our commitment to doing our fair share on climate change involves taking action now to reduce emissions. Any delay escalates cost. We added assessing potential GHG emissions to pipeline project evaluations, and will make significant new investments in green infrastructure and technologies.

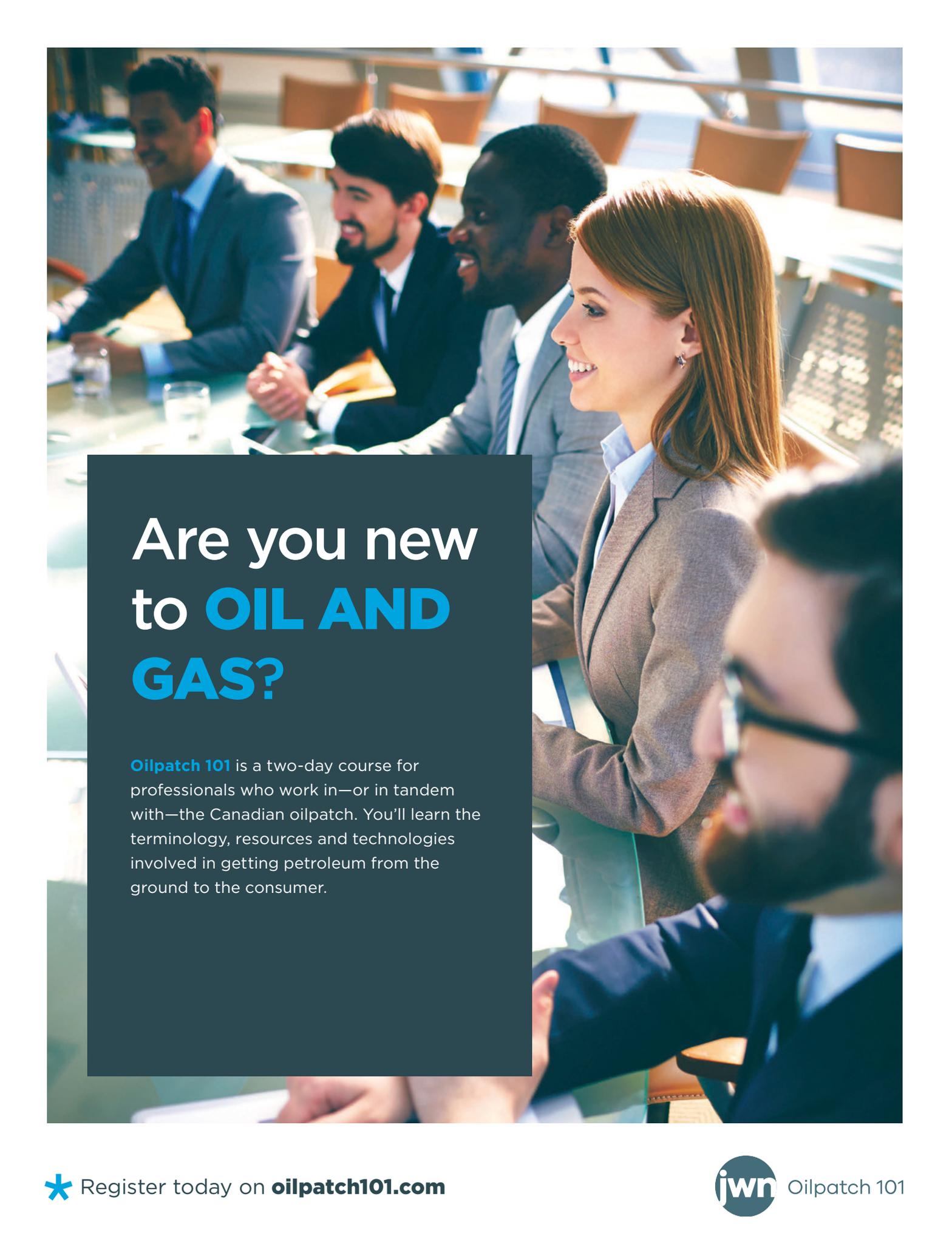
IQ: How does the move to end oil tanker traffic on the northern coast of

B.C. impact current and future tanker traffic off other Canadian coastlines?

Marc Garneau, minister of transport, has the mandate to formalize a moratorium on crude oil tanker traffic on B.C.'s North Coast. I am working with him and other ministers developing an approach to a moratorium. It is too early to speculate on how such a moratorium would impact oil tanker traffic on other Canadian coastlines.

IQ: The government is losing billions in revenue while access to new oil markets is stalled. What is it doing to advance new access?

Access to new markets is critical to our economy. The natural resource sector accounts for 1.8 million jobs and almost one-fifth of nominal GDP. In 2014, oil and gas alone directly employed more than 190,000 people and contributed 7.8 per cent of GDP. Our work to gain new access to oil markets begins with our review of the environmental assessment process to ensure it is robust and fair and includes a more complete consultation with Canada's indigenous peoples. Gaining access to new markets in an ultra-competitive global market is not easy, but I am confident it can be achieved. ■



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RUNNING OUT OF TIME?



Ottawa and Alberta are seen to be taking the right steps to build support for market access, but pipeline investors won't wait forever

DEBORAH JAREMKO

Work that the governments of Alberta and Canada are doing around climate and indigenous issues may be moving the country closer to securing public support for expanded oil market access, but time is running out.

With Keystone XL sitting squashed south of the border, the prospects for new pipeline opportunities are firmly in Canadian hands.

The federal government says that new interim guidelines for environmental assessments are necessary to regain public trust in the regulatory process, and it has announced additional public consultation.

As a result, it pushed back a decision on Kinder Morgan Canada's proposed Trans Mountain expansion to December 2016 from August 2016 as well as extending the timelines for TransCanada's proposed Energy East project.

"The gamble I think that the federal government is taking right now is that it felt it couldn't defend the past process as people had lost confidence in it. It is going to try to build a process that could rebuild support in that period of time," says Dylan Jones, president and chief executive officer of the Canada West Foundation.

"That will actually take some effort."

Jones' biggest concern is the December deadline.



An oil tanker docked at the Westridge Marine Terminal at Port Metro Vancouver, where oil has been exported from the TransMountain Pipeline since the 1950s. Kinder Morgan plans to expand the facility along with the pipeline, starting operations in late 2019.



“Economically, we need to send a market signal as a country to investors and to the world that we can get infrastructure built, and we have to send that signal quickly,” he says. “The question will be about how quickly the federal government can move the dial on this.”

The Alberta government’s new climate strategy has put momentum in a “positive direction” for market access, says Ben Brunnen, manager of fiscal and economic policy with the Canadian Association of Petroleum Producers (CAPP).

“From our perspective, particularly at a national or global perspective, folks are viewing Alberta differently. This initiative does position Alberta in a different lens.”

Simon Dyer, associate regional director, Alberta and the North, Pembina Institute, says that attitudes toward Alberta have begun to shift in environmentalist circles.

“The temperature is being lowered closer to home in the whole pipeline debate.... It’s fair to say that the level of opposition to oilsands pipelines was something that the previous government allowed to grow and fester, and you can’t dissipate all that opposition immediately.”

But there is still a long way to go to rebuild public trust in the energy sector, Jones notes.

Detailed polling by Canada West on public attitudes and the drivers for public trust has found that the public doesn’t believe the energy sector shares its core values, says Jones. “When you have that strong distrust element, it’s very hard to move forward on any of the pieces and this is in the political domain, not the regulatory domain.”

The new federal government is seen to be taking some of those steps with the new budget it announced this spring. The energy industry has been generally supportive of the budget, giving the Liberals particularly high marks for their commitment to increased investment in innovation and technology and aboriginal communities.

“The aboriginal piece I think is a cornerstone to our market access aspirations,” says Alex Ferguson, CAPP’s vice-president of policy and performance.

The government will direct \$8.4 billion over five years to indigenous peoples, with \$2.6 billion of that for education on reserves. The Liberals will spend \$2 billion to provide clean drinking water and \$555 million to repair and build new nursing stations on reserves.

“The investments that are outlined in the Indigenous Peoples section of the document are welcomed from our perspective,” Ferguson says.

“It’s been a long-standing advocacy position for our sector that we’d like to see certainly the federal government come to the table and address some of those issues.”

Ferguson was not surprised that market diversification issues facing the oil and gas industry were not directly addressed in the budget.

“I don’t think our expectations going into the federal budget were that the highlight of the budget for our country would be announcing that we’re going to approve a few pipelines,” he says. “I think what we’re looking for and have been engaged with government is around the pieces that are impeding us from diversifying those markets.”

—With files from the *Daily Oil Bulletin*

Construction of Kinder Morgan’s Anchor Loop expansion project, which was completed in 2008. The project included successful crossing of a UNESCO world heritage site.

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RUSS GIRLING

President and chief executive officer, TransCanada



When Russ Girling took over from Hal Kvisle as president and chief executive officer of TransCanada in June 2010, the company—and its proposed Keystone XL Pipeline—was riding a wave of positive momentum following the National Energy Board’s approval of the project’s Canadian portion.

Little did anyone know at the time, it would take six years before the United States would finalize its decision on the project, a denial that disappointed but did not surprise.

In the intervening years, Girling has become a central figure in the ongoing struggle for Canadian oil producers to access new and expanded markets. And he’s not giving up.

Whether it is the company’s massive proposed Energy East Pipeline to the East Coast, numerous other incremental projects or even Keystone XL itself, Girling is committed to market access.

Girling, who joined TransCanada in 1994 after amassing broad experience in operational and financial leadership through work with Suncor Energy, Northridge Petroleum Marketing and Dome Petroleum, admits that Keystone XL has been “hugely disappointing” for the company. But it’s not over.

“It is still the project that is closest to the finish line of getting market access

for Canadian production,” he told CIBC’s recent 19th Annual Whistler Institutional Investor conference. “We’ll continue to try to advance Keystone XL through the legal processes that we’ve announced and as well from a commercial perspective.”

One of these processes is a \$15-billion NAFTA claim that TransCanada has launched against the U.S.

Matthew Kronby, partner at Bennett Jones Toronto who served as head of the Government of Canada’s Trade Law Bureau from 2009-12 and was with the bureau for almost 20 years, says the claim appears to be one of only a handful of such cases that has the merit to proceed.

“If the claim is to be believed, and there is pretty good evidence of it, at least initially, the U.S. administration disregarded its findings that there were not significant health, safety or environmental concerns raised by the project,” Kronby says.

“[The claim is] going to force them to think about how much latitude a government has to introduce purely political calculations into regulatory decisions and also the extent to which it can bring foreign policy calculations into those decisions, including important objectives like dealing with climate change.”

Girling says TransCanada strongly believes “the decision that was made

was not based on the merits of our application, nor the outcome of the scientific analysis. It was purely arbitrary. They came out and said, ‘Despite all the data, we’re going to make an arbitrary decision.’ That’s what gives us confidence.”

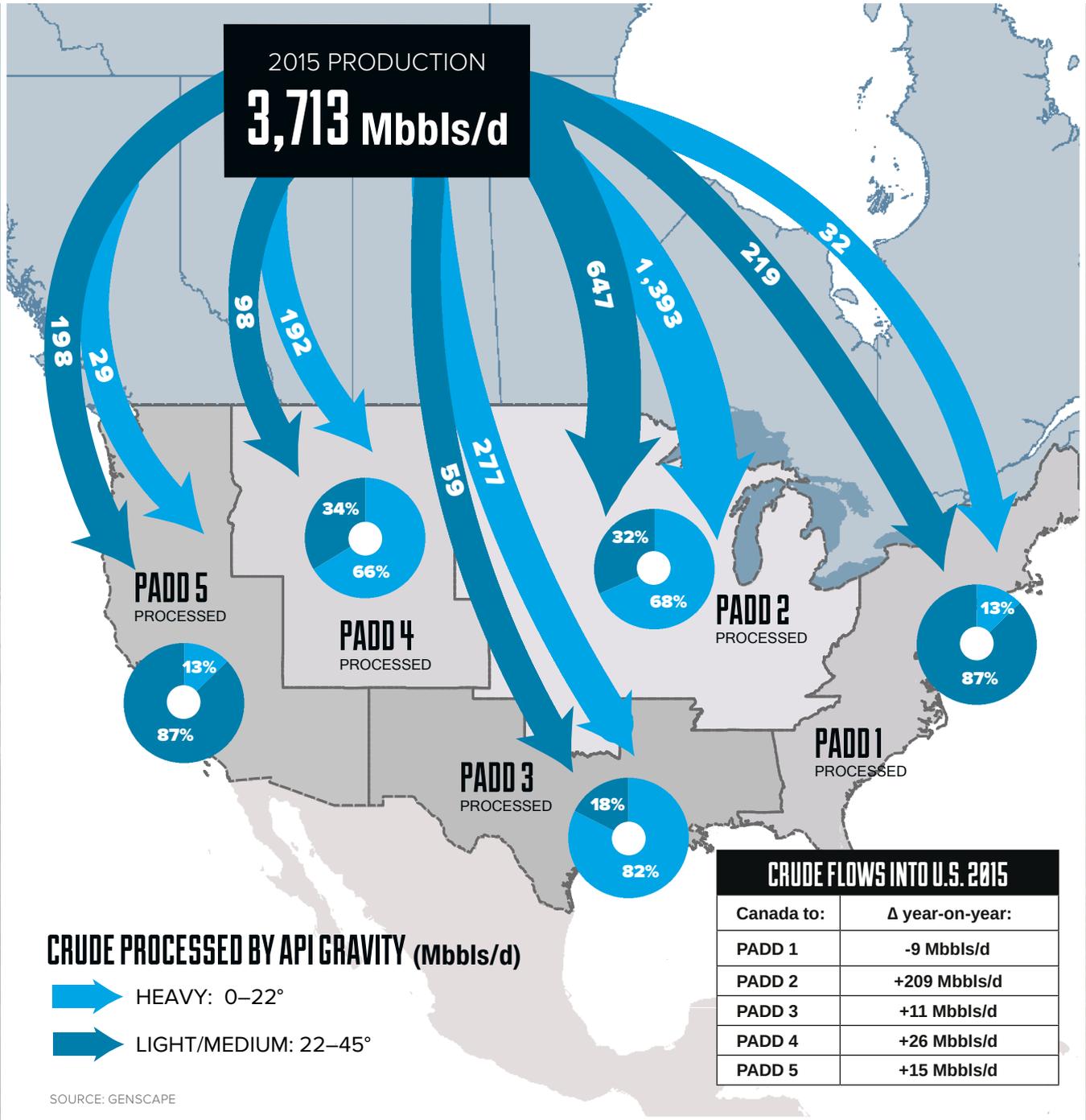
Girling acknowledged the current environment makes it difficult to build oil pipelines, including Keystone XL and the Energy East conversion and line extension from Alberta to Saint John, N.B. Recently, the federal government extended the time allowed for regulatory review and cabinet approval of Energy East to 27 months from 18 to allow more indigenous input and a greenhouse gas assessment.

“What I know is the world is going to use more energy in the future than it’s used in the past, irrespective of the headlines,” Girling said. “That energy will include more renewables, which we’re positioned to do, but it’s going to include more hydrocarbons. Canada and the United States are well positioned to supply those hydrocarbons to the world, but we need to build the infrastructure to get it there.

“Fundamentally, the reason these projects are underpinned by long-term contracts is that there are others that believe that as well. It’s a difficult time to push them through, but that’s what we’re going to do.”

CANADIAN CRUDE SUPPLY TO THE U.S. BREAKS RECORDS IN 2015

Although total U.S. crude oil imports in 2015 continued to be lower than levels reached during the mid-2000s, imports from the U.S.'s top foreign oil supplier—Canada—were the highest on record, according to annual trade data from the Energy Information Administration petroleum supply monthly. Canada provided four out of every 10 barrels of oil imported into the U.S. in 2015.



AL MONACO

President and chief executive officer, Enbridge



Enbridge president and chief executive officer Al Monaco says he has personally not seen a downturn this bad before.

But Monaco, who was raised in Calgary and worked his way up the ranks at Home Oil and Anderson Exploration before joining Enbridge (then IPL Energy) in 1995, remains confident about the future of the industry.

This despite all the challenges that have been felt so acutely, particularly by Enbridge as it has forged ahead with, at times, venomously opposed proposed market access projects.

The company continues to follow its strategy to “increase the scale and the reach of our system so we’re hitting all of the best markets,” Monaco told the recent CIBC 19th Annual Whistler Institutional Investor Conference.

He says the need and opportunity for new market access has not changed, despite the current downturn. He’s also confident that Enbridge is going to play a key role in developing that infrastructure as the industry moves forward.

While Enbridge prepares to make final investment decisions on its proposed Northern Gateway pipeline, designed to carry Alberta oilsands products to Kitimat, B.C., for shipping to Asian markets, the company has been focused on upgrading its existing infrastructure, including developing its regional oilsands system.

“There’s need for more ex-Alberta capacity,” Monaco said. “With that supply push in mind, we’re directly connected to 1.9 million bbls/d of refining demand in the U.S. Midwest. Those refineries need crude supply.... We’re now connected to 1.6 million bbls/d of additional downstream pipeline capacity that delivers crude to other critical markets” in Eastern Canada and the U.S.

Enbridge’s throughput has risen steadily during the downturn and reached a record 2.46 million bbls/d in December. Monaco expects oilsands operations already completed or underway to generate growth of about 800,000 bbls/d through

2019, which means the Western Canadian Sedimentary Basin could be short more than 500,000 bbls/d of pipeline capacity by 2021. Until then, however, the company is confident its mainline can serve the needs of customers.

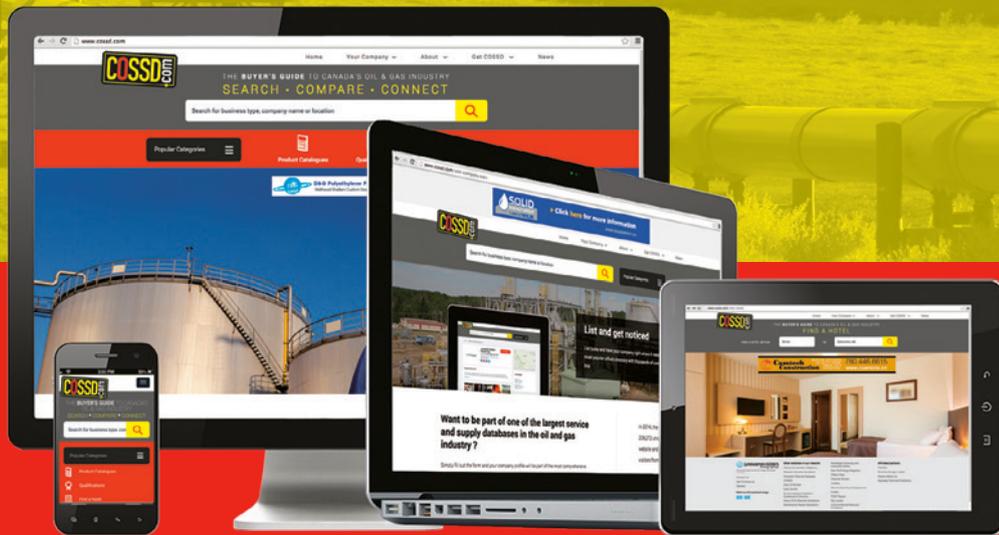
The company has been working for years to dismantle roadblocks to Northern Gateway. The most recent is Prime Minister Justin Trudeau’s indication in December that he wants to impose a ban on tankers off the northern coast of B.C.

Enbridge could perhaps consider a different route than the one conditionally approved in 2014 after one of the most exhaustive reviews of its kind in Canadian history. However, Monaco believes the federal government is still open to discussion. Although the company has more groundwork to do to build support, it does have 28 indigenous investment partners, which strengthens its position.

The company will probably make its final investment decision in the second half of this year, Monaco said. [▶](#)



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RACHEL NOTLEY

Premier of Alberta

Alberta's new provincial government under Premier Rachel Notley has a tough set of circumstances to navigate when it comes to heavy oil and oilsands. The industry is in the midst of a crushing downturn as well as a structural shift—it needs to become more competitive with other global investments while at the same time reducing its environmental impacts. And don't forget about the new market access that is still a desperate need.

Q: Alberta's new carbon policy caps oilsands emissions at 100 Mt/year, which effectively limits production using current technology to about 3.2 million bbls/d. Doesn't this grind new project development to an immediate halt?

Not at all. I believe we can achieve responsible, sustainable and innovative development that supports good mortgage-paying jobs and promotes stable investment in Alberta. Our oilsands industry can grow production by applying technology to reduce our carbon output per barrel. That is what our climate leadership plan and the limit on oilsands emissions will promote.

The limit was established after careful consultation with Canadian and international leaders in Alberta's oilsands industry and leaders in

Canadian and international environmental organizations. That's why we have been able to achieve such an unprecedented consensus.

Q: Lack of sufficient market access continues to cost the Alberta government billions in revenue each year. What are you doing with the governments of other provinces to enable Alberta oil to cross these provinces to reach Canada's coastlines?

Alberta's ability to access energy markets is crucial for Canada's economic future. I see the success of our climate leadership plan as an important part of addressing the traditional barriers Alberta has faced in getting our resources to tidewater.

Our approach is different than that of previous governments, not only in terms of our climate policy but also in the way we work with other provinces. We are engaged in constructive conversation with the provinces and federal government on pipeline roadblocks. We are including civil society leaders in that conversation to make the case that maximizing market access for Alberta's energy products, within the terms of our climate leadership plan, will build prosperity for all Canadians.

Q: Overall, how is the Alberta government working to support the oilsands industry's competitiveness in a global crude oil market where bitumen has become the underdog?

Our royalty framework now positions Alberta to be newly competitive. Our climate leadership plan positions Alberta among the world's most responsible energy producers. It has won the approval of oil executives, environmental leaders and First Nations

The world has heard U.S. president Barack Obama call our resources dirty, but what we heard at the UN Climate Change Conference in Paris was that view is changing under our leadership. The steps we're taking [will] help transform Alberta into one of the most forward-looking and competitive energy producers in the world.

For the longer term, the royalty review panel recommended we explore adding value through partial bitumen upgrading. We will work with industry partners on this and other opportunities for value-added investment. For example, our petrochemical diversification program encourages the construction of facilities that use methane or propane to produce building blocks for numerous products. ■

First steam at Husky
Energy's new Sunrise
SAGD project in
December 2014.



TOMORROW'S OILSANDS

What the oilsands industry looks like in an increasingly low-carbon future

BY CARTER HAYDU

Oilsands production could still be part of a future where greenhouse gas (GHG) emissions are vastly reduced, but companies are going to be looking for incentives to develop and deploy the necessary clean technologies.

“In order for oilsands and oil and gas at large to remain competitive in a world that is becoming increasingly carbon constrained, we need to reduce the emissions of the sector,” says Pembina Institute oilsands director Amin Asadollahi. He adds that the need for cleaner sources of energy was recently illustrated at the United Nations 21st Conference of the Parties (COP 21) in late 2015, which set essential goals for protecting the earth’s climate, such as limiting warming to 1.5 degrees Celsius above pre-industrial levels.

“Technologies must be assessed for overall environmental impact. There are technologies out there that have trade-offs. We should be cognitive of those and look at the grander net benefit of technologies to be deployed,” Asadollahi says.

Fortunately, reducing emissions intensity has a double benefit of not only improving environmental performance of oilsands and heavy oil producers, but also reducing costs—further incentivizing carbon management. He notes the sector has a historic propensity towards solving large technological issues.

“Look back at the days 50 or 60 years ago when this resource was very hard to extract, and if you were to ask back then whether it is possible to extract, a lot of people might not have been so optimistic,” Asadollahi says.

Anamika Mukherjee, specialist in technology collaboration with Cenovus Energy, says her company is working on a multitude of technologies aimed at making its heavy crude and oilsands production part of a low-carbon emissions future. Some initiatives are in the very early stages, often still requiring intellectual property work, while others are more advanced, such as a solvent-aided process expected to lower emissions intensity by 18–25 per cent.

“As far as the future goes, I am hopeful that we will get to that place where we will have a sustainable, low-cost, low-carbon product,” she says.

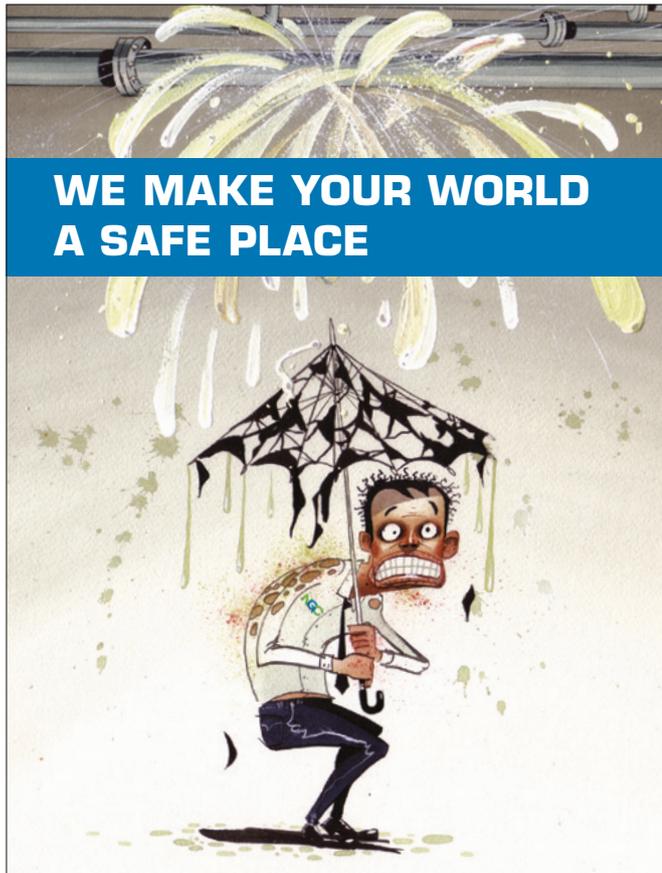
Cenovus Energy president and chief executive officer Brian Ferguson recently took that statement even further.

“Cenovus absolutely recognizes and shares the public’s concern about climate change... If we could produce oil without emissions, we would do that. That’s our goal,” he was quoted as saying in Forbes this January.

Even before Cenovus and other oilsands producers started Canada’s Oil Sands Innovation Alliance (COSIA) in 2012, many companies were already looking at CO₂-reducing technologies. With COSIA, Cenovus and other producers are able to take those initiatives to the next level via industry collaboration.

At Suncor Energy, the aim is for emissions from oilsands production to be on par with, or lower than, other sources of oil. According to a company spokeswoman, the industry is acutely aware that Aboriginal communities, stakeholders, governments and the general public expect responsible →

PHOTO: HUSKY ENERGY



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oil sands development, as well as a commitment to reducing the environmental impacts from operations.

Suncor spokeswoman Erin Rees notes that Suncor and fellow producers, along with environmentalists and the Alberta government, collaborated on the province's new climate change plan, which includes a carbon pricing regime coupled with an overall emissions limit for the oil sands.

Although there has been heightened interest in climate change over the months leading up to COP 21, Suncor has been a long-time advocate for carbon management, she says. Nearly two decades ago, the company launched a corporate-wide plan to manage its GHG emissions. Guided by that plan, Suncor continues to invest in technology and innovation to reduce emissions intensity and ultimately "bend the curve" on absolute emissions growth.

If the past is any indication, future oil sands production should be in line with a world that increasingly scrutinizes industry's environmental performance, notes COSIA chief executive Dan Wicklum. "Between 1990 and 2013, the GHG emissions associated with every barrel of oil sands crude was reduced by 30 per cent," he says.

For COSIA, finding technologies that move the oil sands closer towards a low-emissions future will in part include global competitions like the Carbon XPRIZE challenge, which aims to incentivize breakthrough technologies that convert CO₂ into new products.

With COSIA and co-sponsor NRG Energy each providing \$10 million, the 4.5-year XPRIZE challenge requires new technologies be tested at either a coal-power plant or natural gas facility. Teams must demonstrate their innovations at one or both of the facilities.

Right now, GHG emissions are a by-product of producing petroleum products, Wicklum says. "The challenge is moving completely into the solutions space for this global problem of GHG emissions. We are completely changing the paradigm from what carbon is seen as now [a waste product] to making it an actual resource—a valuable product."

He adds, "With this challenge that is working to harness the world's best minds and innovators, there could be a global impact that could fundamentally change how the whole world addresses GHG emissions. It is a global problem and global management issue."

However, a price on carbon is critical to creating the incentives needed for reducing emissions intensity from the oil sands. "For companies who have invested millions in [research and development] efforts and wish to see their technology deployed, the price on carbon creates the regulatory environment where there is an incentive for those technologies to be fully deployed across the board," Asadollahi says.

He believes a carbon price such as the one in Alberta's climate plan helps companies become more emissions competitive. By incentivizing improvements in emissions intensity, regulations can also improve the cost competitiveness of operations.

"A good portion of oil sands sector costs come from burning energy," he says, adding while companies must burn energy to make energy in the oil sands, carbon pricing encourages greater efficiency and returns with this process.

"It helps the sector in two ways," Asadollahi says. "For one, it improves the emissions intensity of the sector. Secondly, it improves the cost competitiveness of the sector. Those two are key in a low oil-price environment, as is increasing regulatory requirements on emission intensities and GHG regulations today and looking into the future." ■



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EIGHT NEW GHG REDUCTION TECHNOLOGIES THAT COSIA WANTS YOUR HELP COMMERCIALIZING

Canada's Oil Sands Innovation Alliance (COSIA) has issued a challenge to "mobilize the minds and resources of external stakeholders and global solutions providers" to advance eight key technologies for greenhouse gas (GHG) emissions reduction to commercialization.

COSIA also has a similar challenge in place considering five technologies to reduce water use.

"COSIA challenges provide focused, actionable descriptions of the current state of certain gaps as well as the desired outcomes without prescribing the means for reaching the outcomes, as this could limit potential solutions," says COSIA, whose members represent more than 90 per cent of current oilsands production.

"[We are] keen to hear from anyone who believes they have a solution...whether they be external companies (small or large), academic researchers, other research institutes, consultants, entrepreneurs or inventors."

Here are the GHG technologies that are currently part of COSIA's challenge:



1 Direct hot water production for an oilsands mining and extraction process

"New technology is sought that could replace conventional hot water production approaches, which use economizers or low-grade steam, in either new or existing mining operations."



2 New high-efficiency boiler

COSIA is interested in "new steam-generator technologies to replace existing steam generators in the existing process configuration. Proposals based on work that is a proven concept are desired."



3 Higher-value use of low-grade heat

COSIA says it is looking for leading-edge technologies that create value from excess low-grade heat resulting from SAGD production and/or related surface facility operations.



4 Enriched combustion air

The innovation organization is inviting proposals for the supply of technology to produce combustion air enriched in oxygen. "This is a forward-looking request, and proposals that can make a compelling case for investment in early stage technology are of interest."



5 Natural gas decarbonization

COSIA says that these technologies will partially or completely remove the carbon content of natural gas. "The emissions associated with producing the decarbonized gas, plus the emissions from combusting the decarbonized gas, will be less than the emissions from combusting natural gas."



6 Water and energy recovery

COSIA is seeking leading-edge technologies that capture water vapour and waste heat from flue gas from natural gas combustion. "The successful technology will provide valuable high-grade heat to be integrated into the processing facility and produce clean water as condensate that can be used for steam production. Ideally, the technology could be retrofitted to existing combustion equipment."



7 New heat exchanger

New technology is sought which could replace heat exchanger technology in either new or existing thermal in situ operations.



8 Pressure let down

COSIA seeks a new technology that could capture energy, likely power, at a small scale (e.g., 500 kilowatts to three megawatts) when delivering a high or medium pressure energy source through pressure let downs.

COSIA says that proposals, which can be submitted through its website, will be evaluated on overall scientific and technical merit, approach to proof of concept or performance, economic potential, respondents' capabilities and related experience, realism of the proposed plan, and cost estimates.

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