

Alberta Oil & Gas Quarterly

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NEXT ISSUE

LNG: Western Canada's natural gas industry is poised for a game change

On the cover: Construction work underway on the new Heartland Petrochemical Complex near Edmonton in summer 2019.

Image: Inter Pipeline Ltd.

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Content prepared by JWN for the Government of Alberta.

Alberta's Growing Petrochemical Opportunity

Global demand for petrochemical products is growing quickly as the world's population expands and emerging economies build capacity.

According to the International Energy Agency (IEA), the production of plastics has increased worldwide by more than tenfold since 1970, faster than the rate of growth of any other group of bulk materials and almost 60 percent faster than growth of gross domestic product (GDP).

Of the nearly 10 million bbls/d of growth in total oil demand projected for 2030, the petrochemical sector is on course to account for more than a third, the IEA says. At the same time, petrochemicals are expected to drive seven percent growth in roughly 30 trillion cubic feet of increased natural gas demand.

"Society's growing dependence on chemicals has been reflected by a steady period of growth in the output of the chemical and petrochemical sector," the IEA said in its spring 2019 report, *The Future of Petrochemicals*.

Alberta is poised to capitalize on this booming opportunity both in major projects for new production of petrochemical products within its borders and the export of oil and gas feedstocks for petrochemical facilities worldwide.

Abundant, low-cost resources – particularly of natural gas liquids (NGLs) – are key to Alberta's attractiveness in this market. Feedstock price and availability are amongst key considerations for investors when determining whether a region is cost competitive for a petrochemical project, according to the Canadian Energy Research Institute.

The surge of shale gas in North America

has contributed to increased global use of NGLs for petrochemical production, says Steve Weber, vice-president of refining and petrochemical consulting with Argus Media.

For example, he says that ten years ago 90 percent of the ethylene produced in Europe came from naphtha derived from crude oil. Today that has

dropped to 50 percent.

"That difference has been made up by additional cracking of propane and butane, which have become more cost competitive versus naphtha," Weber says.

A sign of the times also is the proliferation of propane dehydrogenation (PDH) and polypropylene (PP) plants around the world. In less than ten years the number of PDH/PP facilities operating globally has increased from less than five to 33, led by development of

Alberta has the opportunity both to build new petrochemical capacity within its borders and to supply feedstock for growing operations worldwide.

Cover Feature



Construction is well underway on Inter Pipeline Ltd.'s Heartland Petrochemical Complex near Edmonton, which will be Canada's first integrated propane dehydrogenation/polypropylene plant. Image: Inter Pipeline Ltd.

projects in China, Weber says. There are also 20 additional PDH/PP plants announced or under construction worldwide.

Two of these are in Canada, where the ethane-dominated petrochemical industry is on its way to a milestone shift with its own PDH/PP capacity in Alberta.

The first project, Inter Pipeline Ltd.'s \$3.5-billion Heartland Petrochemical Complex, has been under construction since December 2017 and remains on schedule for completion in late 2021.

The second project is owned by Canada Kuwait Petrochemical Corporation, a joint venture of Pembina Pipeline Corporation and

Petrochemical Industries Company K.S.C. of Kuwait.

The \$4.5-billion project received partner go ahead in February 2019 and has moved into execution at its site near Edmonton. The facility is expected to be in service mid-2023.

A \$2-billion new methanol plant is also planned for the Grande Prairie region by Nautical Energy, and Inter Pipeline is in the early stages of considering the development of a \$600-million acrylic acid/propylene derivatives facility near Edmonton.

All four of these projects have financial support from the Government of Alberta in the form of future royalty credits.



The new infrastructure will play a part to help struggling natural gas producers in the province, and so will the advent of propane exports off the coast of B.C.

Canada's first propane export facility celebrated its first cargo to Asia in May 2019, a milestone that owner AltaGas Ltd. said "charts a new course for Canadian energy" with market optionality and premium netbacks.

A second export terminal in the same region is under construction by Pembina Pipeline Corporation, expected to start operations mid-2020.

"You have the opportunity either to provide feedstock for petrochemical operations in

Asia, or certainly there are opportunities to further build more capacity in Alberta with the amply supplied and cost attractive feedstocks that are in the Western Canada region," Weber says.

"I'm very optimistic that there's going to continue to be investment [in Alberta]. It's okay to sell the propane to China, but you can also add value through the whole chain rather than just selling the raw materials."

LNG projects in Western Canada are less likely to provide feedstock to global petrochemical facilities, he says, because the NGL value streams are largely expected to be extracted before shipment overseas.

A Feedstock Edge

Alberta's low-cost, abundant resources move the needle on competitiveness

New petrochemical plants in Alberta are economically competitive with new facilities in four global hubs including the U.S. Gulf Coast, according to recent analysis conducted by the Canadian Energy Research Institute (CERI).

CERI found that Alberta's petrochemical plant total supply costs are reduced substantially by Western Canada's oversupply of natural gas and its liquids including ethane, propane and butane; even in the context of carbon pricing.

The conclusions, published in June, do not include the corporate tax and carbon tax policy changes that have been enacted by Alberta's new provincial government under Premier Jason Kenney. Even so, researchers ranked Alberta's total petrochemical supply costs number one in every jurisdiction and context, both with carbon taxation and without (see charts on page 7).

CERI modelled economics for new petrochemical facilities in Alberta, the U.S. Gulf Coast, Ontario and South Korea. For the Canadian jurisdictions, researchers used existing corporate tax rates and carbon pricing, as well as the federal government's planned carbon tax of \$50 per tonne by 2022.

"Alberta is a very competitive market, in particular because of the low feedstock prices and the current abundance of feedstock," said CERI CEO Allan Fogwill.

CERI found that for facilities on the U.S. Gulf Coast, feedstock costs represent approximately 73 percent of a project's total supply cost structure. That compares to 78 percent in Ontario, 83 percent in South Korea, and 67 percent for projects in Alberta.

Consider propane feedstock, for example. For the first seven months of 2019, propane prices at Edmonton have averaged US\$10.31/bbl compared to US\$25.00/bbl at Mont Belvieu, Texas and US\$36.78/bbl in the Far East, according to Sproule and GTI. During the same period, butane prices averaged US\$12.88/bbl at Edmonton compared to US\$25.20/bbl at Mont Belvieu.

CERI's study assessed the different supply costs of ethane, propane, an ethane/propane mix, LPG and naphtha for the petrochemical production of polyethylene (via steam cracking) and polypropylene (via dehydrogenation).

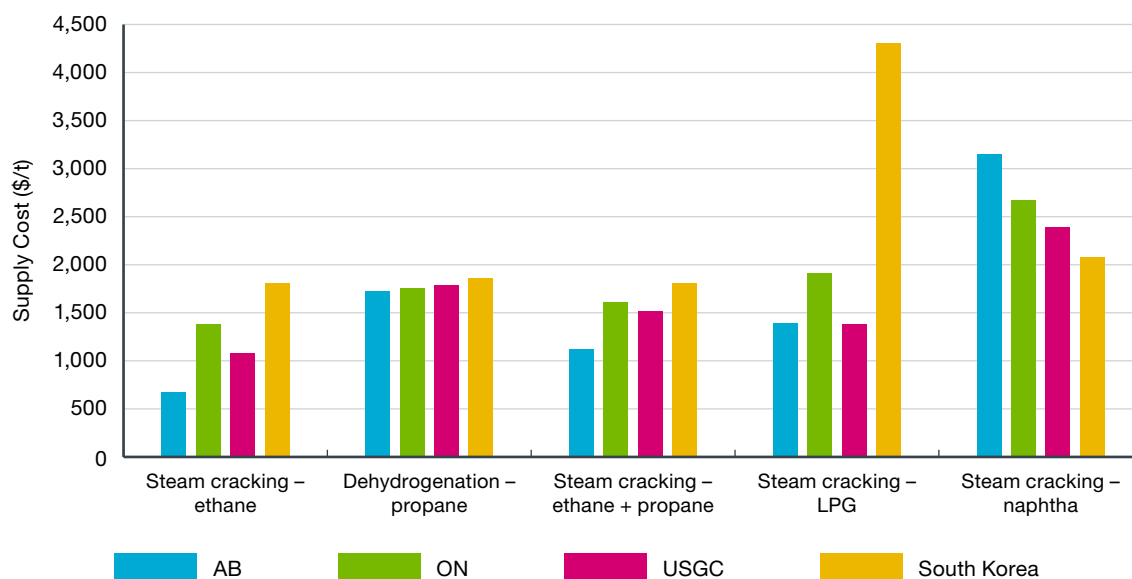
Alberta's supply costs stack up well compared to CERI's other study jurisdictions, but there is worldwide competition for new projects in the petrochemical industry, Fogwill said.

"[Supply cost] in and of itself is not likely to attract a lot of additional investment, because what we've seen in the past is that investment decisions are heavily swayed by local incentives," he said, citing for example US\$1.6 billion in tax breaks extended to Royal Dutch Shell for the US\$6-billion Pennsylvania Petrochemicals Complex, which is currently under construction.

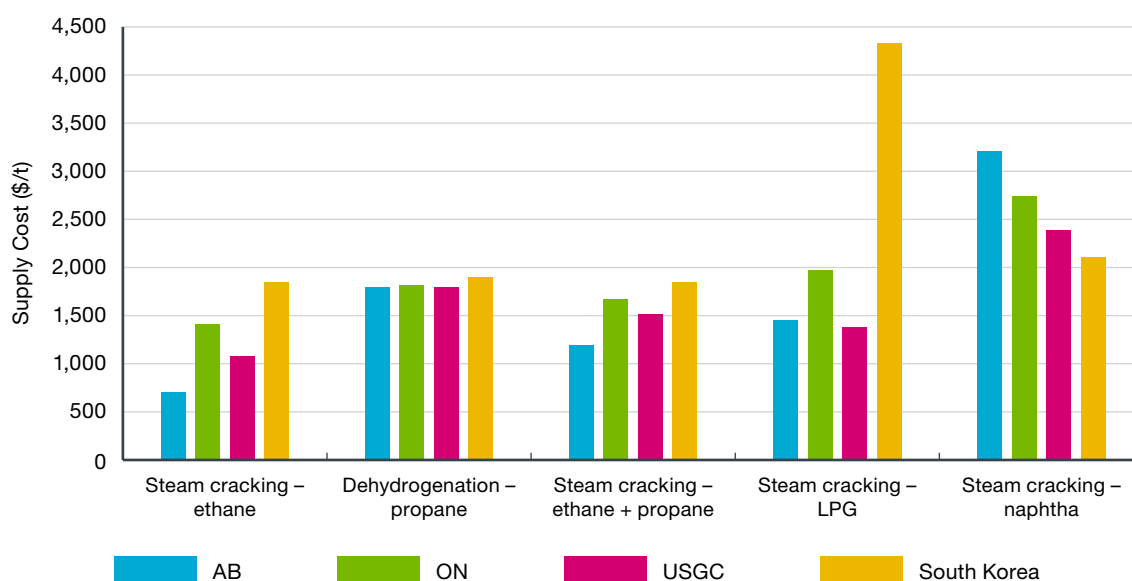
In Alberta there are two integrated propane dehydrogenation and polypropylene facilities under construction, with a combined capital value of \$8 billion. Together these projects have \$500 million in committed future royalty credits from the Government of Alberta.

Indicative Supply Costs Per Jurisdiction And Feed Type, Plant Gate

No Carbon Tax (2018 Constant Dollars)



Carbon Tax (2018 Constant Dollars)



Source: Canadian Energy Research Institute: *Supply Costs and Emission Profiles of Petrochemical Products in Selected Hubs* (June 2019). For the Canadian jurisdictions, “carbon tax” includes the federal government’s planned \$50/tonne carbon tax by 2022 as well as existing provincial legislation. Does not include new Alberta policy including the *Carbon Tax Repeal Act and Job Creation Tax Cut*.

Alberta's Abundant Natural Gas Liquids

The surge of shale gas production in North America is helping reshape the global petrochemical industry. Natural gas liquids (NGLs) ethane, propane and butane have gained significant market share due to increased availability and competitive pricing, says Steve Weber, vice-president of refining and petrochemicals consulting with Argus Media.

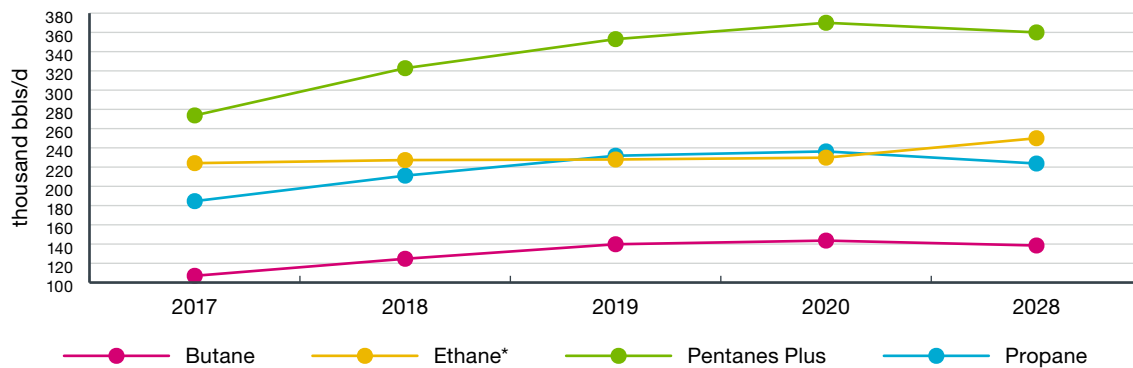
He notes that since 2012 the U.S. has gone from a net propane importer, mostly from Western Canada, to exporting one million

bbls/d, making prices more competitive for global customers including petrochemical producers.

In Alberta, development of NGLs is driving activity for producers in plays like the Montney, Duvernay and Deep Basin.

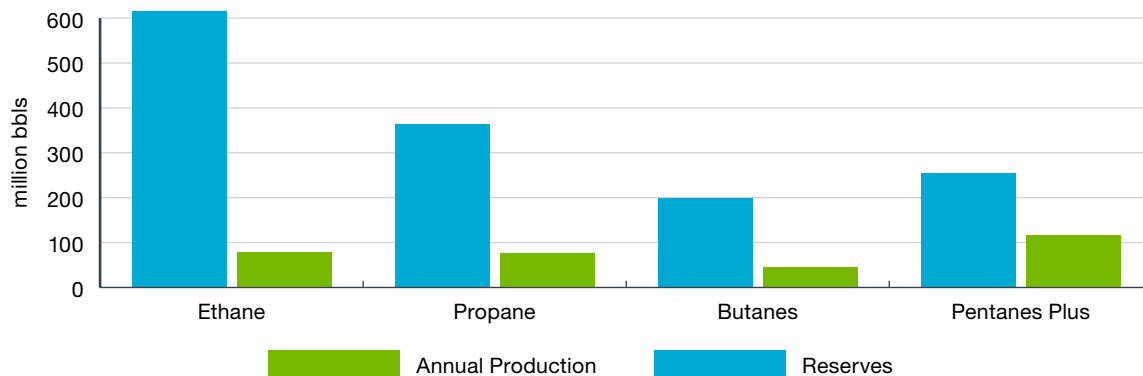
It's a function of profitability; unlike dry natural gas, which is currently experiencing critically depressed pricing, NGLs in Alberta realize prices that are related to the improving light oil benchmark West Texas Intermediate.

Alberta Natural Gas Liquids Forecast



Source: Alberta Energy Regulator ST-98 2019 | *Ethane includes supply from conventional gas and oilsands off-gas

Alberta NGL Reserves



Source: Alberta Energy Regulator ST-98 2019

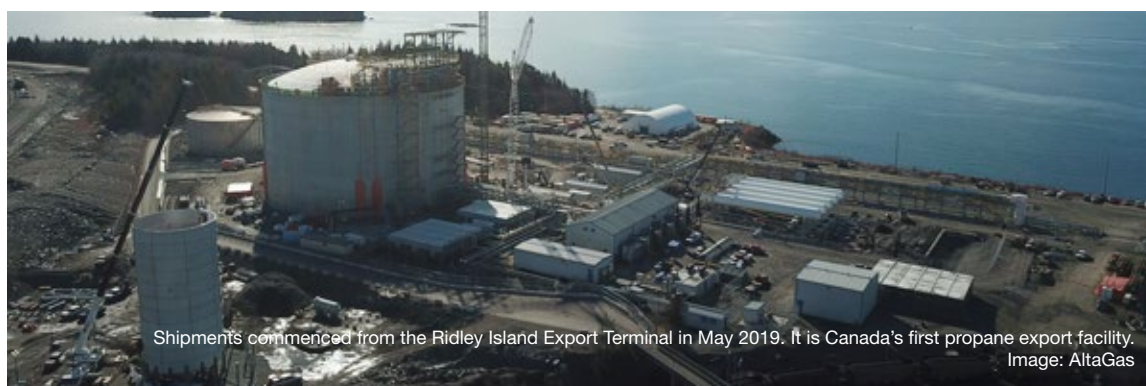
Petrochemical Projects and LPG Exports

Alberta Petrochemical Projects

Project	Owner(s)	Capacity (tpa)	Capital Cost	Status
Heartland Petrochemical Complex	Inter Pipeline	525,000 (polypropylene)	\$3.5 billion	Under construction; start-up expected late 2021
PDH/PP Facility	Canada Kuwait Petrochemical Corporation	550,000 (polypropylene)	\$4.5 billion	Under construction; start-up expected mid 2023
Methanol Facility	Nauticol Energy	3,000,000 (methanol)	\$2 billion	Proposed; start-up expected in 2022
Acrylic Acid and Derivatives Project	Inter Pipeline	80,000 (acrylic acid/propylene derivatives)	\$600 million	Proposed; start-up expected in 2022

Propane Exports (British Columbia)

Project	Owner(s)	Capacity (tpa)	Capital Cost	Status
Ridley Island Export Terminal	AltaGas	1,200,000 (propane)	\$450 million to \$500 million	First shipment May 2019
Prince Rupert Export Terminal	Pembina Pipeline	600,000 (propane)	\$250 million	Under construction; start-up expected mid-2020



‘Cash-Cost Advantage’ at the Heartland Petrochemical Complex



Q&A with David Chappell

Senior Vice-President, Petrochemical Development
Inter Pipeline Ltd.

Calgary-based Inter Pipeline Ltd. is constructing Canada’s first integrated propane dehydrogenation/polypropylene (PDH/PP) plant. Located in the Edmonton region, the \$3.5-billion Heartland Petrochemical Complex will process locally sourced propane into plastic pellets for use in a variety of everyday end uses.

Is Alberta a competitive place to build petrochemical projects compared to other locations like the U.S. Gulf Coast?

While capital costs to build large-scale facilities in Alberta are typically greater than the USGC, the oversupplied propane market in Western Canada drives a long-term, low-cost feedstock advantage. This market is projected to remain oversupplied for the long term.

In addition, Alberta has an abundance of highly skilled and experienced labour and low-cost utilities: natural gas and electricity. Alberta’s location is also rail-cost competitive to major markets, all of which help drive down the project’s expected operating costs to the point that we have a cash-cost advantage to other PP plants in North America.

The other thing that is meaningful to Albertans, and a reason the Heartland Petrochemical Complex is being so well received, is that this plant will add significant value to local resources. It can be built and approved right here in Alberta – without being hindered from other jurisdictions.

Why did Inter Pipeline select to build a PDH/PP plant versus other petrochemical designs such as an ethane cracker?

Inter Pipeline is the only producer of polymer grade propylene in Canada, and as a large propane producer we identified that we had a very knowledgeable team that could capitalize on this opportunity and leverage the abundant supply of low cost feedstock. We also factored in the shortage of both propylene and polypropylene in North America and the competitive delivery costs to markets that we felt this was an extremely achievable business for us to enter into.

How far along would you say Inter Pipeline is on the project’s commercial contracts?

We have executed multiple contracts and

continue to receive interest from a wide range of counterparties.

When we began this project, we stated the objective of securing 70 to 85 percent of total petrochemical processing capacity under take-or-pay contracts with an expectation to carry out negotiations through the entire four-year construction window, and that continues to be the case.

This contracting strategy is expected to provide Inter Pipeline with a large and stable cash flow stream that is not exposed to commodity prices or production fluctuations.

What is the current project status of the Heartland Complex?

From a construction perspective, the project remains on schedule. As of June 30, 2019, we have incurred approximately \$1.6 billion of the \$3.5 billion capital

spend and have achieved some significant construction milestones including the installation of five critical towers on both the PDH and PP plant, with more and more going vertical all the time.

Construction is now running 24 hours a day as we've added a night shift, and there are more than 1,200 people working on site daily.

Communicating this construction phase is an area where we have been proactive. Videos depicting the project's progress are available quarterly on our website's project page at www.interpipeline.com and on our Twitter account @inter_pipeline.

We're also actively recruiting for many of the approximately 200 full-time jobs the Heartland Complex will create and may have as many as half of those positions filled by the end of 2019.

How does Inter Pipeline plan to invest the recent funding for the the Heartland Complex from the Government of Canada?

In March of this year, the federal government announced a \$49 million commitment to Inter Pipeline in support of the Heartland

Petrochemical Complex under its Strategic Innovation Fund. This commitment was made to support the facility, which is the first of its kind in North America and will produce polypropylene, which is currently not produced in Canada.

It acknowledges the new markets we

are opening for Canada and that we will be providing quality new jobs for Canadians.

This grant supports a range of initiatives that will be undertaken by Inter Pipeline ranging from opportunities for students and job creation to investments in related industrial research and development. We'll have several announcements in 2019 related to this funding, which we are looking forward to sharing at a later date.

These types of initiatives go a long way towards creating a competitive environment for developing major projects in Canada.

"The oversupplied propane market in Western Canada drives a long-term, low-cost feedstock advantage."

Upstream News



Image: Cenovus Energy

Oilsands

► The Alberta Energy Regulator says the oilsands reached a major milestone in 2018, averaging bitumen production of 3 million bbls/d for the first time.

Production first reached 1 million bbls/d in 2004 and 2 million bbls/d in 2013.

The AER forecasts that the industry will exceed 4 million bbls/d in 2027.

► Oklahoma-based Devon Energy completed its exit from Canada in June after more than 20 years as an oilsands industry leader.

The company sold its remaining Canadian assets, including the Jackfish SAGD project, to Calgary-based Canadian Natural Resources Limited for \$3.78 billion.

► Production has commenced at Canadian Natural Resources Limited's new Kirby North SAGD project in the south Athabasca oilsands region.

Diluent and bitumen blend connections went into service in mid-July, six months ahead of schedule, Inter Pipeline Ltd. announced. Canadian Natural initiated steam injection in May.

Canadian Natural is proceeding with bringing Kirby North online despite market uncertainty "because

it is important for Alberta," president Tim McKay said, adding that the project will bring 300 new jobs to the province.

The company plans to manage production ramp-up at Kirby North towards capacity of 40,000 bbls/d in early 2021.

Land Sales

► Alberta brought in \$8.83 million in bonus bids at its July land sale, driven by Montney leases, and a group of 16 sections in the Peace River oilsands area.

The government sold 32,800 hectares at an average of \$269.14.

Year-to-date, the government has brought in \$70.92 million in bonus bids, down nearly 70 per cent from the same period last year.

Drilling

► Baytex Energy Corp. says it achieved "very encouraging" initial flow rates from two wells drilled in Alberta's Duvernay play using a technology it has implemented in Texas.

The successful wells were fracture stimulated using a plug and perf system, which is the dominant technology in the Duvernay play. They were also the first Baytex-operated wells to use fracture diversion

technology, which CEO Ed LaFehr described as “a completion strategy working favorably in our Eagle Ford assets.”

Fracture diversion is a system where agents are deployed via wellbores to push injection fluid to new fractures within the reservoir.

Baytex’s first fracture-diversion well was brought on-stream on June 27 and generated a 30-day initial production rate of 1,360 boe/d, 76 percent liquids, the company said. The second well was brought on-stream July 26 and in early August was producing 1,063 boe/d, 89 percent liquids.

These wells delivered an approximate 20 percent reduction from the average cost of previous drilling, to approximately \$7 million each to drill and complete, LaFehr said.

“As the play moves from delineation to development, the efficiency from multi-well pad operations is expected to drive further cost reductions,” he said.

Baytex did not do as well with the two other Duvernay wells it drilled in the first half of the year.

While these two wells encountered favourable geological characteristics, both had to be abandoned

due to wellborn stability issues.

“Having conducted an in-depth review of these two wells, we developed an improved drilling process and will re-drill these attractive geologic locations in the future,” LaFehr said.

➤ Seven Generations Energy says it is “highly encouraged” with results from a new approach to its Montney well pads.

The company brought on its first so-called “triple stack” pad during the second quarter, adding a third layer of reservoir for development. The pad targets the well-understood Upper and Middle Montney, as well as the newer Lower Montney zone.

Seven Generations reported production over the first 60 days from the stack’s Lower Montney wells at 1,467 boe/d, and 1,753 boe/d for the wells in the Upper and Middle Montney. The wells averaged 67 percent and 60 percent condensate, respectively.

GMP FirstEnergy analysts said the results confirm the robust economics of Seven Generations Energy’s Nest 2 operating area and the upside potential of its triple stack developments.

➤ Oil and gas wells in western and northern Canada

continue to get longer and deeper, according to data from the Daily Oil Bulletin.

The average well length/depth increased to 3,007 metres in the period of January to May, 2019, compared to 2,927 metres in the comparable period a year ago. Back in 2010, the average was only 1,724 metres over the first five months of the year.

Alberta Government Actions

➤ Alberta has introduced legislation to guarantee the oil and gas royalty structure that is in place when a producer drills a well is the same structure that is in place 10 years later.

The Royalty Guarantee Act, introduced on June 20, “would increase investor confidence” with a “guarantee that no major changes will be made to the current oil and gas royalty structure for at least 10 years.”

➤ Alberta says it is “taking swift action to support shallow gas producers” by working with municipalities to reduce 2019 taxes on wells and pipelines. The province expects that industry will receive more than \$23 million in support from the tax relief.

Midstream News

Pipelines

▶ Trans Mountain Corporation has issued ‘notice to proceed’ directives to some of its construction contractors on the TMX expansion project.

Companies have been given 30 days to mobilize equipment and commence hiring workers, procuring goods and services, and developing detailed construction work plans.

Construction work will soon begin in communities along the route, including along the right-of-way in Alberta between Edmonton and Edson, and in the Greater Edmonton area. There will also be an immediate return to work at the Burnaby Terminal and at the Westridge Marine Terminal.

Specific start dates in the remaining construction areas are subject to final regulatory approvals and permits. Trans Mountain now expects to

complete the expansion by mid-2022.

▶ Plains Midstream plans to expand the Rangeland Pipeline, which carries light oil production in central Alberta to interconnecting pipelines into U.S. locations including Cushing, Ok. and Houston, Tex.

Subject to shipper commitments and regulatory approvals, Plains plans to build incremental service on two key sections of Rangeland to the U.S. border, increasing overall capacity by about 65,000 barrels per day to 200,000 barrels per day.

Curtailment

▶ The Government of Alberta has extended its oil curtailment by one year, to the end of 2020.

The move comes as a result of continued pipeline delays, including a recent one-year delay to Enbridge’s Line 3 Replacement Project, which was previously expected to

be complete by the end of 2019.

Without curtailment, the province expects production to exceed takeaway capacity by about 150,000 barrels per day. Maintaining the order is expected to help prevent extreme widening of the light-heavy differential, which results in large discounts for Canadian crude.

Alberta has also increased the base limit for curtailment from 10,000 to 20,000 barrels per day, which will mean that only 16 of more than 300 producers will be impacted, down from 29 previously.

Rail

▶ The Alberta government has initiated the process to transfer to industry the crude by rail contracts that were put in place by former administration. The announcement comes as crude by rail is back on the upswing, with the latest data from the National



Image: Pembina Pipeline Corp.

Energy Board showing traffic increased by 40 percent in April compared to March.

Alberta's previous government committed \$3.7 billion to lease 4,400 rail cars, with volumes starting to move in July. The plan was to have the province ship up to 120,000 bbls/d by 2020.

The province has initiated the process to shift those contracts to industry, energy minister Sonya Savage announced in a statement.

"We have said from the beginning that shipping crude by rail is something that the private sector is in the best position to be doing itself."

LNG

▶ The proposed Woodfibre LNG project has taken two major steps forward, signing a binding agreement with BP Gas Marketing as a "foundation customer," and receiving regulatory approval from the BC Oil and Gas Commission.

BP will receive 0.75 million tonnes per annum of LNG over 15 years, with first delivery expected in 2023, Woodfibre owner Pacific Oil & Gas said in a statement. The project is designed to produce approximately 2.1 mtpa.

The new permit contains 35 conditions relating to various aspects of the project such as its design, construction and operation including restrictions around flaring, working around streams, the discovery of any artifacts, noise and light pollution.

The \$1.8-billion project near Squamish, B.C. is expected to reach a final investment decision this summer.

▶ Pieridae Energy has agreed to pay \$190 million to acquire natural gas assets in southern Alberta from Shell in order to feed its proposed Goldboro LNG project in Nova Scotia. Shell will also take an equity stake in Pieridae.

The assets are expected to allow the company to access up to US\$1.5 billion in credit support from the German government to advance the Goldboro LNG project.

Pieridae has a 20-year supply deal with German utility Uniper for 5 mtpa, or half of Goldboro capacity.

▶ An innovation that started in concept as a way to improve reliability of power supply to communities in Canada's north could help create new markets for Western Canada's glut of cheap natural gas.

PTX Technologies is working to commercialize what CEO Colin Nikiforuk calls the "supercharged" version of a 160-year-old refrigeration technology that holds promise for both small-scale LNG projects and for natural gas liquids recovery.

The system is based on a modified aqua-ammonia absorption process. Jacobs Consultancy reviewed the technology in summer 2017, finding it "well-suited for small to mid-scale LNG production applications," and "sufficiently developed to warrant a scale-up."

The first commercial project that PTX is working on is located about 270 kilometres north of Slave Lake, Alberta, at a gas plant owned by Sonoma Resources (now operating as Sonoma LNG).

The plan is to process approximately 7.5 mmcf/d of natural gas into 90,000 US gallons per day of LNG.

Nikiforuk says Talbot Lake is "ready to go" once Sonoma has confirmation of market and funding. The most advanced customer discussions are with Fortune Minerals for its NICO mine, which is planned 160 kilometres northwest of Yellowknife.

Downstream News

Petrochemicals

▶ Chevron Phillips Chemical Company reportedly made a US\$15-billion bid for Calgary-based Nova Chemicals Corp. in June. The deal by the Texas-based joint venture of Chevron Corporation and Phillips 66 would confirm the trend of Big Oil diversifying further into downstream, according to Wood Mackenzie analyst Ashish Chitalia.

Originally created by the Alberta government in the 1950s, Nova Chemicals is currently owned by Mubadala Investment Company, based in the United Arab Emirates.

▶ During the second quarter, work at Inter Pipeline's \$3.5-billion Heartland Petrochemical Complex included placement of all heavy-lift vessels for the project's propane dehydrogenation facility.

Inter Pipeline said that \$287.1 million was invested

in the project during the quarter, with the total capital incurred on the project now at approximately \$1.6 billion.

The Heartland Petrochemical Complex is scheduled for completion in late 2021.

Meanwhile, the \$4.5-billion integrated propane dehydrogenation plant and polypropylene facility owned by Canada Kuwait Petrochemical Corporation has transitioned into the execution phase.

Long-lead equipment order placement is largely complete, an early works construction contract has been awarded and site-clearing is complete. The project is expected to be in service mid-2023.

Refining

▶ The new IMO 2020 low-sulphur shipping rules that take effect on Jan. 1 are not expected to have significant impact on Canada's heavy oil industry, according to MEG

Energy CEO Derek Evans.

He says that the ability of companies to access the U.S. Gulf Coast refining market will dampen the impact of the regulations, which reduce the sulphur content limit of shipping fuel from 3.5 percent to 0.5 percent.

The refining region is "massively undersupplied" for heavy oil as a result of sanctions on Venezuela. It's also the world's most sophisticated refining complex and should have no problem meeting the specs of the IMO 2020 regulations, Evans said.

▶ Demand for heavy oil in the U.S. Gulf Coast refining market has never been higher, but that is not helping the outlook for Canadian production growth, says report by IHS Markit.

"Ironically the call on Canadian heavy sour crude oil—the principal export from the Canadian oilsands—has never been greater as



the rapid deterioration of Venezuelan output tightens the supply of heavy sour crude globally,” said IHS Markit vice-president Kevin Birn.

Imports of Canadian crude to the U.S. Gulf Coast, or PAAD III, have increased in recent years from less than 200,000 bbls/d in 2014 to 840,000 bbls/d in December 2018, according to data from the National Energy Board (NEB). This has occurred as access has improved through incremental pipelines such as Enbridge Inc. Flanagan South and Seaway, and by rail.

Volumes have displaced other sources of heavy crude such as Venezuela and Mexico, but Canada needs the “bullet train” of Keystone XL to significantly increase its U.S. Gulf Coast market share. The one-year delay of the Line 3 Replacement Project isn’t helping either.

NEB data shows that Canadian volumes into PAAD III have declined overall in 2019, to 795,000 bbls/d in January and 711,315 bbls/d in April.

► Marathon Petroleum Corporation’s recent decision to cancel a project increasing heavy oil processing capacity at one of the largest refineries in the U.S. is a major concern for upstream producers in Alberta, said Suncor Energy

executive vice-president Steve Reynish.

Marathon announced in May it will not pursue an approximately US\$800 million project at its refinery in Garyville, Louisiana that would have increased coking capacity by 50 per cent to 150,000 bbls/d. It was expected to be completed in late 2021.

Marathon CEO Gary Heminger said the Garyville Coker 3 project no longer met its investment thresholds, largely due to weaker than expected spreads between light and heavy oil feedstock.

“Geopolitical events have caused lower production of heavy crude, including lower Venezuelan production, slower Canadian pipeline development and our Ukrainian sanctions. In addition, more light crude is being produced as a result of continued U.S. shale growth,” Heminger said.

Suncor’s Reynish said that under normal circumstances, the dramatic reduction in heavy oil going from Venezuela to the heavy oil-configured U.S. Gulf Coast refining cluster would be a fantastic opportunity for Canadian heavy crude.

“Unfortunately we don’t have the pipeline capacity, and that’s part of the frustration. We should be stepping into

that space but can’t,” he said.

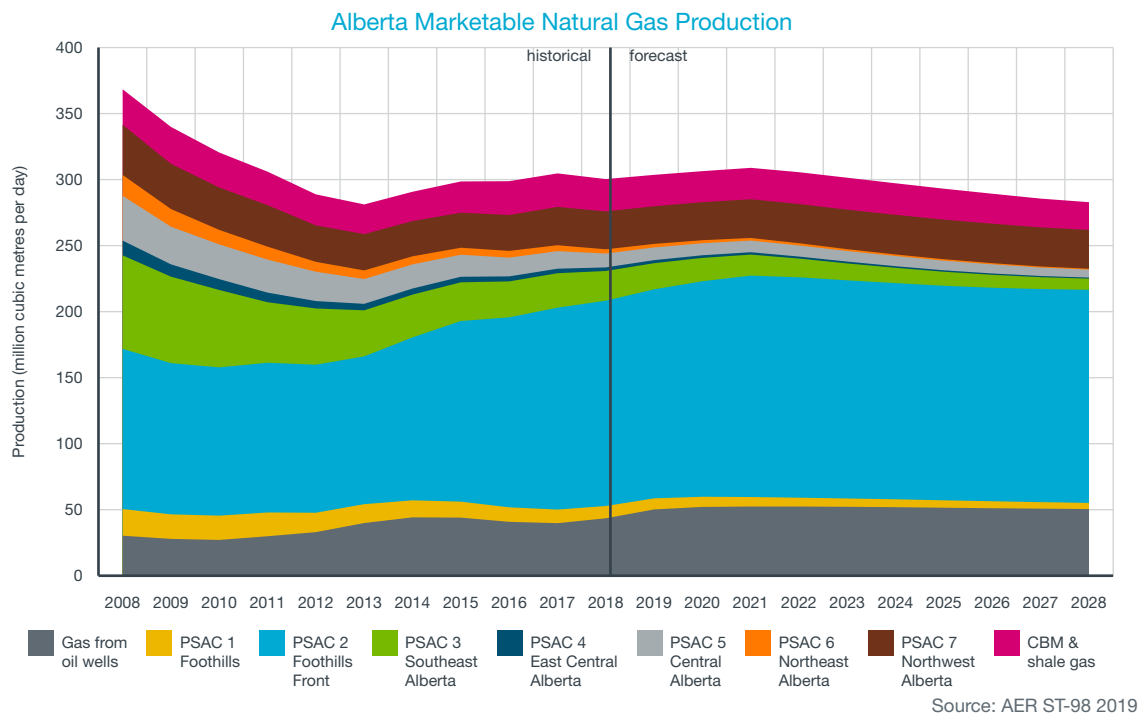
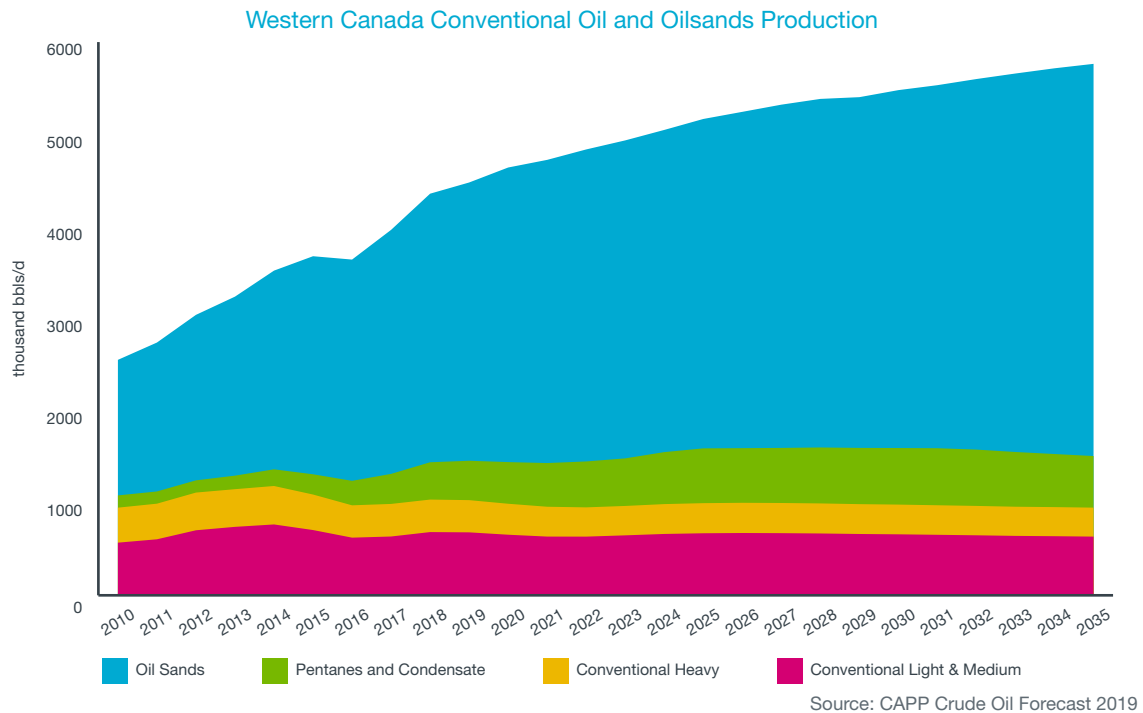
“Let’s not assume that things can’t change, because obviously history would tell us they can and they do. Our main market at the moment is the Midwest and Gulf Coast for Canadian heavy crude, and we would like to keep our customers very happy there and not give them a reason to think, maybe we should just invest in the light side out of the shale oil or even shut down the heavy oil part of the refinery and just go light only.

“That’s a real risk to Canada...We need to be in the business of keeping our customers aligned and happy and not giving them cause to question their business model.”

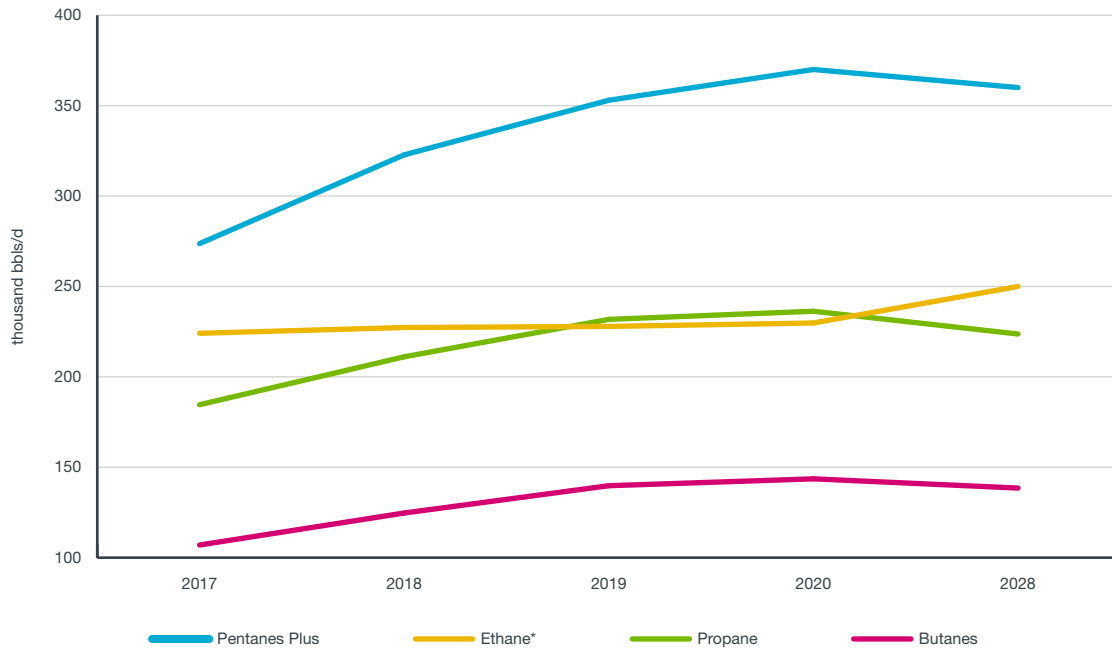
Demand for heavy oil on the U.S. Gulf Coast has never been higher, but Canada's producers are challenged to capitalize on the opportunity without sufficient market access.

— IHS Markit

Alberta Oil & Gas Data



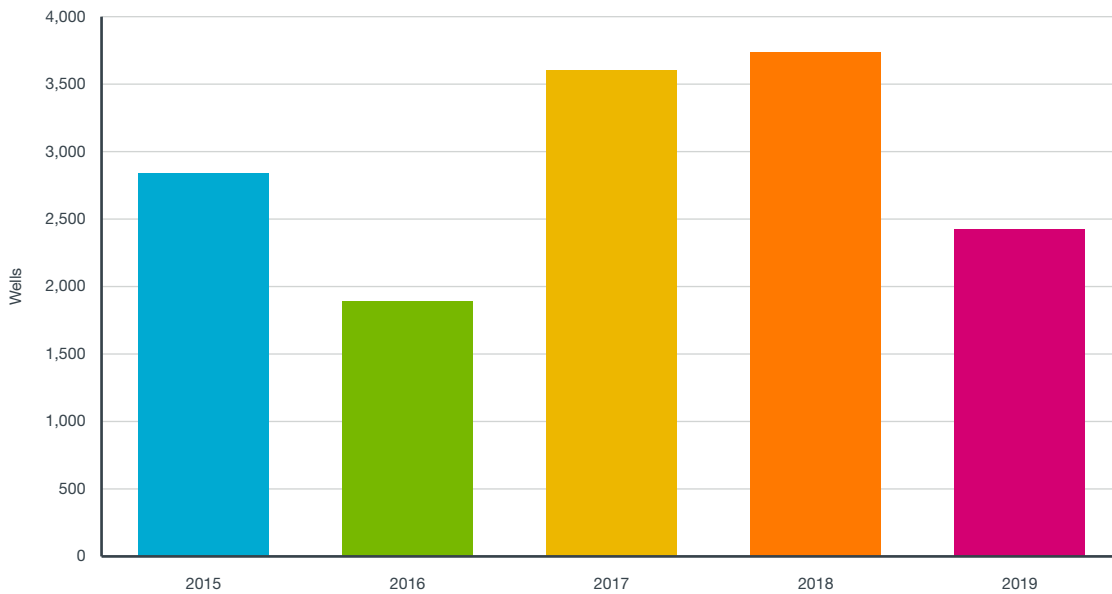
Alberta Natural Gas Liquids Supply Forecast



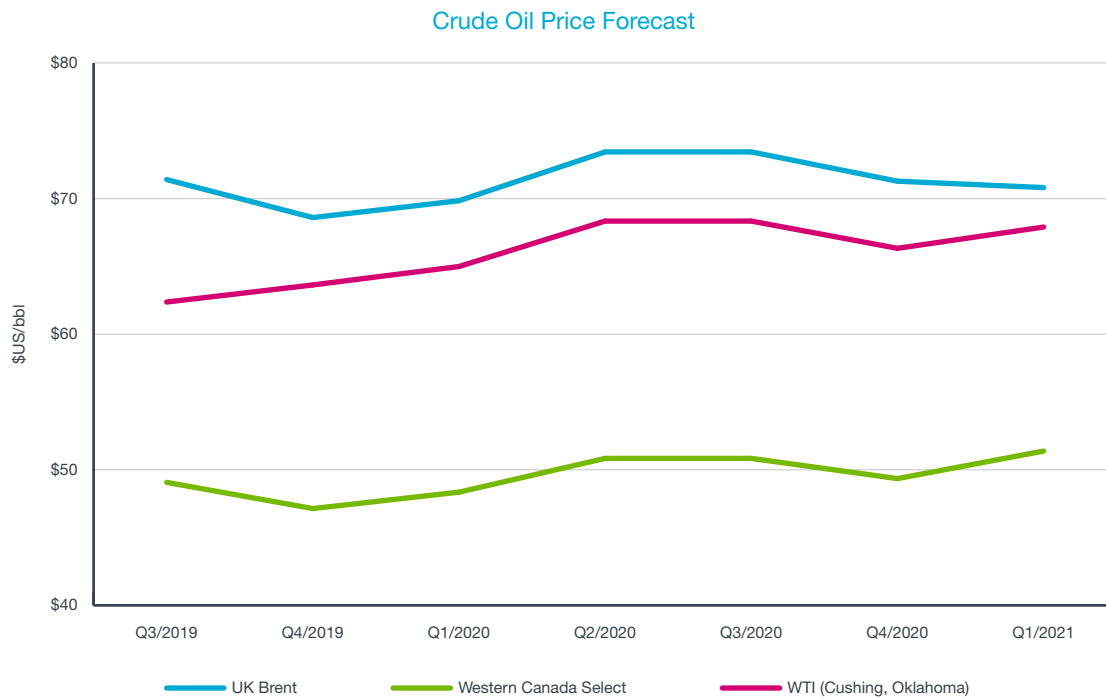
Source: AER ST-98 2019

*Ethane includes supply from conventional gas and oilsands off-gas

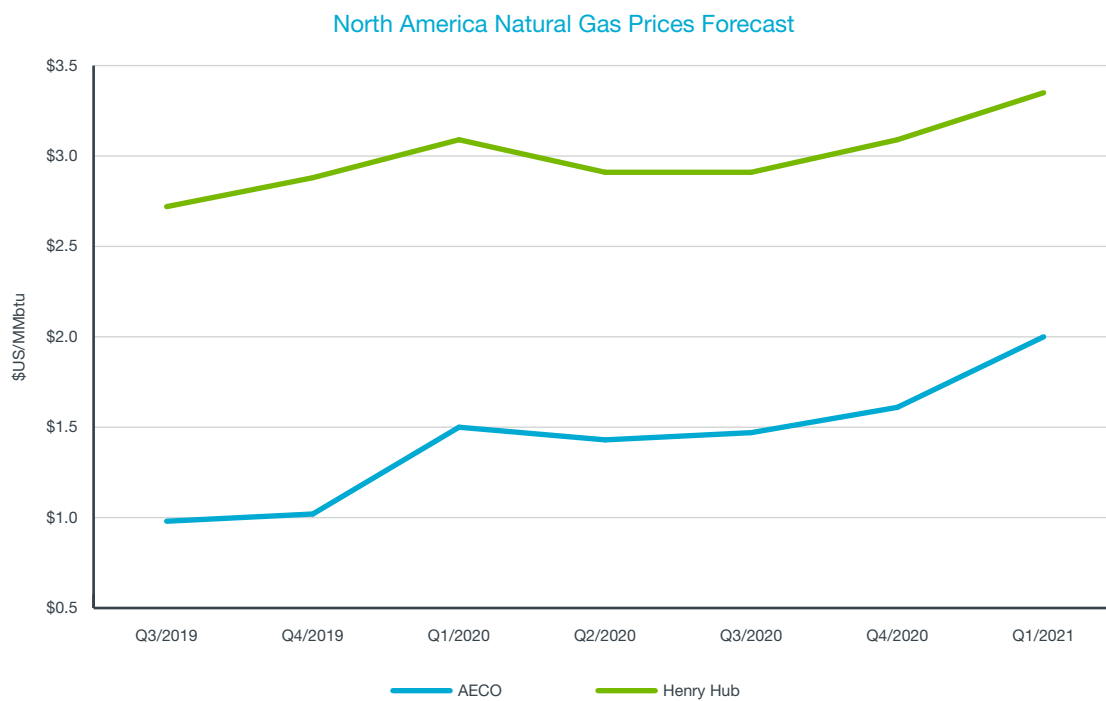
Alberta Drilling Forecast



Source: Petroleum Services Association of Canada

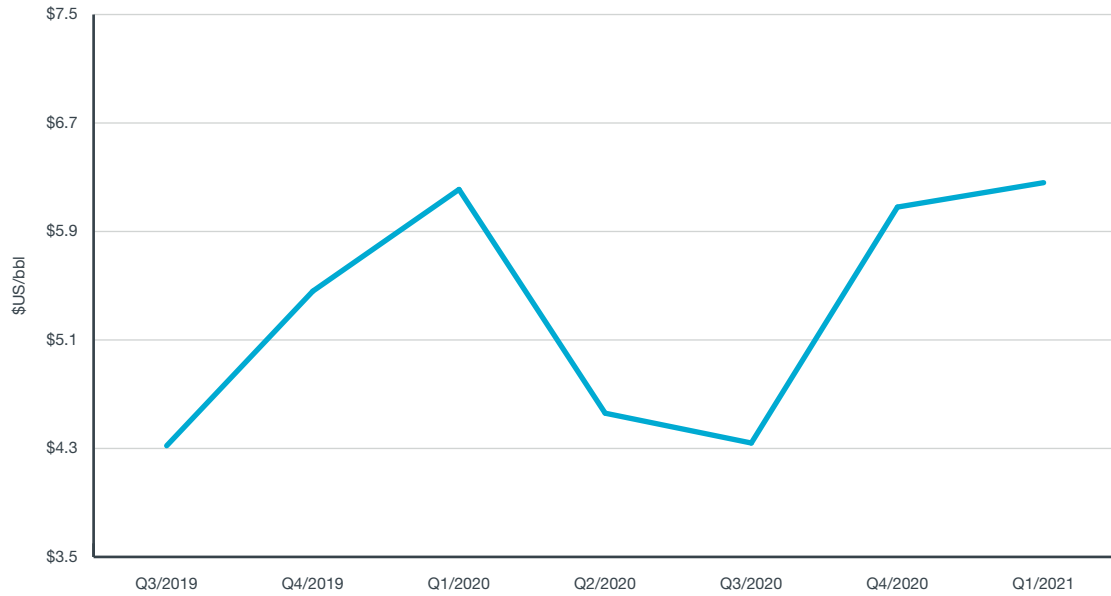


Source: Sproule and GTI



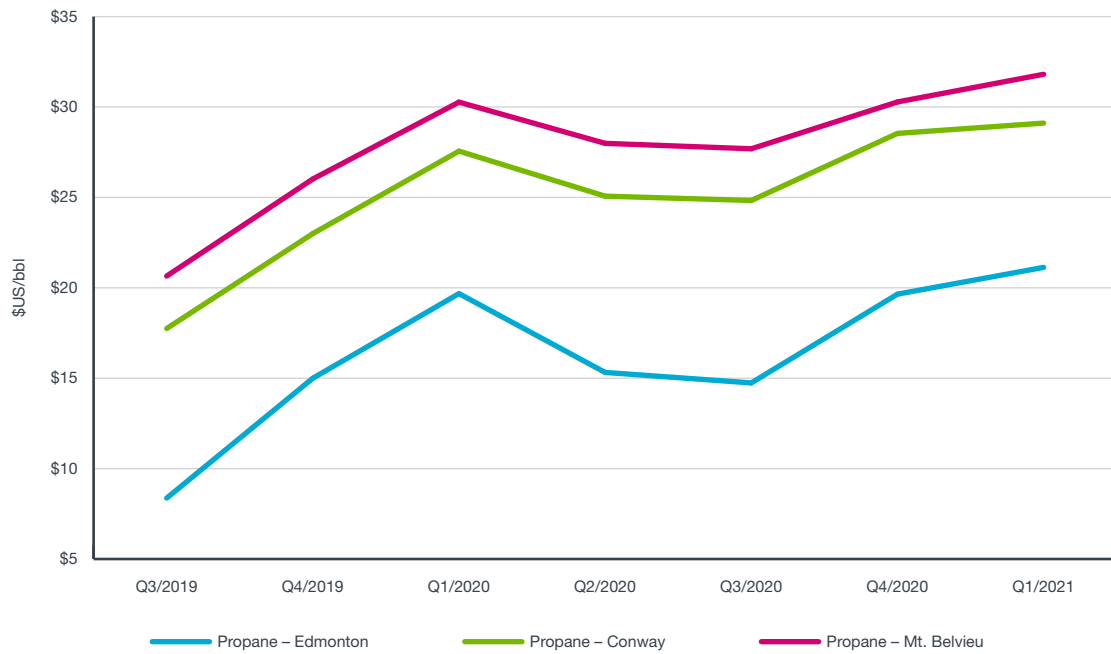
Source: Sproule and GTI

Ethane Price Forecast - Alberta Plant Gate

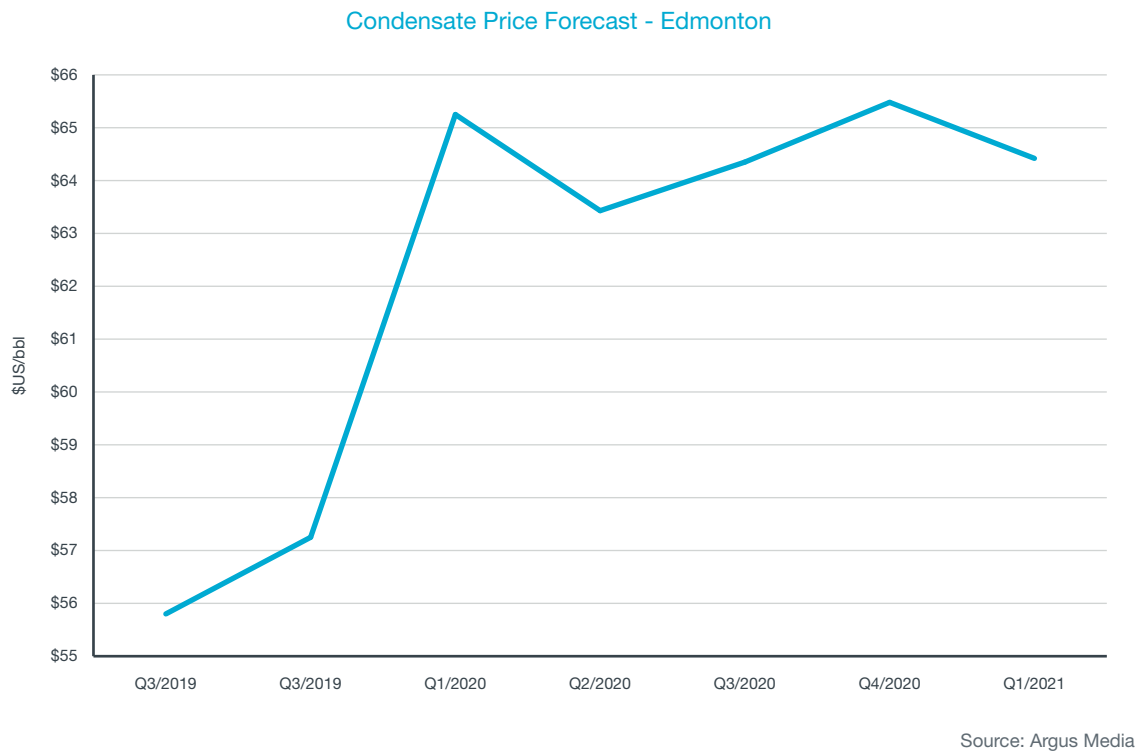
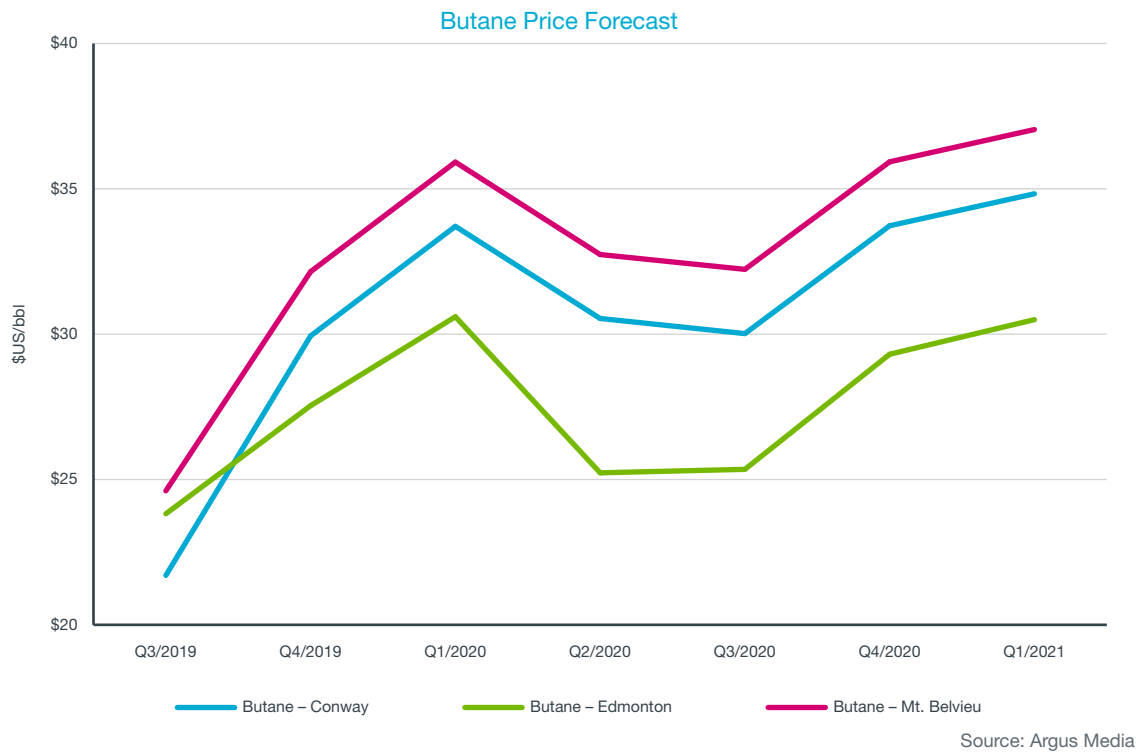


Source: Argus Media

Propane Price Forecast



Source: Argus Media



Plastic Waste: A Solvable Challenge

Q&A with John Thayer, senior vice-president, polyethylene business, NOVA Chemicals



John Thayer, senior vice-president, polyethylene business

Earlier this year, Calgary-based NOVA Chemicals joined 27 global petrochemical producers to found the Alliance to End Plastic Waste with a combined initial investment of US\$1 billion to advance solutions to reduce plastic waste in the environment.

Why did NOVA Chemicals co-found the Alliance to End Plastic Waste?

Plastic waste in the environment is a large challenge. By working together with companies across the value chain, we can have the greatest impact.

How important is this issue for the petrochemical industry in Alberta and Canada?

Plastic products add great value to society, making everyday life healthier, easier and safer, but they do not belong in our environment. We support the Canadian government as they work on the science to better understand the implications of plastics in the environment in and we welcome the opportunity to be a part of the conversation to develop solutions that create a world free of plastic waste.

The issue of plastics in the environment is solvable and action by industry, government,

communities and consumers is essential to bring about meaningful, systemic and permanent solutions to get and keep plastics out of our oceans and the natural environment.

Canada has the opportunity to take a leadership position by improving how plastic waste is managed and by investing in new solutions.

What is this initiative doing?

The Alliance has developed a global vision and a comprehensive, integrated strategy made up of four pillars:

- Infrastructure development to collect and manage waste and increase recycling, especially in developing countries;
- Innovation to advance and scale new technologies that minimize waste, make recycling and recovering plastics easier and create value from all post-use plastics;
- Education and engagement of governments at all levels, businesses, and communities to mobilize action; and,
- Clean up of concentrated areas of plastic waste already in the environment, particularly major rivers that carry vast amounts of land-based plastic waste to the ocean.

What is NOVA doing as part of the initiative?

This investment demonstrates our commitment to a shaping a world that is better tomorrow than it is today and is part of our commitment to sustainability.

We're already committed to and working on this issue. We recently announced our investment of nearly \$2 million (1.5 million EUR) in Project STOP.

Connected to North America's Critical Infrastructure: Oil



Connected to North America's Critical Infrastructure: Natural Gas



Crude Oil Plays

Oilsands Upgraders

Operating

- 1** Suncor Base & Millennium
- 2** Syncrude Mildred Lake
- 3** Athabasca Oil Sands Project Scotford
- 4** Canadian Natural Resources Horizon

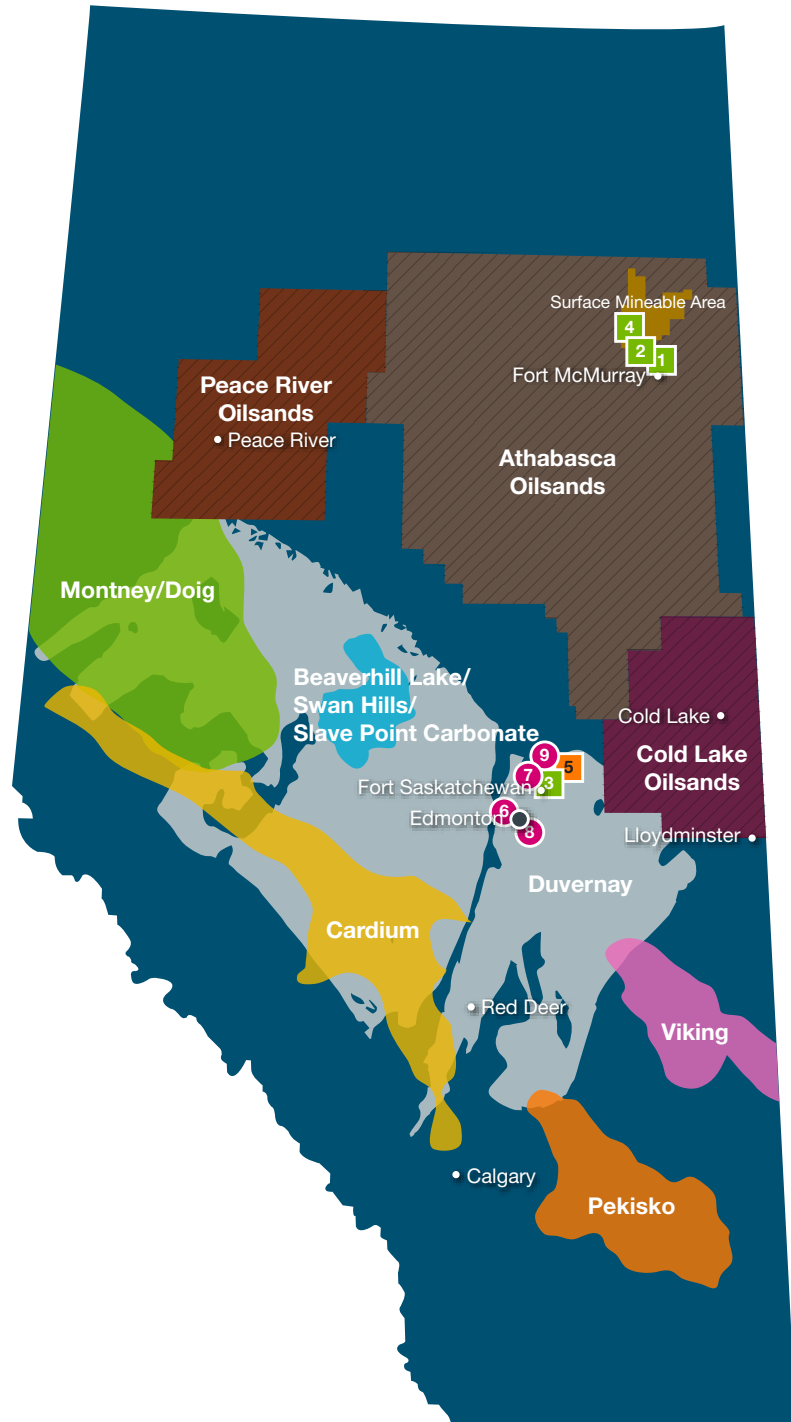
Proposed

- 5** Value Creation Heartland

Oil Refineries

Operating

- 6** Suncor Edmonton
- 7** Shell Scotford
- 8** Imperial Strathcona
- 9** North West Redwater Sturgeon



Natural Gas Plays

Straddle Plants

- 1 AltaGas Ellerslie
- 2 Inter Pipeline Cochrane
- 3 Alta Gas Joffre
- 4 Spectra Empress
- 5 Plains Midstream Empress
- 6 Atco Empress
- 7 1195714 Alberta Empress
- 8 Atco Fort Saskatchewan

Fractionators

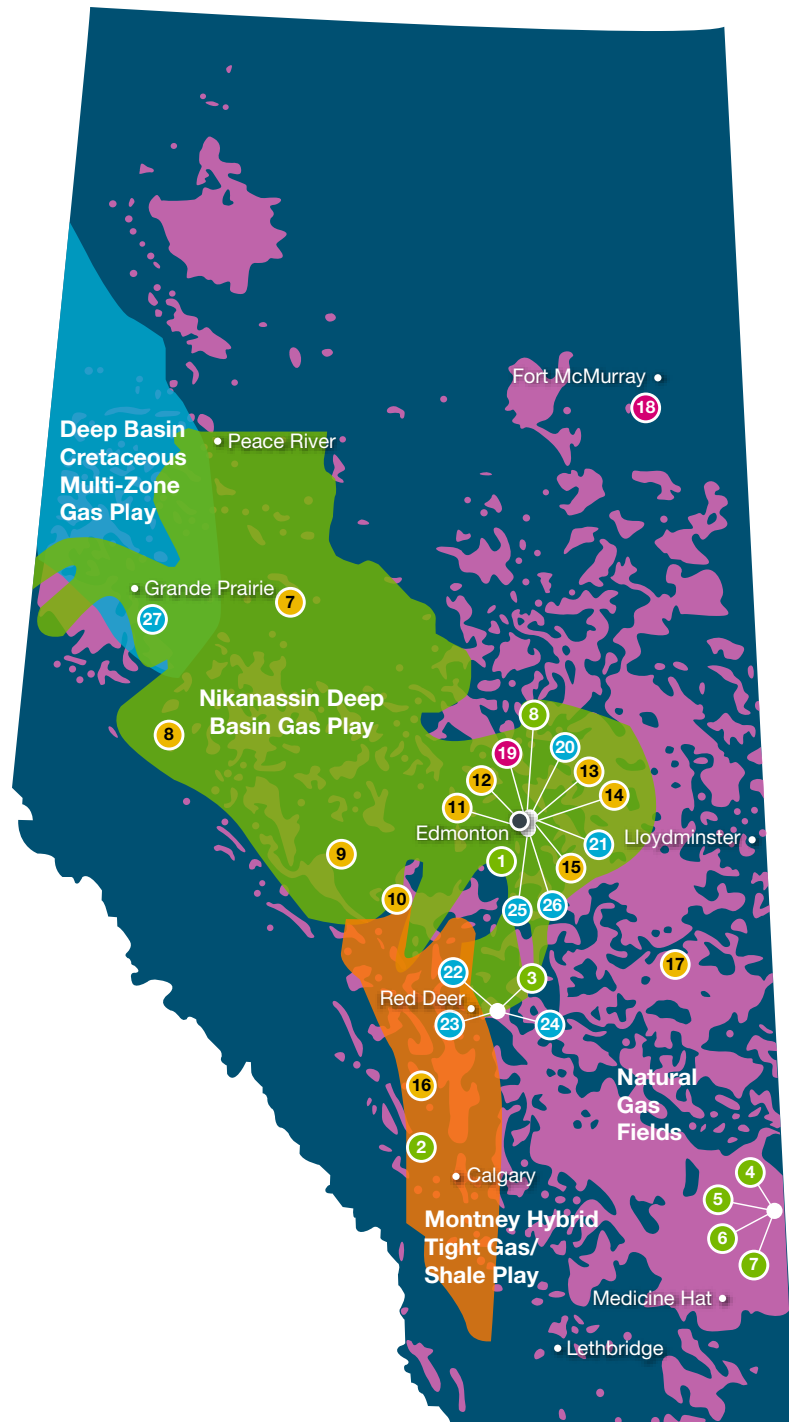
- 7 High Prairie Frac Plant
- 8 Kanata Simonette 13-11 Gas Plant
- 9 Tervita Granada Frac Plant
- 10 Buck Creek Frac Plant
- 11 DOW Fort Sask
- 12 Fort Sask Gas Plant
- 13 Keyera Fort Sask Frac Plant
- 14 Interpipeline ROF Facility
- 15 Pembina INFRA. & Logistics LP FRAC 1, 2 & 3
- 16 Harmattan Fractionation
- 17 Gibson Hardisty

Offgas Plants

- 18 Inter Pipeline Fort McMurray
- 19 Heartland Offgas Delivery (4917)

Petrochemical Facilities

- 20 Pembina PDH/PP (Under Construction)
- 21 Fort Sask: DOW
- 22 Joffre E1: NOVA
- 23 Joffre E2: NOVA
- 24 Joffre E3: DOW/NOVA
- 25 Inter Pipeline Heartland Petrochemical Complex (Under Construction)
- 26 Inter Pipeline Acrylic Acid & Derivatives Project (Proposed)
- 27 Nauticol Energy Methanol Facility (Proposed)



Contacts

Alberta Government

Alberta Advanced Education

www.alberta.ca/advanced-education

Alberta Energy

www.alberta.ca/energy

Alberta Energy Regulator

www.aer.ca

Alberta Environment and Parks

www.alberta.ca/environment-and-parks

Alberta Geological Survey

www.ags.aer.ca

Alberta Innovates

albertainnovates.ca

Alberta Surface Rights Board

www.surfacerights.alberta.ca

Industry Associations

Alberta Land Surveyors' Association

www.alsa.ab.ca

Canada's Natural Gas

www.canadasnaturalgas.ca

Canadian Association of Geophysical Contractors

www.cagc.ca

Canadian Association of Oilwell Drilling Contractors

www.caodc.ca

Canadian Association of Petroleum Producers

www.capp.ca

Canadian Energy Pipeline Association

www.cepa.com

Canadian Natural Gas Vehicle Alliance

www.cngva.org

Canadian Society for Unconventional Resources

www.csur.com

Canadian Society of Exploration Geophysicists

www.cseg.ca

Canadian Society of Petroleum Engineers

www.speca.ca

Explorers and Producers Association of Canada

www.explorersandproducers.ca

Gas Processing Association of Canada

www.gpacanada.com

Petroleum Services Association of Canada

www.psac.ca

Petroleum Technology Alliance Canada

www.ptac.org

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