

LNG Canada: A New Deal for the Nation

A Natural Gas World Special Report

The Long Road to FID

Forging a Future

Greening Canada's Gas

The CEO of Hope

LNGCANADA
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NATURAL GAS WORLD 

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Chief Councillor Crystal Smith

The LNG Canada project is a milestone in Haisla Nation history, which will ensure that our people have a ‘share and a say’ in resource projects now and into the future.



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DREAMS FULFILLED

LNG Canada's 14mn mt/yr liquefaction and export project at Kitimat, on BC's northern coast, has been a decade getting to last October's final investment decision.

But Canada's LNG aspirations date back much further than 2008: as far back as the early 1980s, Dome Petroleum and Japan trading house Nissho Iwai had proposed a 2.9mn mt/yr liquefaction and export terminal at Grassy Point, 30 km north of Prince Rupert.

The Western LNG project, as it was known, would have drawn about 450mn ft³/day of natural gas from Alberta and BC. At the time, a surplus of natural gas was beginning to emerge in western Canada, and Dome and its partners, including pipeline giant TransCanada, Alberta pipeline operator Nova (now a part of TransCanada's system) and a defunct BC Crown corporation, saw LNG sales to five Japanese utilities as a way to soak up the surplus.

Facing financial difficulties, Dome pulled out of Western LNG in 1985, leaving it to ExxonMobil's Canadian subsidiary and federal Crown corporation Petro-Canada to pursue. The following year, the plan was permanently

scrapped, ending Canada's first attempt to reach the global LNG stage.

Fast forward 32 years, to October 2, 2018 when LNG Canada CEO Andy Calitz stood in a Vancouver conference hall to announce that his project's five joint venture participants had agreed to fund the \$40bn first phase of development, making it the biggest private sector investment in Canadian history. Not only were Canada's LNG aspirations closer to realisation, so too were the aspirations of 23 BC First Nations, of dozens of local communities in BC – not least of which the District of Kitimat – and of BC's natural gas producers, who like all Canadian gas producers were desperate to find new markets for another surplus of Canadian natural gas, this one inflated by the shale revolution.

Much remains to be accomplished before BC's "Green LNG" heads overseas to Asian markets sometime in late 2024 or early 2025, but when that first tanker leaves Kitimat harbour, an old dream – but a new deal – four decades in the making will finally be realised.

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THE LONG ROAD TO FID

LNG Canada's decision to move forward with \$40bn project culminates a decade-long process

There is a general appreciation that the announcement by LNG Canada CEO Andy Calitz on October 2, 2018 that the joint venture partners in the \$40bn project had taken a positive final investment decision (FID) came seven years into development, but in fact, the concept of what would become LNG Canada began about a decade ago.

And it didn't emerge as an idea launched by Anglo-Dutch major Shell, the lead joint venture partner.

In fact, Calitz told *NGW* in a wide-ranging interview, the concept was initially advanced by Japan's Mitsubishi and Korea Gas – both of whom saw the natural gas potential of the Western Canadian Sedimentary Basin and its

proximity to their markets in Japan and Korea.

"Conceptually, those two began to look for a project in late 2008 or thereabouts, but they also realised at the start that they would need an international development partner, and approached Shell," Calitz said. "Those three parties then signed an agreement to develop a project from western Canada, from British Columbia."

Mitsubishi and Kogas doubled down on their pursuit of natural gas development opportunities in western Canada in the summer of 2011, when they agreed to collaborate in the development of shale gas resources in the Cordova Embayment, in northeastern BC. Mitsubishi had acquired those resources in 2010 when a Mitsubishi subsidiary, Cordova Gas Resources, acquired a 50% interest in the gas assets of now-defunct Penn West Energy Trust.

The Cordova Embayment resources, in the Horn River and Liard basins of northeastern BC, were to have been part of a privately-held



LNG project, also located in Kitimat, in which Mitsubishi had taken a minority position in 2009. That project is widely believed to have been Galveston LNG, initially launched by Alfred Sorenson – now CEO of Pieridae Energy – in 2004, which today, after a twisting series of ownership changes, is being developed by Chevron and Australia’s Woodside Energy, but without Mitsubishi’s involvement.

A ROCKY START

After joining Mitsubishi and Kogas, Shell brought PetroChina, with which it had long held a strategic international partnership, into the fold and set about finding the best location on the BC coast to site a world-scale natural gas liquefaction terminal.

Over the next couple of years, Shell and its partners reviewed some 500 potential sites, many of them in the traditional territories of Haisla Nation. But those early days, recalls Ellis Ross, now the Liberal MLA for Skeena in the

The Rio Tinto smelter site, as seen from near Haisla Nation’s Kitimaat Village. LNG Canada’s terminal will be located next door to Rio Tinto.

BC provincial legislature but back then chief councillor of the Haisla Nation, didn’t go very smoothly.

“I first met with a few of the LNG Canada people in 2011, when we heard they were coming around,” Ellis told *NGW* in an interview at his Kitimat constituency office. “But it wasn’t like a big event because they had looked at locations all around BC, and when I looked at the locations they had picked for our territory, it seemed to be so random.”

At that first meeting, when he first saw some of the proposed locations, Ellis assumed the LNG Canada people “had just thrown some darts” at a map. One of the chosen sites lacked deep water access; another was in the middle of some of the most sensitive habitat in Haisla’s traditional territory.

Ed Hernandez, implementation governance manager for LNG Canada, wasn’t directly involved in the site selection in 2011 – he was working with TransCanada on the Coastal Gas-Link routing – but he was part of the overall management team that looked at those 500 sites. But they didn’t look long.

The LNG Canada site selection team, Hernandez told *NGW*, was looking for a site near the coast, at a certain elevation above sea level, with easy access to ocean sailing routes in waters deep enough to accommodate tankers. The site needed to be ice-free year-round, it needed to be available and amenable to easy site preparation work.

“As I recall, the initial screening very quickly eliminated the vast majority of those sites, and it wasn’t long at all until they were down to



10, with Kitimat and Prince Rupert still in contention,” Hernandez said. “And once they did detailed site screenings on those 10, the site at Kitimat emerged as the clear favourite.”

The Kitimat location ticked all the boxes, he said. The site had originally been developed by Ocelot Energy in the early 1980s as a methanol

LNG Canada will reconfigure existing jetties at its site to accommodate berths for two tankers.

“KITIMAT ALSO HAD THE ADVANTAGE BECAUSE IT’S A BROWNFIELD SITE WITH A LOT OF INFRASTRUCTURE THAT’S ALREADY THERE, AND THE DOUGLAS CHANNEL IS DEEP AND EASILY NAVIGABLE.”

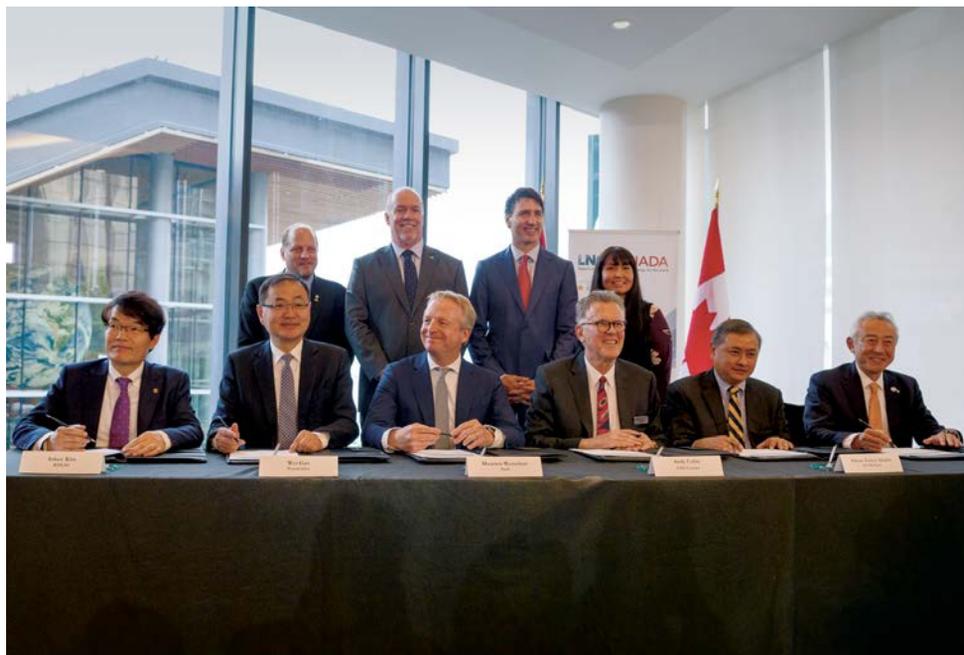
— **Ed Hernandez**, implementation governance manager, LNG Canada

manufacturing facility. Ocelot spun its methanol activities out as Methanex in 1991, and in 2005 Methanex closed the plant and removed most of the manufacturing complex, leaving just the methanol storage tanks. Cenovus Energy subsequently acquired the site to use as a condensate import terminal.

“Kitimat also had the advantage because it’s a brownfield site with a lot of infrastructure that’s already there, and the Douglas Channel is deep and easily navigable,” Hernandez said.

The only criteria that the Kitimat location lacked, he said, was that – at about 90 hectares – it wasn’t quite big enough for what Shell and its partners were planning. But Rio Tinto, the big aluminum smelter nearby that had been operating for nearly 60 years, did have some land available, and LNG Canada began negotiating to acquire some of it. That purchase closed in 2014.

In early 2012 – after considerable education into aboriginal rights and title from Ross and other Haisla leaders – Shell, with a 40% interest, PetroChina, Mitsubishi and Kogas, each with 20%, announced that they had settled on a site “near Kitimat” for their “proposed liquefied natural gas (LNG) export facility” and would immediately begin formal consultations with First Nations and local community residents.



LNG Canada joint venture participants at the FID signing ceremony. Seated at table (left to right): Inkee Kim, Korea Gas; Wei Gao, PetroChina; Maarten Wetselaar, Shell; Andy Calitz, LNG Canada; Adnan Abidin, Petronas; Hidenori Takaoka, Mitsubishi. Standing (left to right): Phil Germuth, District of Kitimat; John Horgan, BC premier; Justin Trudeau, Canadian prime minister; Crystal Smith, chief councillor, Haisla Nation.

“Our combined expertise, and our focus on technological innovation in delivering safe and environmentally-sound LNG projects around the globe, ensures that our LNG Canada project would be well-suited to deliver long-term value for BC and increase access to new export markets for Canada,” said Jose-Alberto Lima, at the time vice-president, LNG Americas, for Shell Energy Resources Company.

In early 2014, the partners confirmed the purchase of the old Methanex site from Cenovus. And that May, they formalised their partnership by signing a joint venture agreement and incorporating a new operating entity, LNG Canada Development Inc., with Calitz – a Shell veteran who had been named to head the project the previous year – as CEO.

“While we are in the early evaluation process and a decision to build the project is still a while away, this agreement reinforces our commitment to developing an LNG facility in British Columbia and allows us to proceed with the next steps in our project assessment,” Calitz said at the JV agreement signing ceremony in front of then-BC premier Christy Clark and Rich Coleman, at the time the energy minister in the provincial Liberal government.

But while the formalisation of the joint venture and the creation of LNG Canada marked a major milestone in the project’s development,

Canada’s first world-scale LNG export facility was still a long way from the finishing line, as far as Calitz was concerned.

“We will need to continue to work closely with the provincial and federal government to ensure that the project is economically viable, as well as working closely with First Nations, the local communities, and regulatory agencies, and move forward on a number of commercial agreements and contracts,” he said. “We remain cautiously enthusiastic about the potential opportunity in BC and look forward to exploring it further.”

BC’S LNG BONANZA

The global LNG market was dramatically different in 2014 than it is today. World oil prices were in excess of US\$100/barrel; natural gas prices in Asia were hovering around US\$14/mn Btu. In that kind of environment, the prospects of a new LNG industry in her province had premier Christy Clark giddy with excitement.

The previous year, she had confidently predicted that LNG developments in BC would bring the province a \$100bn “bonanza” – mostly from an income tax of between 3.5% and 5% the government would levy on proposed LNG export projects and from special higher electricity rates that would be charged to liquefaction terminals by Crown-owned BC Hydro.

Calitz doesn't begrudge Clark's government implementing those measures – after all, she was looking at as many as 20 export terminals setting up shop in her province. But the so-called "Christy Clark Years" – between 2013 and her election defeat at the hands of NDP leader John Horgan in 2017 – presented more challenges than even he had expected when the joint venture agreements were signed.

"The Clark government did a great deal to mobilize and initiate, in the period between 2013 and 2017, the conditions necessary to create the dream of an LNG industry in BC," Calitz told *NGW*. "Between her being a very visionary host of foreign guests from Asian companies to her and Rich Coleman organizing an integrated file for each of the many projects that were enthusiastic to come to BC; for that file to be carried by a deputy minister to make sure that the overall approvals crossed all the necessary ministries and regulators, this was all necessary to ensure that the process was as demanding as it needed to be and also as protective as it needed to be of the people of BC and the nature of BC."

BC'S DREAM EVAPORATES

But as crude oil prices collapsed and the value of LNG investments softened, Christy Clark's vi-

sion of BC's LNG future didn't mesh with those of the industry itself. One by one, BC's prospective LNG projects dropped by the wayside, victims either of lower oil prices, lower Asian LNG prices, excessive power rates or punitive tax levies; of environmental opposition or simply because the world's LNG market had become, very quickly, significantly over-supplied.

Even LNG Canada was feeling the heat, and was working diligently to improve the economics of its project in a climate that, to many in the industry, was seen as untenable. "The naysayers said it can't be done and the critics said it shouldn't be done," he told a Calgary audience in October 2018, a week after FID was announced.

First on LNG Canada's wish list was the removal of the LNG income tax, Calitz recalls.

"When it was first introduced, they asked our advice and it was halved," he says. "They asked for our advice again and it was halved again."

As discussions with various levels of government continued into 2016, LNG Canada was also taking care of its own business. In January, the BC Oil & Gas Commission, which regulates major energy projects in the province, issued an LNG facility permit for the liquefaction terminal in Kitimat – the first in the province to receive such a stamp of approval.



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SHOULDN'T BE DONE.”**

— Andy Calitz, CEO, LNG Canada

“The OGC identified several conditions that must be met by LNG Canada to design, construct and operate the project,” Calitz said at the time. “We have reviewed these conditions and are confident that we will meet these conditions as they are aligned with LNG Canada’s core safety values and commitment to protect the environment, the community and our workers.”

Still, LNG Canada wasn’t about to over-sell the importance of the permit. The project still needed to prove itself economically viable, that it could ensure an adequate labour supply and that it could win other critical regulatory approvals before any FID could be contemplated.

A few months later, the company began the engineering and planning work for Cedar Valley Lodge, a 4,500-bed workforce accommodation centre located immediately adjacent to the terminal site – a location chosen specifically to facilitate the safe transportation of workers by shuttle bus and reducing vehicular traffic on Kitimat’s roads.

Again, LNG Canada cautioned against reading too much into the decision to start planning Cedar Valley Lodge: FID was not yet at hand, although now the joint venture participants were suggesting that such a decision could likely be expected in late 2016, assuming all other factors fell into place.

In the first half of 2016, only a few LNG projects in BC were still standing: LNG Canada was the acknowledged front-runner; Malaysia’s Petronas was still working on its Prince Rupert project; Steelhead LNG was still developing its Kwispaa project on Vancouver Island, with the help of the Huu-ay-aht First Nation; Woodside and Chevron were still discussing their Kitimat LNG project at Bish Cove, just down the Douglas Channel from LNG Canada’s site; and Woodfibre LNG was still anxious to get underway with its much-smaller 2.1mn mt/yr project at Squamish, some 60 km north of Vancouver.

ON THE ROPES

By late summer, however, the conditions that had felled so many BC LNG projects finally caught up with LNG Canada, and Andy Calitz – by now referred to in the business press as the “CEO of Hope” – made what he has repeatedly said was the toughest announcement of his

career. FID would be delayed for at least two years, while the partners continued to study global LNG industry challenges.

While many critics of Clark’s Liberal government pointed to the LNG income tax and the extraordinary power rates as the reason for the delay, Calitz insisted then – as he does now – that the decision reflected market realities far beyond the borders of either BC or Canada.

“Our project has benefitted from the overwhelming support of the BC government, First Nations – in particular the Haisla – and the Kitimat community,” Calitz said in announcing the delay. “We could not have advanced the project thus far without it. I can’t say enough about how valuable this support has been and how important it will be as we look at a range of options to move the project forward towards a positive FID by the joint venture participants.”

Mainly, Calitz told *NGW*, the decision was the outcome of a number of coalescing factors: crashing oil prices, the associated reduction in the value of LNG, and the continued over-supply of the global LNG market. Layered on top was Shell’s \$53bn acquisition earlier that year of British energy giant BG Group, which Calitz said “impacted the immediate affordability” of the LNG Canada project.

The decision to delay FID washed through the Haisla and Kitimat communities like a tidal wave.

For Crystal Smith, who was Ellis Ross’s assistant at the time, news of the delay cast a pall over Haisla’s headquarters in Kitimaat Village, just across the Douglas Channel from Kitimat and the site of the LNG Canada plant.

“But for me, that lasted only for about a day or two; we had capacity and education investments lined up and those continued, so we looked at it as a way to refocus, tighten our purse strings,” she told *NGW*. “They [LNG Canada] were not going away. There was one permit application process that took about 80 meetings – and they told me that they would not have even started that process if there was any thought that there would not be FID.”

For Ross, who heard of the delay directly from Calitz even before the public announcement was made, the news hit him “like a ton of bricks.”

“I knew right away what it meant for us,” Ross told *NGW*. “The contracts aren’t going to

be there; all the profits we made from those contracts and the cash we gave to our people, it's going to end, and Kitimat is going to come to a standstill."

"WHEN IT FINALLY HAPPENED, WHEN I FINALLY FOUND OUT, I WAS ECSTATIC...AND THEN I CRIED FOR ABOUT TWO HOURS."

— **Crystal Smith**, chief councillor, Haisla Nation, on positive FID announcement

COME BACK BETTER

But Kitimat didn't come to a standstill, and neither did LNG Canada. When the delay was announced, Calitz vowed that he and his team would use the time to make the project even better, and would maintain and enhance relations with the Haisla and other First Nations associated with the project.

And at a Vancouver LNG conference in May 2018, he reiterated a promise he had made in 2016: that LNG Canada would be in construction before the end of 2018.

LNG Canada and its joint venture partners used the time after the FID delay to address global market conditions and make changes to the project that would ensure it remained cost-competitive with other LNG supply options in Asia, Calitz told the Calgary audience.

"During that period of two years we reduced our delivered cost into Asia by 6%, we returned to the market to select JGC/Fluor to build the LNG plant on a lump sum basis, we worked with the federal government and the provincial government to drive a fiscal regime that could be competitive with the other regimes," he said.

Almost from the time John Horgan and his NDP government took power in 2017, he had

set out four conditions that would need to be met for LNG developments to proceed in BC. All projects, the policy said, would need to:

- Guarantee a fair return for BC's natural resources,
- Guarantee jobs and training opportunities for BC residents,
- Respect and make partners of First Nations,
- Protect BC's air, land and water, and live up to the province's climate commitments.

"Our new approach welcomes investment that puts our province's people and future first, and rejects the old ways of resource development at any cost," Horgan said. "Our obligation is to the people who call BC home, and our job is to get the best deal for them and the generations that follow."

NEW DEAL

Those four conditions formed the basis of the government's negotiations with LNG Canada, and in March 2018, those discussions culminated in a new fiscal framework that would underpin future LNG developments in the province – conditional, of course, on LNG Canada making a positive FID by the end of November.

The new framework provided relief from the 10% provincial sales tax (PST) during construction, subject to repayment of the PST once operations had begun; ensured adherence by LNG Canada to BC's GHG emissions standards under the province's Clean Growth Incentive Program; assured LNG proponents that they would pay the same BC Hydro rate as other industrial users; and eliminated the LNG income tax proposed by the previous government.

"There was a certain squaring of interests during those discussions," Calitz told *NGW*. "But what I also want to convey, because sometimes the debate about this is incomplete, is that LNG Canada will pay federal corporate income tax, will pay provincial corporate income tax. LNG Canada will pay royalties, will pay carbon taxes, will make payments to the District of Kitimat, will make substantial payments to First Nations."

While LNG Canada won't divulge what those payments add up to on an annual basis,

it's fairly safe to say that they run into the hundreds of millions of dollars – and perhaps more.

In April 2018, a joint venture of Japan's JGC Corporation and Fluor Corporation, was selected as LNG Canada's engineering, procurement and construction (EPC) contractor – conditional, again, on a positive FID by the project's joint venture partners later that year.

MANNA FROM MALAYSIA

And the same month, in what was perceived by many at the time as the clearest signal yet that LNG Canada would, in the end, make a positive final investment decision, Malaysia's Petronas – which in 2017 had cancelled its own LNG export project at Prince Rupert – joined the LNG Canada family.

With 10% carved from each of Shell's and Kogas Canada's equity positions and 5% from PetroChina, Petronas became a 25% equity partner in LNG Canada, and the deal, Calitz told *NGW*, quite possibly saved the project. In late 2017, when discussions with Petronas started, world oil prices were heading down again, and the biggest barrier to FID was, quite simply, the affordability of the project.

"I can't say for certain what the outcome might have been, but the fact that they came in stabilized the transaction and stabilized the FID," he said. "Their entry in 2018 removed the main reason why the project was delayed in 2016, which was affordability."

But while affordability had improved, other issues remained, not least of which were lingering worries that proposed new tariffs on foreign-sourced steel used to build the frames of the massive liquefaction modules that would be shipped to Kitimat and bolted together to make a plant.

Dubbed the FISC (fabricated industrial steel components) tariff, the retaliatory duty of 45.8% was targeted at steel from China, Korea and Spain that the Canadian International Trade Tribunal had ruled in May 2017 was injuring the Canadian steel industry as a result of dumping and subsidization.

Although it first appeared as if the tariff could add 45.8% to the cost of a module, the fact that it would apply only to the frames of the modules – representing about 20% of the value of the modules – lessened the financial impact of the duty. But it didn't remove the risk, and until they had clarity on where their

own modules would come from, LNG developers were reluctant to move forward.

Canada's two active LNG developers at the time, LNG Canada and Woodfibre LNG, took different routes to an answer. LNG Canada sought a judicial review of the tariff, hoping it would be struck down by the courts, while Woodfibre sought a declaration that modules imported to Canada should not be subject to FISC since no fabrication yards in the country were in a position to make the modules and would not, as a result, be harmed by their importation.

Woodfibre LNG's application was rejected by the Canada Border Services Agency in late November, leaving the future of that project uncertain, but Calitz said that LNG Canada's selection of an EPC contractor gave it more clarity into the module fabrication process and allowed its joint venture partners to factor FISC into their FID deliberations.

"LNG Canada understands the modules better now that we have selected an EPC contractor and the likely source of where those modules will come from and the number of modules and the content of those modules in terms of fabricated industrial steel components," he told *NGW*.

As well, LNG Canada's joint venture partners have thoroughly examined the various tariff arrangements that might be applied to their modules, and have made a case in their own minds and to the courts about which smaller modules could be manufactured here and which larger ones could not, Calitz added.

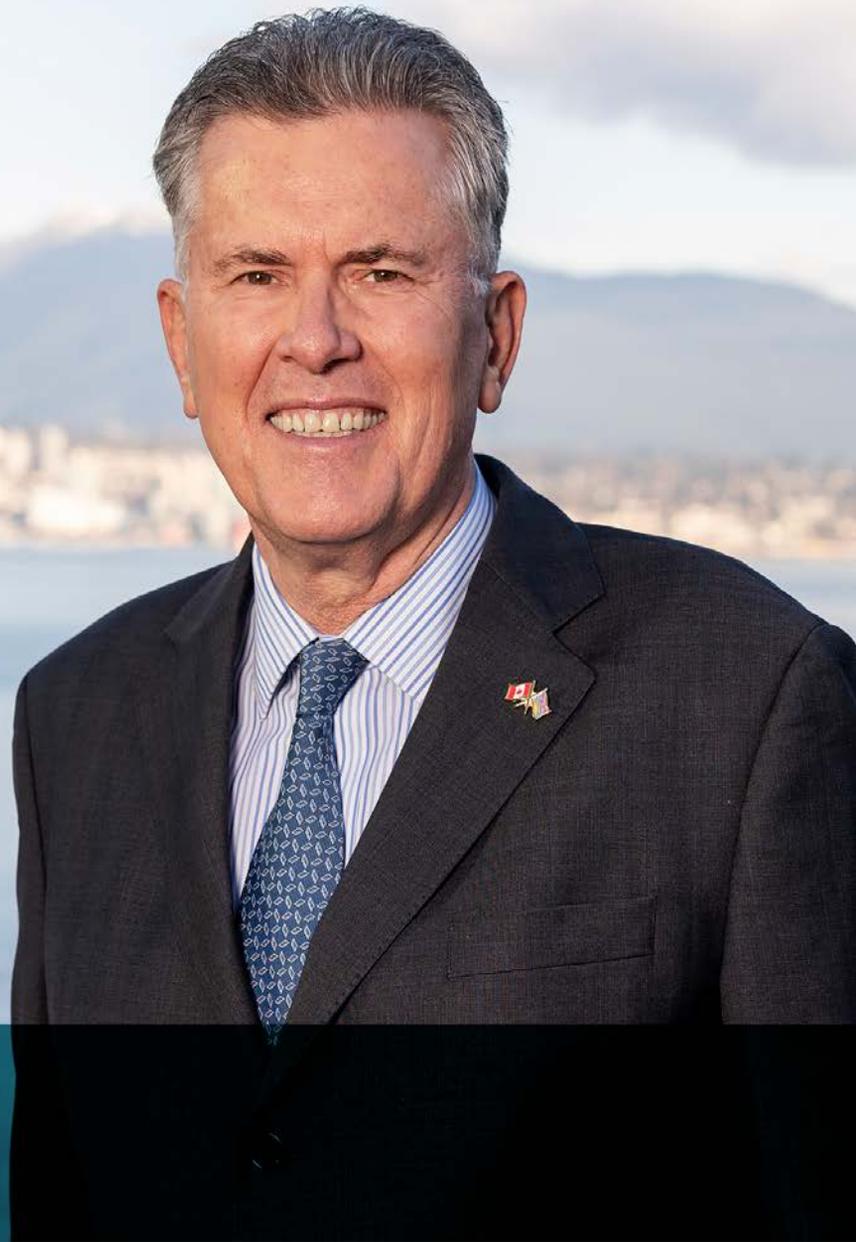
"We have taken a risked view of the likely outcome of the judicial review plus other trade remedies that we might have," Calitz said. "When we put all of those together, we said that we would go ahead with the FID."

And at a little after 9 pm Pacific Daylight Time on October 1, all five partners made that decision official. Calitz made the FID announcement the following morning in Vancouver, in front of Canadian prime minister Justin Trudeau, BC premier John Horgan, Kitimat mayor Phil Germuth and the Haisla Nation's Crystal Smith, who had learned of the decision at 11 pm the previous evening.

"I had posted the week before something to the effect of asking if this was going to be the week," Smith told *NGW*. "Is this going to be the week that our lives change forever? When it finally happened, when I finally found out, I was ecstatic...and then I cried for about two hours." ●

CEO OF HOPE

A year ago, he was the CEO of Hope; now, with LNG Canada moving into the construction phase, Andy Calitz is the CEO of Delivery



A favourite saying of Andries (Andy) Calitz is that it takes a village to make a megaproject – and he should know. In a career that has spanned nearly a quarter-century, Andy has lived in a dozen “villages” – from Cape Town on the southern tip of Africa to Sakhalin off Russia’s east coast; from London to Perth, Australia – and seen his share of megaprojects, including the Sakhalin-2 LNG project in Russia and the Gorgon LNG project in Australia.

Since 2013, however, he and Carina, his wife of 20 years, have been camped out in the exclusive neighbourhood of Whytecliff Park in West Vancouver, a set of steep stairs and

a four-km paddle from Bowen Island – a trip the two make nearly every weekend in their tandem kayak.

“I have been kayaking for some time,” Andy says. “I’ve kayaked down the Thames River in the UK, the Swan River, in Perth, Australia, and the Haida Gwaii”, a strait separating Graham Island from BC’s north coast, not all that far from Kitimat, site of his latest megaproject, LNG Canada’s 14mn metric tons/year liquefaction terminal.

The time on the water, he says, is a perfect escape from the stresses of leading the largest private sector investment in Canadian history, a project that will provide jobs for an estimated



20,000 people worldwide over the next five years and forever change the future prospects of the more than 15,000 First Nations members it will directly touch.

And doing it with Carina is an extra benefit – it gives them both a chance to reconnect on a personal level, and the couple have celebrated, every decade since they turned 40, with a major trip, usually with a large group of friends. The first was climbing Mt Kilimanjaro; the second, a tandem bike trip along the 3,000-km route of the Tour de France. The most recent was this past winter, when they left the relative balminess of Vancouver at Christmas for a two-week kayaking adventure in, of all places, Antarctica.

“For the trip to Antarctica – I occasionally wonder what we were thinking, considering the temperatures we will encounter – Carina and I have been training by paddling from our home in West Vancouver to Bowen Island and back every Sunday,” he said in an interview a few weeks before the trip. “Kayaking practice helps me get familiar with watching for ferry wakes – and how to avoid going into very cold water.”

SHARED EXPERIENCES

In a LinkedIn blog post published in September 2018, Andy reflects on these once-a-decade adventures, how they connect with his daily business life by teaching him how to relate to people, how to motivate them, how to instill in his team the same drive and purpose that has carried him from South Africa to India and Peru, from Russia to China, from Australia to Europe to Vancouver.

As importantly, however, they give he and Carina a shared experience, which work doesn’t often do. The rest of the blog, he turned over to Carina, who explained the lessons they have learned by being on the road – or the mountain, or the water – together.

“Climbing Kilimanjaro with our South African friends was something we could look forward to, and was the first of what has become an every-decade tradition,” she writes. “It also gave Andy and I some-

thing to do together, because when you are married to a man with a career that takes the family from South Africa where you were both born and met, to England where you know no one, to Moscow in post-Soviet transformation, back to England where you now know some people, to China in transformation, to remote Perth Australia, the Hague and Vancouver, having a shared experience becomes essential to staying connected.”

For the last 10 years, the couple has also taken annual biking tours with their friends – the South Island of New Zealand, along the fjords of Norway, across the Andes of Chile and Argentina, through the wine lands of South Australia and the rice paddies of the Mekong Delta, to name just a few.

Those tours, Andy writes in another blog post, may have taken he and Carina to six continents – North and South America, Europe, Africa, Australia and Asia – but they also allowed both to achieve multiple goals.

“Most importantly, they were an opportunity to regain some life/work balance, turn off work and concentrate on remaining physically active, healthy and spending quality time with my partner and friends,” he wrote. “As you’re cycling thousands of miles over a month-long period, you have time to reflect. In fact, a lot of time to reflect.”

A GLOBAL CAREER

Born in South Africa, Andy was educated in electrical engineering at the University of Stellenbosch, just outside Cape Town and in business at Harvard Business School, the University of South Africa and the University of Witwatersrand in his native country and at Insead, a global MBA institution with campuses in France, Abu Dhabi and Singapore.

He began his working career at Eskom, the South African electric utility, where he served in a number of managerial and executive roles between March 1995 and October 1996, when he left to join the only company he has known since – Royal Dutch Shell, the lead joint venture participant in the LNG Canada consortium and one of the largest LNG developers in the world.

His early postings at Shell, however, were to its power group in India and to the Camisea gas projects in Peru. He got his first real taste of the natural gas and LNG business when he was sent to Moscow in 1998 as Shell's gas marketing manager and then head of business development for central and eastern Europe and Russia. There he was actively involved in the Shell-Gazprom alliance as well as with major energy projects in Ukraine, Romania, Bulgaria, Russia, Uzbekistan, Turkmenistan and Poland.

A move to help Shell develop its strategic gas and power alliances with CNOOC and Sinopec sent Andy and Carina to Beijing, but he was soon on the move again, to Shell International Trading and Shipping Co, first as general manager, LNG shipping in 2000 and then to Russia's Sakhalin Island in 2002, where he was Shell's project director on Sakhalin-2, Russia's first LNG project.

In 2005, Andy was assigned to be Shell's project director at the Gorgon LNG project in Australia, where he worked with counterparts from Exxon-Mobil and Chevron to take that project – three trains, 15.6mn mt/yr of LNG capacity – to a final investment decision (FID) in 2009.

Although Gorgon's executive committee members – including Andy – based their FID on a projected cost of \$37bn, none of them could foresee how external events in the Australian construction industry would coalesce with site challenges associated with Gorgon's location on Western Australia's Barrow Island to send costs spiralling. Gorgon was eventually completed in 2016, but by then, the cost had reached \$54bn.

In an interview with *NGW*, Andy was characteristically frank about what befell Gorgon LNG after he departed.

"One does not take FID in anticipation of any schedule over-runs or budget over-runs by more than 5% or by more than a month," he said. "That was what we as the executive team believed at the time."

But that wasn't how the project unfolded, Andy recalled. "If I were to speak to what I thought happened, it related to execution difficulties probably being more complex on an island with very little infrastructure, no port, with a quarantine barrier around it and an underestimation of just what that logistical challenge meant for the project."

With Gorgon advancing to construction, Shell moved Andy yet again, this time to the relatively calm environs of its headquarters in The Hague, Netherlands, where he was vice president of new business development for Shell's upstream international division. In 2013 came his initial posting to LNG Canada, first as a vice president and then, in the spring of 2014, as the CEO of the operating company set up by the project's joint venture participants at the time – Shell, PetroChina, Japan's Mitsubishi and Korea Gas.

RIGHTING THE SHIP

At the time he took over as CEO, LNG Canada was struggling to gain traction with many of BC's First Nations, including the key Haisla Nation, on whose traditional territory the terminal would be built.

Ellis Ross, Haisla's chief councillor at the time, recalls that LNG Canada's original project leadership had little grasp of the issues surrounding aboriginal rights and title: they assumed that they could just buy land from Rio Tinto or Methanex and their project would be off and running.

"I had to teach them then that all of the land around Kitimat, the Rio Tinto land, the Methanex land, that was all our traditional territory, and it was all unceded territory," Ellis told *NGW*. "Without saying as much, they basically thought they didn't have to deal with us."

But then Andy entered the picture, and everything changed, Ellis says. "He said to me, 'we've seen what happened in the past with our project, we know we got off to a rough start, but I guarantee you, I promise you, we are going to do things different,'" he recalled. "LNG Canada changed gears pretty quickly, and we eventually signed one of the best deals the Haisla have ever seen."

Crystal Smith, who followed Ellis as Haisla Nation's chief councillor, has a much more personal view of Andy and Carina, less business, more caring, almost grandfatherly. And that compassion, she says, has infected his entire team at LNG Canada.

"Andy is great to be around and to hear him speak I always learn something," she says. "He has this caring attitude, and also from his wife Carina. I get this feeling from them that they are like my grandparents or something. But that is LNG Canada - that is their personality, and from the top down, that is the feeling that I get."

Making sure all the stakeholders have that same feeling is a key component of Andy's leadership style, and it's why his second favourite saying is "first, build relationships; then, build a megaproject."

"In BC, the quality of relationships developed with First Nations, munic-

“ANDY IS GREAT TO BE AROUND AND TO HEAR HIM SPEAK I ALWAYS LEARN SOMETHING. HE HAS THIS CARING ATTITUDE.”

— **Crystal Smith**, chief councillor, Haisla Nation



On their first “every decade” adventure, Andy (centre) and his wife Carina climbed Mt. Kilimanjaro with a large group of old friends.

PHOTO: ANDY CALITZ

ipal and provincial governments, and the community, will make or break a project,” he wrote in another blog post in October 2017, a year after LNG Canada’s joint venture participants had postponed a final investment decision and while many on the outside of BC’s embryonic LNG industry were worried the project might never happen.

But getting a megaproject to the finish line, Andy wrote, is not a sprint – it’s a marathon.

“It takes almost seven years to get to ‘Yes’ and another five to construct the facilities,” he wrote. “The 20,000 or so people who will touch (this) project between the start (and) the finish all need to share three beliefs: society will be better off when the project is done; it can and will be done; and their lives and careers will be made better by the experience.”

LIFE LESSONS

Andy has applied the same principles throughout his 24-year career, from South Africa to Russia to China to Australia to Europe to Canada, and in each of those stops, applying those principles has brought a unique set of rewards, he says.

A voracious reader, Andy turns to books to familiarise himself with every

new city, to learn about what has transpired in the past, to see how the past informs the present.

“Whenever I live and work in a new city, one of the first things I do, and continue to do while living there, is to learn about the history and culture of the place,” he says. “It helps me with my goal of becoming a citizen of the world, because when you live in as many places as we have, you feel as connected to the globe as you do to your country of origin.”

In Moscow, he learned of the scale of the Russian energy industry, of the struggle to keep the country with the largest number of cold cities on the planet warm through a long winter amidst fears that the heating system and the power may go out at any time – as they often do.

In Perth, he learned the value of a long, 35-km tandem cycling trip with Carina every morning. “This is how you nurture and build a relationship – heading in the same direction, pedalling equally hard, each with a different but mutually compatible role.”

In Vancouver, Andy and Carina have found a city of contrasts, of skiing in the morning and kayaking in the afternoon, of good European and Asian

and Canadian restaurants. He’s learned of the hospitality and friendliness of Canadians, and of their love for clean seas and clean air, and of the importance of making sure those you love are a part of your integration into a new country, and that you enjoy those new experiences together.

Andy fully expects to see the first two trains of LNG Canada through to commissioning some time in 2024. Beyond that, he has little clarity of what his future might hold – but he’s certain a retirement home isn’t part of that future.

“I am far from retirement,” he says. “My dream now is that LNG Canada will be built safely, on cost and schedule, and with the same stakeholder support we had during development. When I one day leave corporate life, I won’t retire, but give time to the environment. And then travel around the world, staying for a month each as a local in The Whitsundays, Bali, Montenegro, the Amalfi Coast, Helsinki, Reykjavik, Newfoundland, New York, Bermuda, Belize, Bogota, Santiago.”

In other words, pretty much what he’s done for the past 24 years – without the 18-hour days that come with leading a global undertaking. ●

FORGING A FUTURE



Nowhere are the benefits of LNG Canada's project more evident – and welcome – than among the 23 First Nations at the facility and along the pipeline route that have signed Agreements and are engaged with the development.

It's fairly safe to say that the 23 First Nations that will be directly impacted by the large-scale LNG Canada project in BC have much to gain from the successful completion of the Kitimat liquefaction facility and the 670-km Coastal GasLink pipeline that will feed it.

From Dawson Creek in BC's northeastern corner to the head of the Douglas Channel, First Nations see LNG Canada as a way forward to economic reconciliation and, through that, to cultural reconciliation. Long kept on the sidelines when resource developments were forced on to their traditional territories, BC's First Nations are now engaged stakeholders in what is the largest private sector industrial development in the 152-year history of Canada.

"What it means for us is a sense of independence," says Crystal Smith, chief councillor of Haisla Nation near Kitimat, on whose traditional territory the 14mn metric tons/year LNG Canada plant is being built.

Smith says she and the other 10 members of Haisla Nation Council have a vision of building a healthy, prosperous, powerful and independent nation, and of tying their cultural identity to that vision so that generations of Haisla to come can share in it. And LNG Canada, she told *NGW*, is making that possible.

"When we talk about what LNG Canada means to us it means being able to provide the opportunity for that vision to become reality," she says. "That means, from the context of what we have suffered, from residential schools, the Sixties scoop, the Indian Act, it is to be able to break out of that box and to be able to really focus, at a community needs level, on what it means to heal from that trauma."

OPEN WOUNDS

At the centre of the reconciliation process for the Haisla – and indeed for all of Canada's First Nations – is the residential school program. For more than a century, from the 1870s to the late 1990s, residential schools operated by various religious denominations removed aboriginal children from their homes and families and forced them into boarding schools.

As many as 150,000 aboriginal children suffered through the abuse and neglect of the residential school program, and it wasn't until 2006 that the churches, the Canadian government and various Indigenous organisations settled a class action lawsuit brought by residential school students.



“LNG CANADA HAS SET THE BAR FOR HOW INTERACTION NEEDS TO BE DONE, HOW GOOD BUSINESS IS DONE.”

— Crystal Smith, chief councillor, Haisla Nation

Disbursements to nearly 38,000 former students eventually reached nearly \$3.2bn, and in 2008, then-prime minister Stephen Harper stood in the House of Commons and formally apologized to all residential school students.

But that didn't end the suffering, Smith says.

“Those wounds have never been closed – some of our people just kind of put a blanket over [them] to literally ignore [them] – but it didn't heal anything,” she says. “And then they shelled out all this money and these apologies, and then it was gone...it was all gone, all the programming that we'd had was gone, but all the trauma and the wounds from that past history were still there.”

RICH HISTORY

The Haisla – the name means “dwellers downriver” – have occupied the lands around the Douglas Channel on BC's northern coast for more than 9,000 years, drawing on the waters of the Douglas and Devastation Channels, the Upper Prince Royal Channel and Gardner Canal, and the surrounding forests, for food, shelter and livelihood.

Combining two historic bands, the Kitimaat and the Kitlope, and eight matrilineal (descent is determined through the female line) clans, most Haisla carry on the traditions of hunting and gathering. Once numbering in the thousands, a flu pandemic in 1918 ripped through the Haisla, virtually wiping out two of the eight clans. Today, Haisla Nation counts about 1,800 members – not quite half live in Kitimaat Village, on the south shore of Douglas Channel, almost directly across from the LNG Canada site – while the others live in nearby Terrace, in Prince Rupert, further south in Vancouver or even farther afield.

Wherever they are, Smith says, they are still Haisla, but until the economic opportunities from LNG development began flowing in, Haisla Nation could do little for those of its members living “off reserve”.

“Many of the INAC (Indigenous and Northern Affairs Canada, which administers a federal support program) dol-

lars are restricted to the reserve, and with 800 of our 1,800 members living on the reserve, that is where the dollars go,” she says. “With LNG Canada's final investment decision (FID), it means that that box of restrictions is no longer an issue. You live in Vancouver, you live in Winnipeg, you are entitled to services just as much as my sister, who lives on the reserve.”

With the economic boost LNG has brought to the Haisla, the Nation can now fund an entire department dedicated solely to reviving and preserving the Haisla language and culture. That never would have been possible without LNG, Smith says, and it's a clear sign that First Nations, industry and government can work together to bring reconciliation.

“I've been asked a lot about what the consultation process for reconciliation looks like,” she told *NGW*. “When you combine what the First Nations' goals and objectives are along with industry and government and you have common goalposts and you work towards that, that is success, and that is what LNG Canada means to the Haisla.”

In the Haisla Nation, success looks like HaiSea Marine Service, a joint venture between Haisla Nation and marine services company Washington Marine, which operates along the BC coast as SeaSpan. HaiSea Marine will provide marine pilots and tugboat captains to help LNG tankers navigate the 140 km of the Douglas Channel between Kitimat and the open waters of the Hecate Strait.

And it looks like Triton-Haisla and Ledcor-Haisla, a pair of joint ventures with Triton Environmental Services and Ledcor Constructors, respectively. Those two JVs helped LNG Canada execute a fish management project that included safely removing fish from two tributaries of the Kitimat River that cut across the liquefaction terminal site, dewatering those tributaries and creating a temporary diversion channel for spawning salmon, and developing 300,000 m² of offsetting fish habitat in nearby Minette Bay.



Kitimaat Village, across the Douglas Channel from LNG Canada's site, is the traditional home of the Haisla Nation.

The re-routed tributaries will eventually be returned to their normal river courses, once construction is complete; the new saltwater fish habitat, however, will remain in place for decades to come.

Ledcor-Haisla is also carrying out site preparation for both the liquefaction terminal location and the adjoining Cedar Valley Lodge, the primary workforce accommodation centre for the LNG Canada project.

THE BIG PICTURE

But the LNG Canada project is not just helping Haisla Nation. From Dawson Creek to Kitimat, other First Nations are benefiting from the project, Dan George, chief of the Ts'il Kaz Koh First Nation near Burns Lake in northeastern BC and chair of BC's First Nations LNG Alliance (FNLNGA), said after LNG Canada CEO Andy Calitz announced the project's positive FID on October 2, 2018.

"Our northern nations have watched industry take resources from our lands for years and get nothing for it," he said. "We see the LNG Canada project as offering, over time, a way of helping First Nations tackle poverty, unemployment, and social issues, and as a way of building careers for our people and economies for our First Nations. The sooner the better, for all of us."

One of those northern nations George speaks of is the Gitxaala Nation, which numbers nearly 2,000 and occupies traditional territories from Nass River to Aristazabel Island on BC's north coast. The Gitxaala have a capacity benefits agreement with LNG Canada that has already brought benefits to the Nation, chief Clifford White said in a blog posted to the FNLNGA website in November 2018.

"The benefits include a lot of potential for partnerships, and for employment and training, of course, and education," he wrote. "Through our impact benefit agreement with LNG Canada we carved out some work, and then there was some procurement, they also purchased some goods and services from us. To that end, we are building businesses around that."

And the Gitxaala have also been able to address housing issues in their home village of Kitkatla on Dolphin Island, which has been continuously inhabited for 10,000 years.

"We just opened our first 46 units of affordable housing, and we're building another 60 units of affordable housing," White wrote. "So, again, it's looking outside the box. It's looking at what are our needs, our peoples' needs, and how can we bring that to fruition and make things happen."

Karen Ogen-Toews, CEO of the Alliance and a former chief of the Wet'suwet'en First Nation, termed the decision "huge news" for all BC First Nations, offering the chance for lifetime careers, steady and reliable sources of revenue and billions of dollars in tax revenue for all levels of government.

"It means jobs and training and education and it means opportunities for First Nations businesses and procurement and partnerships," she said. "Imagine what these can do for First Nations communities where unemployment now can be running at 50% and 60% and 70%."

Along the route of the Coastal GasLink pipeline, more than \$620mn worth of contracts – conditional on a positive FID – were awarded in July 2018, and another \$400mn can be expected as construction gets underway, CGL said in September 2018 as it announced community and project agreements with all of the elected indigenous bands along its route.

"When we first began this project over six years ago, our goal was to build more than just relationships with First Nations communities in BC – it was to build trusted partnerships – and that has made all the difference," CGL CEO Rick Gateman said. "We are grateful to these First Nations communities for this opportunity and appreciate the incredible support they have shown us over the years."

The contracting and employment opportunities and the long-term benefit programs set forth in the agreements were designed specifically for each community along the route, providing indigenous groups with job opportunities and sustainable sources of revenue over the life of the project. Support for the agreements comes from the elected leaders of the 20 First Nations along the CGL route, as well as from several traditional and hereditary leaders within those communities.

"[This] announcement is a testament to what we can accomplish when industry and First Nations work together," Gary Naziel, a councillor with Witsset First Nation, said at the time. "This project will provide jobs, contracts and financial benefits that Witsset First Nation can use to enhance programs and initiatives for our citizens, such as language and cultural programs."

SETTING A HIGH BAR

First Nations leaders are unanimous in their assessment of how the LNG Canada leadership team – and in particular

"I'VE MET HUNDREDS OF THESE CORPORATE GUYS, AND THEY ARE ALL PRETTY MUCH THE SAME, BUT ANDY STOOD OUT TO ME."

— **Ellis Ross**, MLA, Skeena

CEO Andy Calitz and Susannah Pierce, director of external relations – have approached engagement with them.

"When you compare some of the other proponents that are here to LNG Canada, it is like night and day," Smith says. "LNG Canada has set the bar for how interaction needs to be done, how good business is done. Other corporates in their industry, and other corporates in general, need to take a page out of their workbook."

Ellis Ross, who is now the Liberal MLA for Skeena, which takes in Kitimat, was Haisla's chief councillor when Calitz came on board in 2013. Prior to his arrival, Ross told *NGW*, relations with LNG Canada were a bit rocky, but Calitz changed all that.

The two first met at a Vancouver conference in 2013, where they participated together on a panel discussing BC's LNG opportunities.

"I've met hundreds of these corporate guys, and they are all pretty much the same, but Andy stood out to me," Ross recalled in an interview. "He said to me 'we've seen what happened in the past with our project, we know we got off to a rough start, but I guarantee to you, I promise you, we are going to do things different.' Nobody has really said that to me before, at least at that level. So we worked out a process, a bit of a protocol on how we would do this, and he delivered." ●

BOOMING AGAIN

With yet another major project on its horizon, the small industrial town of Kitimat, BC is facing another boom

PHOTO: DISTRICT OF KITIMAT

At the centre of LNG Canada's project – the single largest private sector investment in Canadian history – will be the coastal town of Kitimat, BC, located at the head of the Douglas Channel, some 294km (159 nautical miles) from Triple Island. Triple Island marks the start of the open ocean shipping lanes to Asia.

For Phil Germuth, mayor of the District of Kitimat, the final investment decision (FID) in October 2018 by LNG Canada's five joint venture participants was a long time coming – seven years since the site was selected in 2011, 10 years since JV partners Mitsubishi and Kogas first saw the potential for a west coast LNG terminal to move BC gas to Asian markets.

"This is arguably the most exciting time in history to be on council in Kitimat," Germuth told *NGW* in an interview following the FID announcement. "People are smiling, everybody is very positive. We are an industrial town and we know what industry brings."

Over the last couple of decades, Kitimat has seen its share of ups and downs: the closure of a major methanol production facility in 2005 threw 130 people out of work; five years later, a major pulp and paper mill was shuttered, with the loss of 535 jobs. On a positive note, a US\$4.8bn modernisation of Rio Tinto's aluminum smelter, the region's largest employer, brought a welcome boost to Kitimat's economy between 2012 and 2015.

When it was built in the 1950s, the aluminum smelter was regarded as the largest private sector investment in Canadian history. Now, modest Kitimat, population just over 8,000, will be home to yet another "biggest ever" project.

But LNG Canada marks more than another up cycle for Kitimat, Germuth said.

"LNG Canada is a game-changer for us," he said. "It gives us certainty and confidence that

we're going to have another major industrial partner here for another four to five decades. From the city's point of view, that certainty of tax revenue coming in means we can finally start planning. We need a new fire hall, the museum is starting to fall apart, one day it would be nice to have a city hall that's not in a shopping centre."

The tax benefit of the LNG Canada project, located on 400 hectares of land right next door to the Rio Tinto smelter, is about \$10mn annually to Kitimat, but the town won't realise that benefit immediately. To give the project partners certainty during the construction period, a graduated schedule covering the first 10 years of the project was negotiated – a tax revitalisation bylaw, Germuth calls it.

In the first year of construction, LNG Canada will pay \$1.62mn in municipal taxes; that doubles, to \$3.23mn in the second year, increases to \$4.85mn in the third year, to \$6.47mn in the fourth year and to \$8.08mn in the fifth year, when construction is expected to be complete. During operations – the final five years of the bylaw – the annual levy will be held at a constant \$9.7mn, and will be linked to BC's Consumer Price Index to account for inflation.

They could get an additional break, Germuth said, if ongoing negotiations with the federal and provincial governments result in Ottawa taking on replacement of the ageing Haisla Bridge over the Kitimat River – the only link between the residential side of Kitimat and the industrial side, where the liquefaction plant will be located. If the bridge replacement can be funded as a federal infrastructure project, Kitimat won't have to pay for it using its own tax revenues, some of which will be contributed by LNG Canada.

"For all those years after Eurocan and Methanex shut down we've been eating into our re-

serves just to maintain the level of service that people expect here,” Germuth said. “We were always thinking that LNG was going to happen – it was just a matter of when, not if – so now that it is finally happening, that’s a big relief.”

In the wake of the FID announcement, one of the first and most visible impacts of LNG Canada’s decision was on the local real estate market, Germuth said.

“House prices went nuts,” he said. “We had around 80 houses on the market one day; the next day there were 10. Out of town speculators were coming in and buying up blocks of houses site unseen. Even the realtors were shocked at the kind of drastic reaction we saw to the FID announcement.”

Infrastructure, he said, isn’t an issue. Kitimat was founded as an industrial town to support Rio Tinto’s smelter development back in the 1950s, and the town has lots of elbow room available to it.

“There is lots of extra land here – Kitimat was originally designed for up to 40,000 people – and the neat thing is that they knew decades and decades ago where future residential areas were going to go, which made it easier for us to plan our infrastructure.”

Shannon Dossantos, a realtor with the Re/Max Kitimat agency, backed up Germuth’s observations regarding the activity of speculators in the days after FID was announced.

“The activity after FID was mostly investors purchasing properties to keep as rental properties,” she told *NGW*. “The activity since then has definitely slowed but it should be interesting to see what spring brings.”

According to statistics released by the BC North Real Estate Board, Kitimat in 2018 saw a 148% increase in sales year-over-year, to 243 from 98 in 2017, and a 41% jump in active listings, to 110 from 78.

Those 243 property sales in 2018 were worth a total of \$74.3mn compared to \$20.6mn for the 98 sales in

2017, driving the average selling price of a single-family home to \$298,200 from \$222,602.

Included in the 243 property sales last year were 30 half-duplexes and 27 townhomes, and already that segment of the market is starting to heat up. JV Development Group, based in Vancouver, and Kerkhoff Construction of Chilliwack, BC are planning a multi-phased residential development on 27 acres called Riverbrook Estates, the initial phase of which will include 47 townhomes.

“We are just launching the project this week, starting with an event at the World Outlook Financial Conference in Vancouver,” JV Development Group principal Jason Pender told *NGW* in late January. “We have 25% already spoken for and anticipate we will be sold out in the next 60 days.”

Pre-selling on a second phase of townhomes – another 46 – will likely begin this summer, to be followed by the development or sale of 16 single-family lots. Phase 3 of the project would entail the marketing of 70 bare land strata lots, which would likely go to the market late this year once site servicing work is completed, Pender added.

With activity in the real estate market poised to continue to heat up, Germuth was quick to point out that LNG Canada is doing what it can to keep a lid on things. It purchased 49 units in the recently-completed Haisla Town Centre condominium project which will also see the construction of an 80-room hotel, 15,000 ft² of commercial space and a 5,000-ft² restaurant space on land owned by the Haisla First Nation in the centre of Kitimat.

“LNG Canada over the last six years has done a great job of working with community organizations trying to make sure things go as smoothly as possible,” he said. “Besides the Haisla Town Centre, which they’ve leased for 10 years to house their people, they’ve built something like 15 new houses in Strawberry Meadows and

“THIS IS ARGUABLY THE MOST EXCITING TIME IN HISTORY TO BE ON COUNCIL IN KITIMAT. PEOPLE ARE SMILING, EVERYBODY IS VERY POSITIVE.”

— Phil Germuth, mayor, District of Kitimat





Riverbrook Estates (top) is a new multi-phased residential neighbourhood in Kitimat being developed by JV Development Group of Vancouver. Haisla Town Centre is a new condominium project in downtown Kitimat.



they've got other houses and condos elsewhere. They've built a lot of stuff, and they did it all way before FID."

While LNG Canada is active in the local Kitimat real estate market to ensure its own employees have appropriate housing options, it's not interested in foisting its project's 4,500 or more construction workers on the community over the four or five years it will take to build the 14mn metric tons/year first phase of the LNG plant.

To that end, space has been set aside adjacent to the terminal site, where the 4,500-bed Cedar Valley Lodge will be built under the terms of a contract with a joint venture consisting of Alberta's Atco Structures LNG and Bird Construction of Ontario. Workers building that facility will be housed at a 2,200-bed camp in Kitimat – Sitka Lodge – operated by workforce housing developer Civeo.

Others are also taking advantage of what is expected to be ongoing demand for workforce housing, Germuth said, not only to deal with the influx of workers on the LNG Canada site but also with workers associated with construction of Coastal GasLink, the pipeline that will deliver feed gas from the Montney area of northeastern BC to the terminal site.

Horizon North Logistic's 1,000-bed Crossroads Lodge camp was expected to see its first 200 beds ready for occupancy earlier this year. Other developments planned for the 57-acre site include 14 acres of commercial space consisting of a combination of modularly-construction hotel, retail and office space and 27 acres that could be used to develop modular residential housing.

"As part of their development agreement, not only do they have to build the camp, but they also have to develop a hotel and commercial space, right on the side of the highway," Germuth said. "As soon as you come into Kitimat that hotel and commercial development is going to be the first thing that you see. They also have a number of acres for housing that they are going to be looking at doing."

With close to 8,000 camp beds in the region, Kitimat is bracing for a significant increase in its transient population as the LNG Canada project proceeds through construction. That increase, Germuth said, will undoubtedly stress the local infrastructure, most notably protective services, but here also the town is able to draw on past experience.

In preparation for Rio Tinto's smelter modernisation project in 2012, Kitimat increased the complement of the local RCMP detachment, and that increased complement of officers remains in place today.

"We kept it up knowing that this was potentially coming, and also with the realisation that if you want to hire more RCMP, it can take a year or more," Germuth said. "We didn't want to get caught not having enough."

The town's fire department – consisting of 18 full-time fire fighters, all of whom are also fully-accredited paramedics – is also working with LNG Canada to ensure adequate fire protection at the Cedar Valley Lodge.

And that, Germuth said, really speaks to the lengths to which LNG Canada and its joint venture partners are going to ensure the success of the project and the continued success of the town of Kitimat.

"They have been outstanding to work with," he said. "To see how much effort they put into not just getting their project ahead but also in helping the community be prepared is really second to none. Not only are we happy to have LNG, but the real icing on the cake is the quality of the proponent, because they really nailed it." ●

GREENING CANADA'S GAS FOR THE WORLD

LNG Canada will produce the least carbon-intensive LNG in the world

A key reason why the BC government, under the leadership of premier John Horgan and his coalition government partner, BC Green Party leader Andrew Weaver, supported the LNG Canada project was that it would produce the world's "greenest" LNG.

It's a brand Horgan and other stakeholders are eager to see extended to the global natural gas stage. It's a brand that begins to take shape in the Montney shale gas fields of northeastern BC. And it's a brand that will be perfected 670 pipeline kilometres away in Kitimat, BC, when LNG Canada's first two liquefaction trains are powered up.

The "greenest gas" label was important to LNG Canada CEO Andy Calitz in the years lead-



PHOTOS: SHELL CANADA

ing up to a positive final investment decision (FID) – it was, in fact, one of the three objectives he wanted to see realised (the other two were to build strong stakeholder support and be the first major LNG plant in BC and the first on North America’s west coast) before that decision was taken. “We wanted to design a plant that was absolutely exemplary and world class in terms of its CO₂ footprint, and we’ve done that in terms of CO₂ intensity,” he told *NGW* in an interview.

And it’s important to the BC government as well, especially to Dave Nikolejsin, the deputy minister who has carried the LNG file in the BC bureaucracy almost from the beginning and has been pushing the “BC Brand” around the world.

“The great thing about it is that we have brought it to market in a way that deals with the climate

change issue,” Nikolejsin said of the LNG Canada project when he spoke to a Canadian Society for Unconventional Resources (CSUR) forum in Calgary a month after Calitz announced the project’s positive FID. “We are developing, along with LNG Canada, this idea that really does work for the joint venture partners in LNG Canada, that it is important to be responsive to the concerns around the world about being leaders in the climate change space.”

When the first two trains of the LNG Canada complex are in operation, producing up to 14mn metric tons/year (mt/yr) of LNG from some 2.1bn ft³/day of Montney shale gas, CO₂ emissions will settle in at about 0.15 metric tons of CO₂ equivalent (mtCO₂e)/mt of LNG – just under the BC government’s target intensity of 0.16 mtCO₂e/mt of LNG.



Shell Canada’s Saturn gas processing plant.



Actuators at Shell Canada's Groundbirch production facilities are all-electric, improving the carbon footprint of natural gas produced for the LNG Canada project.

A good portion of the green label can be applied at the liquefaction terminal itself. Using green power from BC's mostly-hydro grid and highly-efficient gas turbines in the liquefaction trains brings the best of both worlds, LNG Canada's director of external affairs, Susannah Pierce, told the World Gas Conference in Washington, DC last summer.

The project could have gone all-electric, using electric drive at the plant, she said, but the lack of sufficient electricity capacity, transmission, and the cost of power meant the all-electric option was not feasible. An all-gas option, on the other hand, could have come at a substantially lower cost, but CO₂ emissions would have gone through the roof.

"Rather than choose one or the other, the leadership team eventually landed on a hybrid approach: gas turbines for the liquefaction trains and auxiliary power from BC Hydro renewable energy supplies," Pierce told her WGC audience. "The end result, while higher cost, helped to address public concerns over CO₂ emissions and meant the project would have among the lowest carbon intensity of any large-scale LNG export facility anywhere in the world."

And that carbon intensity is not just a little bit lower – it's significantly lower. Virtually every other major LNG project in the world comes in at more

than 0.2 mtCO₂e/mt of LNG, and some are more than double that intensity: Chevron's Gorgon LNG project in Australia, for example, has a carbon intensity of nearly 0.5 mtCO₂e/mt of LNG, while Conoco's Darwin LNG, also in Australia, is only slightly less than that.

While the carbon-intensity of the LNG Canada plant is admirable in itself, the real story behind the "green-ness" of BC LNG output starts in the Montney shale gas fields. LNG Canada's Joint venture partners – Royal Dutch Shell, Malaysia's Petronas, PetroChina, Mitsubishi and Korea Gas – are all responsible for delivering their own equity shares of natural gas for liquefaction. And virtually all of that gas will come from the Montney, where Shell and PetroChina are partnered in the Groundbirch project, Petronas has its North Montney Joint Venture and Mitsubishi is partnered with EnCana at Cutbank Ridge.

Montney shale gas comes out of the ground with a dramatically lower CO₂ content than other natural gas produced elsewhere in western Canada – about 1% CO₂ by volume compared, for example, to 12% CO₂ in the Horn River basin just to the north – and from the time it's produced, Montney gas destined for Kitimat will see that CO₂ intensity reduced even more.

Widespread electrification of the drilling, production and conditioning processes in Shell's Groundbirch operation, and similar initiatives at Cutbank Ridge and in the North Montney, are expected to reduce upstream CO₂ emissions by 60%.

At Groundbirch, Shell Canada has reduced its GHG emissions by about 25% over the last three years, and the centrepiece for those reductions is its new Saturn gas processing plant, which is powered entirely by electricity. Running on electric compressors reduces the plant's emissions by 90%, or about 150,000 mtCO₂e/yr.

That's a start, Shell Canada president and country chair Michael Crothers told NGW, but there is more Shell and other Montney

producers can do to ensure BC's LNG potential is met in the years to come.

"We have electrified most of our gas plants, but we have others that we have not done, so that's an opportunity," he said, noting that the Montney has the potential to support even more LNG development over the next several decades.

"But we need to be able to demonstrate to Canada and to Canadians that we can actually manage the emissions from that and make sure there is opportunity to continue to drive those down, as a sector."

In the field, Shell has replaced pneumatic actuators on its well pads, which used to run on natural gas, with electric actuators, which completely eliminates vented GHGs, including methane, explains Rej Tetrault, Shell Canada's general manager, foothills and Groundbirch.

"With our new Generation Four well pad (from which as many as 20 wells are drilled and fracked) design we've moved from a pneumatic system which used to use fuel gas to activate valves, to an electric system, where we're using electric power to activate valves on the multi-well pad," he says. "Now we have a pneumatic-free multi-well pad that leverages electricity, and uses less electricity than a blow dryer. We're very, very proud of that."

Even drilling the wells is cleaner: natural gas instead of diesel is used to power all Shell's rigs in the field, reducing GHG emissions from drilling by another 28%.

All of these factors go into the BC Brand for clean natural gas and green LNG, which Nikolejsin then sets out to sell to energy consuming nations around the world, but primarily in the target markets of Asia and southeast Asia.

"I am in the market a lot – in Japan and China mostly – and all else being equal, they are very interested in this story and our products, and it's not just LNG – it's NGLs, propane, ethane, methanol," he told his CSUR audience. "They would really like all that stuff from us, at a fair price, and then attach that brand to it."

And what he's selling, even if environmental opponents back in Canada don't recognise or appreciate it, much less buy it, is the possibility of dramatically lower global CO₂ emissions if BC LNG is used, say, to displace coal to generate power in China.

In Washington, LNG Canada's Pierce explained that Canada's own emissions-reduction efforts, both at the federal level and at the provincial level, don't look beyond Canada's borders for the benefits that come from producing the world's cleanest LNG. But increasingly, projects like LNG Canada's Kitimat terminal are

"I AM IN THE MARKET A LOT – IN JAPAN AND CHINA MOSTLY – AND ALL ELSE BEING EQUAL, THEY ARE VERY INTERESTED IN THIS STORY AND OUR PRODUCTS."

— **David Nikolejsin**, deputy minister, BC energy department

being looked at closely by the international community for their impacts on the global emissions front, and they are liking what they are seeing.

"In LNG Canada's case, our own wells-to-wires analysis found the net global reduction of GHGs using natural gas from the LNG Canada project alone would be equivalent to 60 to 90mn metric tons/yr, which is the equivalent of eliminating all of BC's annual emissions, or taking roughly 20 to 40 coal-fired power plants in China out of service," Pierce said.

Even the US – which is fully 42 kilometres ahead of Canada in the marathon to reach global LNG markets – acknowledges BC's green gas: a small-scale liquefaction project just across the BC border in Washington state has been approved by state regulators, but only if it sources natural gas from BC.

"They recognise, down there in Tacoma, that Canada has all the rules and regulations that make Canadian gas at least five times cleaner – perhaps as much as eight times cleaner – than any gas they could source domestically, from US producers," Nikolejsin said at the CSUR event.

"But the best validation I can give you is that this is the largest private sector investment ever in the history of Canada," he said. "Trust me when I say that we did a ton of work with the joint venture partners of LNG Canada, and anybody who thinks they didn't do their homework on this would be mistaken – five of the largest companies in the world have made a decision to spend \$40bn and make money doing it, and they have found that you can have that environmental story and still have an excellent investment opportunity." ●



GLOBAL EPC EXPERTS

A joint venture of Texas-based Fluor and Japan's JGC has been hired to lead construction of the LNG Canada liquefaction plant in Kitimat, bringing global expertise to Canada's biggest-ever private sector investment project.

Ahead of its October 2018 final investment decision (FID), perhaps the most eagerly-awaited bit of news from LNG Canada was its April 2018 announcement that Fluor and Japan's JGC Corporation had won the US\$14bn engineering, procurement and construction (EPC) contract for the project.

In the wake of LNG Canada's decision in the summer of 2016 to delay a final investment decision on its project, the joint venture participants went back to the market with a request for proposals to identify a preferred EPC contractor willing to build the first two trains – some 14mn metric tons/year of liquefaction capacity – on a lump sum basis.

“One pays a certain premium for a lump sum agreement because of the risk that the contractor - in this case JGC/Fluor - has to absorb, but it also brings them absolute clarity in terms of what they have to do,” LNG Canada CEO Andy Calitz told *NGW*. “The ownership team of LNG Canada has to resist the temptation to interfere on their side.”

What LNG Canada's ownership team can do, he said, is “help JGC/Fluor be successful” through as much site preparation work as possible. Berms and diversion channels have been built to direct tributaries of the Kitimat River away from the project site, workforce accommodation has been contracted in Kitimat, and the main camp site for the 4,500-bed Cedar Valley Lodge has been

prepared, and rail, road and deep-water port facilities are already in place.

“All of that de-risks the project and gives options to make sure that execution has a fighting chance of coming in at the contract price,” Calitz said.

The JGC/Fluor Joint Venture (JFJV) emerged from a year-long search that first identified four EPC consortia based on several criteria, including prior experience in LNG design and modularization, track record of project completion, and experience with construction in western Canada. Two of those four – including JFJV – were shortlisted by LNG Canada in February 2018.

JGC/Fluor was chosen, in part, based on the partners' significant experience in Canada and extensive LNG and mega-project experience worldwide. Fluor has 70 years of Canadian project experience – more than 7,500 construction workers were employed on Fluor-managed Canadian projects in 2017 – while JGC has constructed more than 48 LNG trains globally.

LNG Canada's project certainly fits in that global wheel-house.

GE TURBINES HELP LNG CANADA MEET EMISSIONS TARGETS

“What lies ahead is a truly global project,” Calitz told an Energy Roundtable audience in Calgary shortly after FID was announced. “We will do engineering and procurement in Japan, Canada and other countries around the world; we will construct the plant in Kitimat; Cargill will do engineering and procurement in Vancouver; in Houston we will do marine loading and procurement.”

Some site-preparation work has been underway at Kitimat since early November 2018, when JFJV first mobilised to the site, taking over two of the four construction areas. “With this move, on-site activities are scheduled to ramp up with the geotechnical and site survey teams and clearing the way for a team from Haisla Triton Limited Partnership to proceed with environmental monitoring and fish salvage operations,” JFJV said in a November 19, 2018 blog post on its project website.

Site clearing work by a joint venture of Haisla Nation and Brinkman Forest began in December 2018 and continued into January this year.

Despite the on-site activity, most of the pre-construction activity earlier this year was taking place at Fluor and JGC offices in North America and Japan, focusing on design and procurement work, JFJV project director Phil Clark told *NGW*. Most engineers in the early phase of pre-construction will be located at Fluor’s offices in Calgary and Vancouver, but some will also be located at JGC’s headquarters in Japan and at other locations around the world, primarily in Asia.

Design and fabrication will ramp up over the next 18-24 months, and as design work is completed, more and more activity will transition to the work site.

“We expect peak activity at site to occur around mid-2021 to 2023, with the bulk of construction hiring taking place in mid-to-late 2020 and 2021,” Clark said.

With a commitment to develop the “greenest” LNG project in the world, LNG Canada turned to GE Oil & Gas (now part of Baker Hughes) for high-efficiency gas turbine and compressor technology to power its liquefaction processes.

Both trains at the 14mn mt/yr plant will use GE’s LMS100-PB dry low emission (DLE) aeroderivative gas turbines and vertically and horizontally split centrifugal compressor technologies.

“With its aviation heritage and the introduction of intercooling technology, the LMS100 offers the highest simple-cycle efficiency of any industrial gas turbine,” GE says. “Rated at 105 MW and 45% percent efficiency at ISO conditions, the LMS100-PB provides clear advantages in total cost of ownership.”

The aerodynamically coupled free power turbine provides speed, flexibility and high torque for typical LNG compressor loads, especially during start sequencing with pressurized conditions in the refrigeration loop, avoiding the need for starter/helper motors.

“The decision to power our facility with highly efficient natural gas turbines and compressors in combination with renewable electricity reflects our commitment to listen to and act on feedback from our stakeholders, when possible,” LNG Canada CEO Andy Calitz said.

At peak construction, he said, more than 4,500 workers will be on-site in Kitimat, including craft workers, support workers and management. But because of the shiftwork nature of the employment, JFJV will need between 7,000 and 7,500 workers to fill those positions.

“More than 20,000 people will touch this project by the time construction is completed,” Calitz told his Calgary audience. “In 2021, the third year of construction, the largest fabricated steel structures, at 10,000 tonnes, ever to arrive in Canada will arrive in Kitimat, where there will be roughly 4,500 workers on site.”

Both JFJV and its various subcontractors will be hiring for the project, tapping first into the local labour market, then into the wider provincial and national pools. Clark doesn’t anticipate the need to look outside Canada for any of the trades that will be needed for the project.

“We are focused on building this project in a way that brings lasting benefits to the local community and to BC,” he said. “Positions will be available for apprentices and there is a focus on developing positions for traditionally underrepresented individuals and groups.”

And like LNG Canada, JFJV is committed to providing contracting and procurement opportunities for First Nations and local businesses, Clark added. “We post upcoming opportunities on our website and a number of local businesses have already been awarded contracts for site preparation and environmental monitoring.”

Backed by five of the world’s biggest natural gas and LNG players, the LNG Canada project will be world-class in every sense of the word, Clark said, with best practices being deployed in safety, construction planning, environmental protection and community focus.

LNG CANADA TO USE PROVEN DMR LIQUEFACTION TECHNOLOGY

Shell-led LNG Canada will use a proven double mixed refrigerant (DMR) liquefaction technology developed by the Anglo-Dutch major and used for the first time at the Sakhalin-2 LNG project in Russia.

“We have sought to not have any technological firsts in this project,” LNG Canada CEO Andy Calitz told *NGW*. “We will use existing liquefaction technology; we will not try to have a port with super-large ships; we will not try new tank technologies, all as part of making sure that we don’t get caught by technological slip-ups.”

The DMR process uses two mixed refrigerant cycles: a heavier mix in the pre-cooling cycle and a lighter mix in the main liquefaction cycle.

According to a technical paper published by Shell Global Solutions International, the process was developed to cope with – and even exploit – the varying ambient temperatures at Sakhalin. The same temperature differentials between winter and summer are a feature of LNG Canada’s Kitimat location, on BC’s northern coast.

“The swing from $-25\text{ }^{\circ}\text{C}$ to $+25\text{ }^{\circ}\text{C}$ between the winter and summer months required a liquefaction technology that could be seasonally optimised and adjusted,” the paper explains. “Increasing the proportion of propane creates a heavier refrigerant mix for the first cycle in the summer months, which cools gas to $-40\text{ }^{\circ}\text{C}$, while adding ethane yields a lighter mix for winter, cooling gas to $-65\text{ }^{\circ}\text{C}$.”

Traditional C3-MR liquefaction uses pure propane in the pre-cooling cycle and a mixed refrigerant – typically nitrogen, methane, ethane, ethylene and propane – in the main cooling cycle. But that process can’t be adjusted to account for varying ambient temperatures, the Shell paper says, and is best suited to large-scale plants in equatorial locations where ambient temperatures do not vary.

Shell has found that the DMR process used at Sakhalin-2 uses 6% less energy than a C3-MR plant in the Middle East and 9% less than a C3-MR plant in the Far East.

“The DMR process hence reduces the amount of natural gas used to run gas turbines by taking advantage of low ambient temperatures for cooling, and the ‘saved’ gas can be processed into more LNG,” the paper notes.

At the same time, waste heat generated by the liquefaction process is used as a heat source in the gas-treating unit, minimising CO_2 emissions and improving energy efficiency.

SAFETY FIRST

“Safety is the heart of everything we do – we believe we are safer together and the project aspires to be the safest project on earth,” he said. “We are focusing not just on compliance with safety regulations and personal protective equipment, but on actively caring for and empowering our workers onsite.”

At the work site, safety training is paramount, with a program that focuses on awareness – knowing how to spot hazards and unsafe behaviours – communication and teamwork.

“Workers are encouraged to identify and report any potential hazards and we have regular inspections and audits to ensure we are working safely,” Clark said.

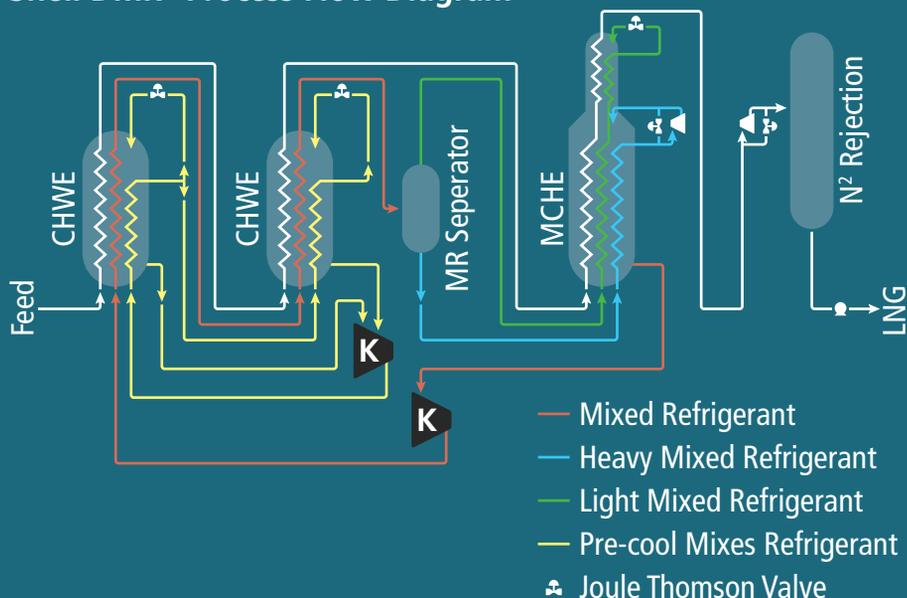
“These processes are combined with data analysis and behavior-based observation programs to ensure we are proactively mitigating risks.”

Project leadership, Clark said, is deeply involved with onsite safety, engaging with works regularly on daily site walks. That focus on safety, Calitz told his Calgary audience, is one of the priorities of the LNG Canada joint venture participants.

“What lies ahead is building the safest project on earth,” he said in Calgary. “Over the life of construction there will be 120mn person-hours of worker exposure. Safety is a real value and we have the aspiration of being the safest project and we will work very hard to send every man and woman home safely every night.”

And the attention to safety extends beyond the work site, Clark said, with the provision of medical services and support, mental health awareness and support, fitness and recreation facilities and personal health checks.

Shell DMR® Process Flow Diagram



A GLOBAL PROJECT

With its global connections, JFJV has access to fabrication yards globally, Clark said, and will use those to put together the modules – some as large as close to 10,000 metric tons – that will then be shipped to Kitimat. Module delivery will be timed to fit within JFJV’s advanced work packaging system, a rigorous construction planning process that allows better management of workflow at the construction site.

“During the design phase, we are generating the materials, equipment and tools needed for work to take place at site in small packages,” Clark added. “This creates a smooth construction path for our craft teams and improves the amount of time craft can spend on their tools, versus waiting for materials or plans.”

Environmental protection is as important as employee protection for LNG Canada’s joint venture participants, and the company has worked closely with Haisla Nation and other First Nations to plan work activities

that will minimise potential impacts to the environment.

“The design of the facility also meets some of the strictest regulatory standards in the world for safety, sustainability and environmental protection,” Clark said. “We have a strict compliance management system in place, with comprehensive environmental management and work plans and multiple check points.”

A “world-class” environmental team comprised of environmental specialists, fish, amphibian and avian biologists, wildlife monitors and a third-party environmental monitor is in place to ensure compliance with permits and all applicable laws. And the same environmental considerations will be integrated into all construction activities on a daily basis, Clark added.

Finally, JFJV is taking steps to ensure that Kitimat itself isn’t overwhelmed by what is the biggest private sector project ever undertaken in Canada. On-site workforce housing – Cedar Valley Lodge – will mitigate the project’s impact on local housing availability and prices, while material, not just the prefabricated

modules, will be shipped to the site by water to limit heavy construction traffic through Kitimat.

“We are providing regular updates to community members via our website and ensuring that local businesses and residents are involved in the project,” Clark said. “We are also providing training and workforce development opportunities for local residents.”

One of those who has won employment with the LNG Canada project is Crystal A. Smith, a member of Haisla Nation – and not to be confused with Haisla chief councillor Crystal Smith. Crystal A. Smith was hired in January to be a community representative for LNG Canada, working at the LNG Canada/JFJV community information centre in Kitimat.

“I want to help, not only our Haisla community, but surrounding communities too, so they have a bigger and brighter future,” she says. “The more information and correct knowledge everyone has about this project, the more successful we will all be.” ●



“WE EXPECT PEAK ACTIVITY AT SITE TO OCCUR AROUND MID-2021 TO 2023, WITH THE BULK OF CONSTRUCTION HIRING TAKING PLACE IN MID-TO-LATE 2020 AND 2021.”

— Phil Clark, project director, JFJV

STRENGTHENING THE PORTFOLIO



LNG Canada's five partners will use output from the BC project to make their domestic supply and global trading portfolios more robust.

LNG Canada's five joint venture participants will use their respective shares of output from the 14mn mt/yr first phase of the project to diversify their LNG portfolios, on both the domestic supply needs side and the portfolio trading sides of the equation.

LNG Canada is a joint venture comprising mainly state-owned companies with strategic domestic gas supply needs – Korea Gas (5%), PetroChina (15%) and Malaysian Petronas (25%) – and two portfolio traders, Anglo-Dutch Shell (40%) and Japanese Mitsubishi (15%).

Mitsubishi has already signed two offtake agreements, marking the first ever major sale of Canadian gas in Asia, apart from some ISO container exports to China in 2018.

Petronas was already deeply involved in another Canadian LNG project which never got to final investment decision, so for it, LNG Canada was a natural fit.

Co-operation between Shell and Petronas in gas projects is long-standing. Both were involved in the Bintulu gas-to-liquids plant completed in 1993 and the MLNG Tiga liquefaction plant completed in 2003.

Japan's Mitsubishi, trading as Diamond Gas International, will take 2.1mn mt/yr of LNG from the project, and Tokyo Gas will in turn buy 0.6mn mt/yr for 13 years from 2026 and Toho Gas will take 0.3mn mt/yr, leaving Mitsubishi with 1.2mn mt/yr for trading.

Kogas has a small stake and yet is one of the biggest importers of LNG. The government is keen to raise the share of gas in its energy mix and has revised the tax regime to penalise coal instead of gas. This raises questions about the likely involvement of Kogas in other Canadian west coast projects.

Petronas is among the biggest LNG suppliers globally. According to its website, its LNG sales portfolio



“WE TAKE FINAL INVESTMENT DECISIONS WHEN THEY ARE OPTIMAL, AND SIGN LONG-TERM CONTRACTS WHEN THAT IS OPTIMAL”

— **Maarten Wetselaar**, Integrated Gas & New Energies Director, Royal Dutch Shell

at present stands at 34mn mt/yr. Petronas has stakes in four other liquefaction projects: Petronas LNG complex, Petronas floating LNG (FLNG Satu), Egyptian LNG and Gladstone LNG in Australia. Petronas is building its second floating LNG facility.

It has regasification facilities in Melaka and Johore in Malaysia and in Milford Haven, the UK port that is also home to the South Hook LNG terminal. In fact, the Dragon LNG terminal used to be part-owned with BG, which is now Shell. However, given the shipping distances, LNG from Canada is unlikely to wind up there.

Petronas' global gas resources stand at 130 trillion ft³ and it is looking abroad to boost reserves. It is covering its bases by moving gas production overseas, including developing assets in Australia and Canada, through Canadian subsidiary Petronas Canada (formerly Progress Energy) to ensure a broad mix of suppliers.

Together with various joint venture partners, Petronas Canada hold more than 60 trillion ft³ of reserves and contingent resources in the North Montney basin.

“We were blessed with a lot of gas, and we started producing LNG in 1983,” said Petronas upstream head Anuar Taib at the World Gas Conference in June 2018: “But oil and gas are finite and if we want to maintain our leadership, we have to go overseas.”

His talk also covered energy poverty: he grew up in a household where, when he was four or five, cooking was done using wood and coconut shells and lighting came from a kerosene lamp. But there are still hundreds of millions of people in Asia living like that,

he said, he said, explaining his motivation for developing the country's gas supply portfolio.

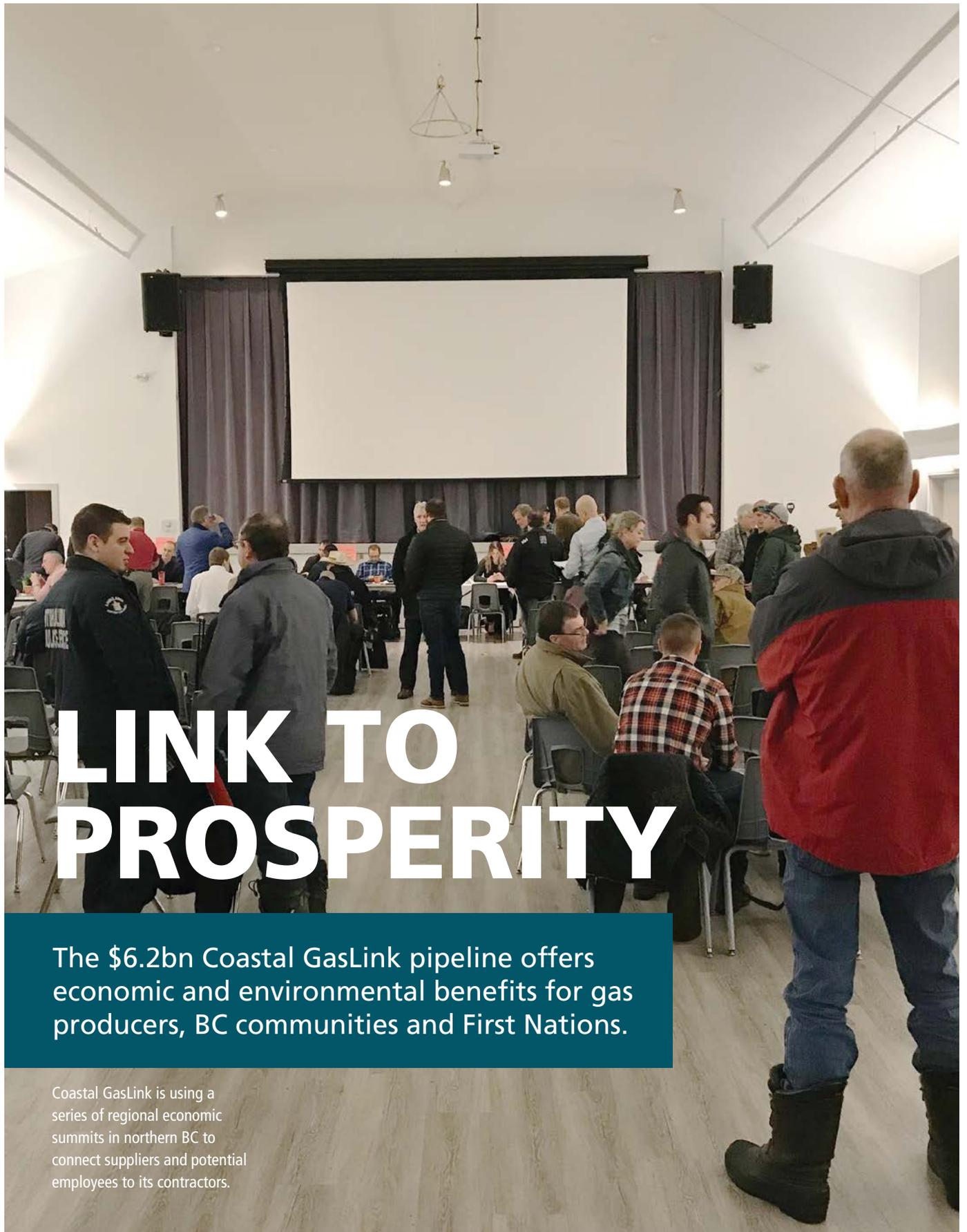
In a comment to *NGW*, Shell said it believed that it has an “unmatched global portfolio and (is) well positioned with options in all basins to grow the supply of LNG that is needed. LNG Canada adds a differentiated point of supply in this portfolio with its very close proximity to north Asian demand – and is therefore highly complementary.”

Shell's offtake volumes from the project will be managed as part of its global LNG portfolio, and will add significant trading optionality. With much of the LNG demand growth coming out of Asia over the coming decade, LNG Canada is well placed to satisfy that demand, it said.

Launching the third Shell annual LNG outlook on February 25, Maarten Wetselaar said that the company did not like to tie FIDs to long-term contracts, as the buyers could then use that pressure to take FID to negotiate prices downwards. “We take final investment decisions when they are optimal, and sign long-term contracts when that is optimal,” he said.

Once the contracts are signed however, partners will be able to take them to banks for refinancing the project.

PetroChina said that its stake in the LNG Canada project boosted its presence overseas and its revenues from unconventional Canadian gas resources. It also spoke of the “deepening strong co-operation between the two countries.” ●



LINK TO PROSPERITY

The \$6.2bn Coastal GasLink pipeline offers economic and environmental benefits for gas producers, BC communities and First Nations.

Coastal GasLink is using a series of regional economic summits in northern BC to connect suppliers and potential employees to its contractors.

IMAGE: COASTAL GASLINK

Canadian pipeline giant TransCanada – which will soon be known as TC Energy – has been developing its 670-km Coastal GasLink (CGL) pipeline since 2012, nearly as long as Anglo-Dutch major Shell and its joint venture participants have been developing the 14mn mt/yr LNG Canada export terminal that will receive the gas.

Extending from the prolific Montney shale gas basin in northeastern BC to Kitimat, on the province's northern coast, CGL will cross two mountain ranges and push through the traditional territories of 20 First Nations. Initial capacity, with one compressor station, will be 2.1bn ft³/day; adding up to seven more compressor stations will increase capacity to about 5bn ft³/day – enough to supply an additional two liquefaction trains, should the LNG Canada joint venture participants take a positive final investment decision on that 14mn mt/yr expansion option.

“The proposed project will, over 30 years, contribute billions of dollars in construction-related expenditures, labour income and employment, and taxes to the municipal, provincial and federal governments, which will benefit all Canadians,” TransCanada said in its initial project application to BC provincial regulators in 2014.

Beyond construction spending of C\$6.2bn (US\$4.7bn), CGL is expected to boost Canada's gross domestic product (GDP) by some \$4.3bn over that 30-year period, with 50% of that increase anticipated in BC. Some 37,201 person-years of employment will be generated during the four-year construction period, yielding \$1.4bn in labour income in BC, \$700mn of federal and provincial tax revenues, \$20.9mn in annual property tax revenues and another \$625mn in other municipal revenues over the life of the pipeline.

But those benefits, and others, won't come at the expense of the environment, CGL president David Pfeiffer – named to the post when CGL entered the construction phase earlier in 2019 – told *NGW* in an interview.

“We have made significant efforts the past six years to create a pipeline project that balances economic development with environmental protection and sustainability,” he said. “We have committed thousands of hours to engaging with and listening to local communities and First Nations on this project and have developed mitigation plans using that input to avoid or reduce the potential environmental, social,

“WE HAVE MADE SIGNIFICANT EFFORTS THE PAST SIX YEARS TO CREATE A PIPELINE PROJECT THAT BALANCES ECONOMIC DEVELOPMENT WITH ENVIRONMENTAL PROTECTION AND SUSTAINABILITY.”

— David Pfeiffer, president, Coastal GasLink

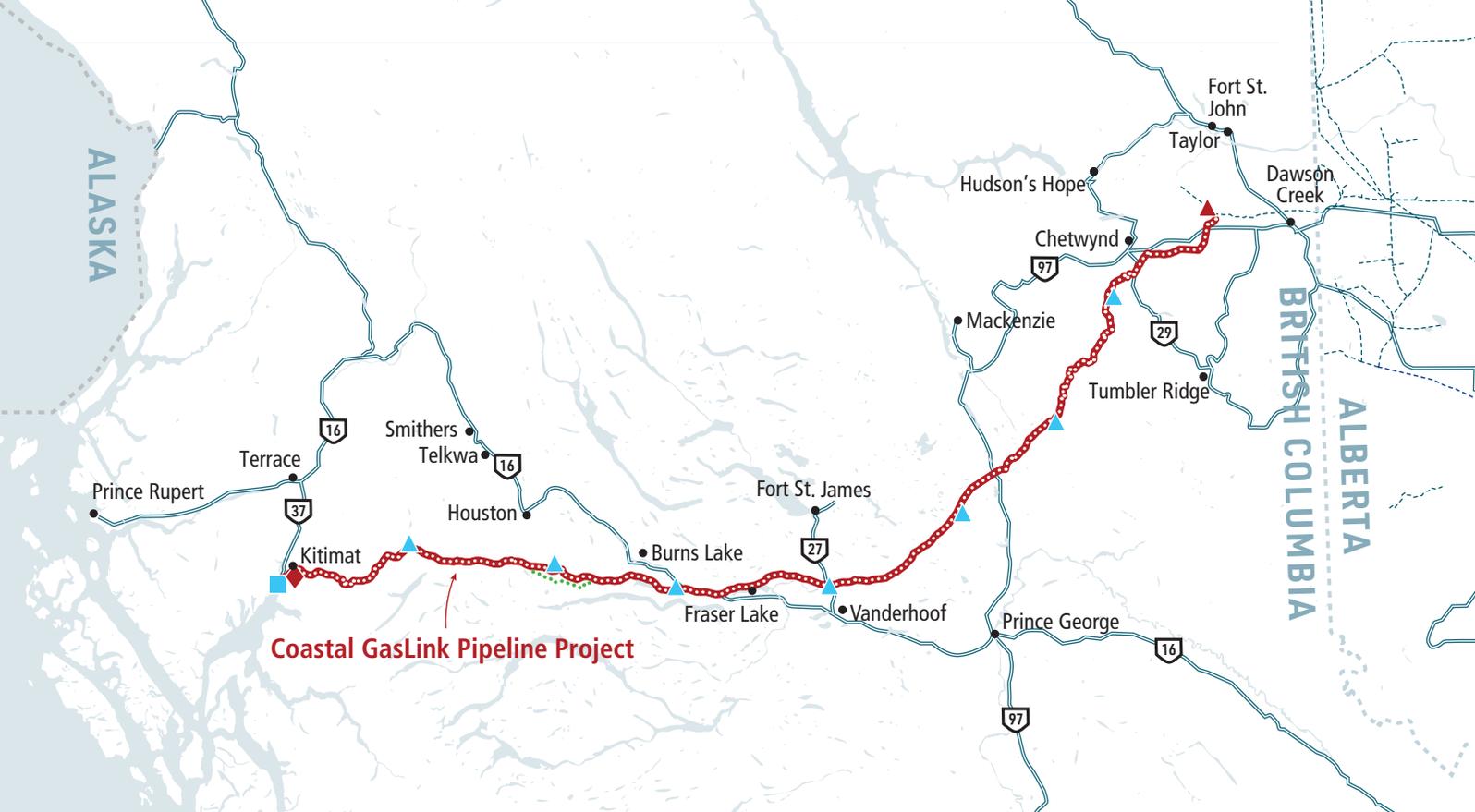
economic, heritage and health effects assessed for this project.”

Those efforts, Pfeiffer said, include:

- Participation in government-led programs to manage key wildlife populations of concern to BC, including southern mountain caribou and grizzly bear.
- A socio-economic effects management plan to monitor direct effects of the project on community infrastructure, labour, employment and contracting opportunities.
- Continued engagement with indigenous groups and local governments along the pipeline route to share information about the construction schedule and collect ongoing feedback about the project.

IN THE BEGINNING

In 2012, TransCanada won the right to design, build, own and operate CGL and immediately began an engagement process with stakeholders, followed by environmental and engineering studies along the



Coastal GasLink Pipeline Project

- ⋯ Coastal GasLink Pipeline Project Certified Corridor
- ⋯ Potential South of Houston Alternate Route (SHAR)
- ◆ Proposed Coastal GasLink Metering Facility
- ▲ Proposed Coastal GasLink Compression and Metering Facility
- ▲ Potential Future Coastal GasLink Compression Facilities (TBD)
- LNG Canada Facility
- TransCanada's NOVA Gas Transmission Ltd. (NGTL Existing System)

proposed route. Over the next few years, the CGL team would log more than 15,000 interactions and engagements with aboriginal communities and more than 350,000 hours of environmental and engineering fieldwork, more than a third of which was carried out by aboriginal people.

"Coastal GasLink will add value to British Columbians, particularly aboriginals and communities along the conceptual route, by creating real jobs, making direct investments in communities during construction and providing economic value for years to come," TransCanada CEO Russ Girling said in June 2012. "We know the value and benefits that strong relationships in BC can bring to this project and we look forward to deepening those ties as our

extensive pipeline network grows to meet market and customer needs."

Formal applications – for an environmental assessment to the BC Environmental Assessment Office (EAO) that comprised 7,200 pages and for a project design approval to the BC Oil and Gas Commission (OGC) – were filed in early 2014, and in October that year, a conditional environmental assessment certificate was awarded by the EAO, followed soon after by the required permits from the OGC.

By early 2018, CGL had received all provincial approvals for the project, including the so-called South of Houston Alternate Route (SHAR), designed in the wake of consultations with the Wet'suwet'en First Nation to avoid areas of cultural importance to the Wet'suwet'en.

And over that summer and fall, announcements continued to cascade from CGL offices: conditional workforce accommodation contracts were signed with Houston-based Civeo and Calgary-based Black Diamond Group; conditional pipeline construction contracts were signed with joint ventures Macro-Spiecapag, Surerus-Murphy and SA Energy Group and with Pacific Atlantic Pipeline Construction, with each group responsible for two spreads along the 670-km CGL route.

In July, CGL said it had awarded conditional contracts worth \$620mn to northern BC indigenous businesses for right-of-way clearing, medical, security and camp management requirements, and promised another \$400mn of additional contracting and employment opportunities would be available to indigenous and local BC communities during construction.

“Coastal GasLink represents a once-in-a-generation economic development opportunity for Nadleh Whut’en First Nation,” Nadleh Whut’en chief Larry Nooski said in June 2018. “We negotiated hard with CGL to guarantee that Nadleh people, including youth, have the opportunity to benefit directly and indirectly from the project, while at the same time, ensuring that the land and the water is protected through adherence to our Yinka Dene Uza’hne guide to surface water quality standards. We are proud of this day and what it means for the future.”

In September, CGL announced it had signed community and project agreements with the elected leadership of all 20 First Nations along its route, signaling the “strong indigenous support” for the project.

“When we first began this project over six years ago, our goal was to build more than just relationships with First Nations communities in BC; it was to build trusted partnerships, and that has made all the difference,” Rick Gateman, CGL’s president at the time, said in a statement. “We are grateful to these First Nations communities for this opportunity and appreciate the incredible support they have shown us over the years.”

The contracting and employment opportunities along with the long-term benefit programs set forth in the agreements were designed specifically for each community along the route, providing indigenous groups with job opportunities and sustainable sources of revenue over the life of the project, CGL said. Along with the supported of elected First Nations leaders, many traditional and hereditary leaders also offered their support.

“Today’s announcement is a testament to what we can accomplish when industry and First Nations work together,” said Gary Naziel, councillor for the Witsset First Nation. “This project will provide jobs, contracts and financial benefits that Witsset First Nation can use to enhance programs and initiatives for our citizens, such as language and cultural programs.”

On October 2, 2018, the LNG Canada joint venture participants announced a positive final investment decision for their project; the same day, TransCanada announced a similar commitment for the CGL project.

“Today’s announcement signifies an important step forward for Coastal GasLink as well as for the province of BC and the country,” TransCanada’s Girling said. “The magnitude of the work undertaken over the past six years has been extensive. It demonstrates the commitment of our teams, our partners, BC communities and indigenous groups to work together toward a single goal of fostering an LNG industry off Canada’s west coast that will help maximize the value

of our important natural gas resources in a sustainable and responsible way.”

Construction of the pipeline is underpinned by 25-year transportation service agreements with all five LNG Canada joint venture participants – Royal Dutch Shell, Malaysia’s Petronas, PetroChina, Japan’s Mitsubishi and Korea Gas – who will be the exclusive users of the pipeline’s initial 2.1bn ft³/day of capacity.

GETTING TO IT

With positive FIDs from both LNG Canada and TransCanada, site preparation work began along the CGL route in early 2019, largely focused on clearing space for as many as 14 workforce accommodation camps. Many of these contracts are being executed by more than a dozen First Nations and their service partners, Pfeiffer told NGW.

And in early January, the Macro-Spiecapag joint venture became the first CGL construction contractor to start work awarded road access contracts in along the western-most section of the pipeline route to joint ventures involving the Haisla, Kitselas and Witsset First Nations.

At the same time, CGL implemented a series of regional economic summits throughout northern BC to familiarise local contractors with upcoming opportunities associated with the project. By late February, those summits had facilitated more than 3,000 one-on-one meetings between CGL’s contractors and interested suppliers and job-seekers, he said.

“We’re extremely pleased with the success of our economic summits and have had nothing but positive feedback from both job-seekers, local businesses and contractors,” Pfeiffer said. “These summits are intended to connect people, businesses and services with potential opportunities and they have been enormously successful in doing that.”

BUMPS IN THE ROAD

CGL’s path forward, however, hasn’t been entirely smooth. Like many energy infrastructure projects in Canada, it’s seen its share of opposition, from environmentalists who object to its status as a provincially-regulated undertaking and from a small minority of hereditary indigenous leaders who remain adamantly opposed to any developments on their traditional territories, despite approvals already granted by elected First Nations leaders.

In July 2018, BC environmental activist Mike Sawyer filed a challenge with Canada’s National Energy Board (NEB), which regulates inter-provincial energy developments, asking that the board review the appropriate jurisdictional setting for the CGL proj-

“REGARDLESS OF THE HEADLINES AND THE PROTESTS, LNG CANADA HAS EVERY INTENTION TO COMPLETE OUR PROJECT. WE HAVE EVERY INTENTION TO MAINTAIN OUR CONSTRUCTION SCHEDULE.”

— **Andy Calitz**, CEO, LNG Canada

ect since it was entirely likely that gas from Alberta, moving on TransCanada’s federally-regulated NGTL system, would find its way into the supply of gas feeding the LNG Canada terminal.

CGL countered by explaining that its project would be operated completely independently of the NGTL system, that LNG Canada’s five joint venture participants would be the only shippers on the line, and its sole purpose would be to transport natural gas within the province of BC.

“CGL is non-rate-regulated. (TransCanada) separates management of its non-rate-regulated subsidiaries, such as CGL, from its rate-regulated subsidiaries, such as...NGTL and the TCPL Mainline,” CGL said in a filing to the NEB in January. “The only service available on Coastal GasLink is transportation within BC.”

Paul Jeakins, CEO of the BC Oil and Gas Commission, agrees with that assessment, and in an interview with *NGW* remained confident in CGL’s status as a provincially-regulated pipeline.

“Our opinion at the beginning was that this would be under our jurisdiction and we maintain that,” he

said. “Where the pipe starts, where we anticipate the gas coming from, is all wholly within BC. It will not be connected to the larger Alberta system coming this way at this point, so it is a BC project and it’s connected to a BC coastal project.”

The matter remains before the NEB, with a decision not expected until late summer.

In late 2018, a dispute between CGL and the Office of the Wet’suwet’en, the hereditary chiefs of the Wet’suwet’en First Nation across whose traditional territory CGL will traverse for some 190 km, came to a head when CGL filed for and received a temporary injunction from the BC Supreme Court forcing the hereditary chiefs to remove a roadblock that was preventing CGL workers from accessing the pipeline’s right-of-way south of Houston, BC.

The roadblocks were forcibly removed by RCMP in mid-January, and the matter remains uncertain ahead of a final decision from the courts regarding CGL’s request for a permanent injunction. CGL’s workers were able to gain access to an area near the right-of-way to prepare for installation of workforce accommodations later this year, but in February, work was halted again when culturally-significant artifacts were discovered on the site.

LNG Canada CEO Andy Calitz remains steadfast in his commitment to get the LNG Canada project – including the CGL pipeline – across the finishing line, and he reiterated that commitment at a BC Natural Resource Forum in the northern BC city of Prince George in late January.

Many BC First Nations, he said, are tired of managing poverty. The LNG Canada project – including the CGL pipeline – is seen by the majority of the 15,000 First Nations members it will touch as a way out of that poverty, as a way to instead manage prosperity.

“Regardless of the headlines and the protests, LNG Canada has every intention to complete our project. We have every intention to maintain our construction schedule. We have every intention to deliver the jobs and economic benefits we committed for First Nations, for local residents and skilled tradespeople across all northern communities, and for British Columbians and Canadians.

“There is far too much at stake for LNG Canada not to defend our project; not to stand up for the First Nations and the more than 15,000 members they represent; not to stand up for the northern communities, and municipal, provincial and federal governments that have stood up for our project in the past; not to stand up for the 10,000 people that will be hired by LNG Canada and Coastal GasLink during construction; not to stand up for the majority of British Columbians that want and need LNG Canada to proceed.” ●



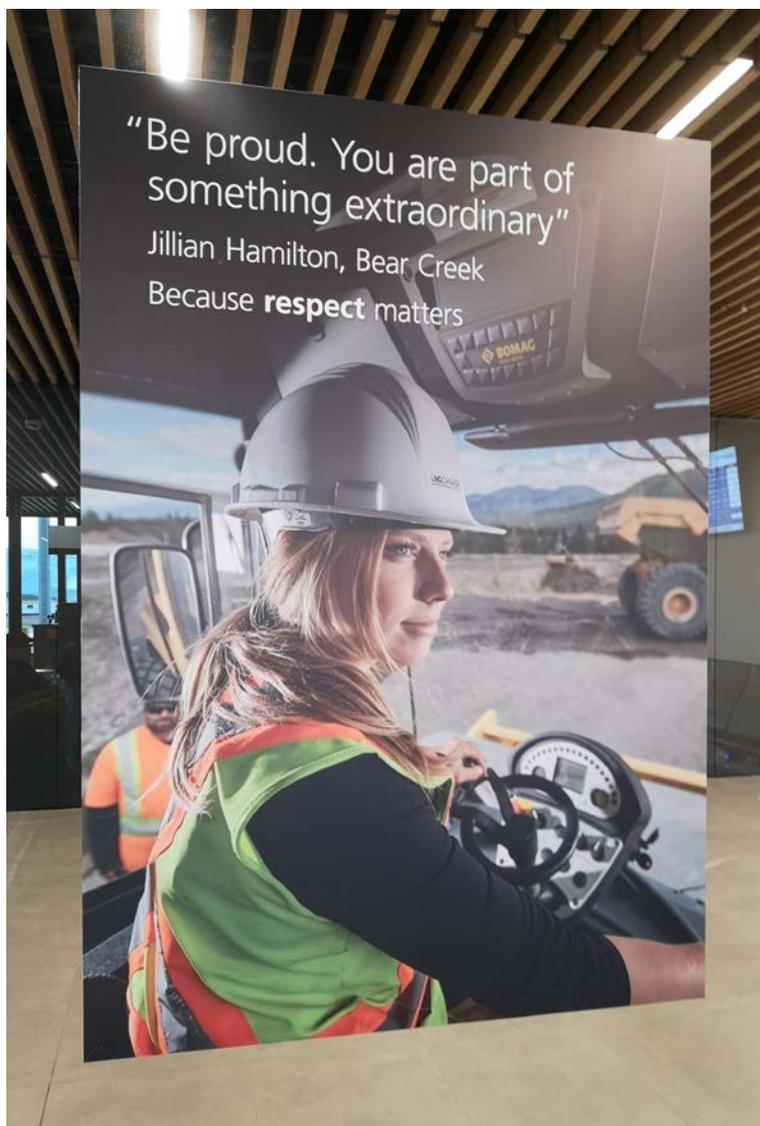
MEETING THE CHALLENGE

At its peak, the LNG Canada project will employ more than 10,000 workers in BC; already, the project has brought new opportunities to the province's labour force.

The timing of the Shell-led LNG Canada project presents a challenge to BC's construction trades groups, but the leader of the labour group representing the province's skilled trades unions is confident those challenges can be overcome.

As construction on the liquefaction terminal in Kitimat and the Coastal GasLink pipeline between there and Dawson Creek approaches this year, both projects will be joining other major infrastructure projects already underway in the province or poised to begin soon: BC Hydro's Site C hydroelectric project, the Pattullo bridge replacement project in Vancouver, an expansion project at the Vancouver International

Kerry Carlick (left) and Sarah Poole are two marine mammal observers hired to protect mammals in the Douglas Channel during dredging operations at the LNG Canada site.



A series of posters inside the Northwest Regional Airport in Terrace, which serves Kitimat, focus on LNG Canada's project and the people who will benefit from it.

Airport and several major projects on Metro Vancouver's transportation network.

Taken together, all those projects – and the potential expansion of the TransMountain crude oil pipeline between Edmonton and Burnaby, a Vancouver suburb – will help boost non-residential employment in BC by nearly 13,000 jobs, according to a BuildForce Canada survey in January 2019. At peak construction, LNG Canada's liquefaction terminal will employ 7,500 workers; the companion Coastal GasLink pipeline project, another 2,500.

"British Columbia is two years into an unprecedented expansion that is expected to see non-residential investment increase by 60% over five years, between 2017 and 2021," the survey said, adding that to meet the upcoming employment and replacement demand between now and 2021, some 13,400 workers

will need to be drawn into the province or shifted from other industries.

But Tom Sigurdson, executive director of BC Building Trades (BCBT), which represents unionised construction workers, isn't worried about meeting that demand.

"Construction is seasonal and cyclical, always has been and likely always will be," he told NGW. "At the present time we know BC has the potential to lead Canada in economic growth, which will put demand pressure on the supply of skilled trades."

To help meet that demand, BCBT will continue to work with its signatory contractors to increase the number of apprentices in its training programs. More than 7,000 individuals are now registered with BCBT's training centres, either as apprentices, in pre-apprenticeship programs or as journey-level workers upgrading their skills, Sigurdson said.

"But even with that number we know we need to bring in even greater numbers to meet the BC demand of skilled workers."

Protocols, however, are already in place to make that happen, he said. Through a dispatch system that extends across Canada and even into the US, the BC workforce can be supplemented by "travellers" who are interested in coming to work in BC, reversing a flow that has long seen BC workers head east for opportunities.

"For decades BC workers have travelled to Alberta, the western provinces and indeed across North America to work on projects east of the Rockies and south of the border," Sigurdson said. "Should we not have the appropriate skills at the required time, we will turn to travellers to assist us with our skilled labour supply."

Phil Clark is project director for the Fluor/JGC Joint Venture (FJFV), the engineering, procurement and construction contractor hired by LNG Canada to build the Kitimat liquefaction terminal. At peak construction between 2021 and 2023, he says, some 4,500 workers will be busy on the 400-hectare terminal site, which means that, given the shift-work nature of employment, FJFV and its subcontractors will need to hire upwards of 7,500 workers to execute the five-year construction plan.

"Trade positions we expect to need include boiler-makers, carpenters, heavy equipment operators, electricians, iron workers, labourers, millwrights, painters, pipefitters and welders," Clark says. "The project will also require numerous other skills, including team members in the administrative, construction supervision, engineering, environmental, procurement, project controls, project management and safety fields."

A driving goal of both the LNG Canada consortium and FJFV is to bring lasting benefits to the local

community and to the rest of BC, he adds. Workforce development and training programs are already in place in Kitimat and across northern BC to help workers upgrade their skills. Positions will be available for apprentices – as much as 25% of the Kitimat work crew will be apprentices – and there’s a focus on developing positions for traditionally under-represented individuals and groups, primarily women and First Nations members.

And virtually all of them, Clark says, will be Canadians. “We will first hire locally, and then within British Columbia, prior to hiring from the rest of Canada for work at the project site. With the quality and quantity of Canadian craft workers, we don’t plan to bring in trade workers from other countries.”

To help ensure enough workers were available in BC to support its construction plans, LNG Canada in 2015 established the LNG Canada Trades Training Fund (TTF), a \$1.6mn fund administered by the BC Construction Association (BCAA) designed specifically to support industry and apprenticeship training for the construction and related trades in BC.

This past February, the LNG Canada TTF marked a triple milestone: the 1,000th individual participant, the 500th employer sponsor and the 150th LNG Canada placement at College of New Caledonia (CNC), a post-secondary institute serving much of northern BC from campuses in Prince George, Quesnel, Mackenzie, Vanderhoof, Fort St. James and Burns Lake.

All three milestones reside within one apprentice, Marissa McTavish, an electrical apprentice from Prince George, who was placed into the LNG Canada TTF by her employer, Primus Electric. She began her Level 3 training at CNC in February, becoming the 150th LNG Canada TTF placement there.

“LNG Canada’s support makes a big difference to our small electrical company and to Marissa, who is a great example of a hard-working British Columbian looking for an opportunity to support her family with a career in the construction trades,” Primus Electric owner Ben Primus says.

“As a single mom, this opportunity to develop my skills in the electrical trade means steady employment, good wages, and self-respect,” McTavish says. “I’m so grateful for the support from LNG Canada and Primus Electric. It means that I don’t have to finance my schooling on my credit cards. It’s a huge relief to be able to attend school without the stress of wondering how I will pay for it. I can just focus on doing really well.”

For LNG Canada, which is committed to ensuring that funding for the TTF will continue, the program plays a valuable role in increasing the number of

“CONSTRUCTION IS SEASONAL AND CYCLICAL, ALWAYS HAS BEEN AND LIKELY ALWAYS WILL BE. AT THE PRESENT TIME WE KNOW BC HAS THE POTENTIAL TO LEAD CANADA IN ECONOMIC GROWTH, WHICH WILL PUT DEMAND PRESSURE ON THE SUPPLY OF SKILLED TRADES.”

— Tom Sigurdson, executive director, BC Building Trades

skilled tradespeople available to it and other projects across the province.

“At LNG Canada we recognize the valuable role all British Columbians play in maintaining a vibrant, skilled workforce, not only for the emerging LNG industry, but for the prosperity of industries across BC,” Tracey MacKinnon, LNG Canada’s workforce development manager, says. “We’re proud that our program is connecting people to successful employment in their local regions and acknowledge the leadership of the employers who are sponsoring apprentices.”

The Trades Training Fund is just one of several initiatives LNG Canada and its partners are spearheading to ensure sufficient skilled workers are available across BC. Another is its Connect program, launched in 2015 to connect local candidates in Kitimat and Terrace to available construction job opportunities.

Funded by LNG Canada and operated by the BCAA as an extension of its Skilled Trades Employment Program. Connect found jobs for more than 200 candidates in its first two years of operation, and early last year was expand-

“IT’S A HUGE RELIEF TO BE ABLE TO ATTEND SCHOOL WITHOUT THE STRESS OF WONDERING HOW I WILL PAY FOR IT. I CAN JUST FOCUS ON DOING REALLY WELL.”

— Marissa McTavish, apprentice, LNG Canada TTF program



ed to Smithers, BC with the added participation of Coastal GasLink, the TransCanada subsidiary charged with building the \$6.2bn pipeline that will connect the Kitimat liquefaction plant to gas supplies in north-eastern BC.

“We’re very pleased to be embarking on this targeted, high-value workforce development program with LNG Canada and the BC Construction Association,” Gregory Cano, director of project planning and execution at TransCanada, said when the program was expanded. “We’re looking to assist people in the area who wish to gain the transferable skills and work experience they need to thrive in this economy, and ensure they get visibility to the local opportunities that surround them.”

Bruce Hobson runs the Connect program in Smithers, and he’s eager to help local candidates become job-ready and connect them to employers who are hiring.

“The Connect program works well because we treat every candidate as an individual, we know the employers, and we take care to make the right connections for the right opportunities at the right time,” Hobson says.

And indigenous youth not yet in the workforce are also benefiting from LNG Canada’s commitments. In 2018, it provided sponsorship support to the Outland Youth Employment Program (OYEP) West, a six-week, live-in camp near Prince George which provides indigenous youth aged 16 to 18 an immersive, hands-on experience to develop critical life and work skills. In February, it extended its commitment with a three-year, \$150,000 sponsorship of the program.

“OYEP has outstanding programming and provides significant opportunities to indigenous youth,” says Susannah Pierce, LNG Canada’s director, external

relations. “We saw the benefits OYEP West provided to the 2018 participants, and it was an easy decision to continue our support.”

Over the past 19 years, OYEP has impacted the lives of close to 500 indigenous students from more than 71 communities across Canada. In 2018, the OYEP West camp included more than 20 indigenous youth from 16 First Nations communities, including Karrison Brown of Burns Lake First Nation, half-way between Kitimat and Prince George.

“It was an amazing experience for us and we learned a lot of valuable skills and lessons through the program,” she says. “I think that everyone should have a chance at experiencing something like the OYEP camp.”

Youth in the program are immersed in a resource-based work culture, including safety training, time management, remote and rotational work schedules, and work-life balance. The program includes a combination of core in-camp training, personal development planning, natural resource-based curriculum, job-shadow experiences and employer-employee connections.

Derek Orr, business development manager at Carrier Lumber and a former elected chief of the McLeod Lake Indian Band, was instrumental in bringing the OYEP model to BC.

“OYEP has a structured environment that provides Indigenous youth a chance to interact with fellow peers, gain skills and develop their self-confidence,” he says. “LNG Canada’s decision to fund OYEP for the next three years goes to show, once again, how resource development in BC can provide meaningful opportunities for communities.” ●



THE INSIDE TRACK ON GLOBAL GAS MATTERS.

NATURAL GAS WORLD



TURKISH STREAM ON PUTIN'S TERMS THE KINGDOM'S COMPETITIVENESS IN THE EAST LANE OILFIELD SERVICES NOT OUT OF THE WINDOW YET REALITY CHECK: NEW DEAL OF OPPORTUNITY?	BAKU WANTS RIGS FOR ITS GAS US LOOKS INTO NUCLEAR QUESTION GASOLINE EARNINGS SUFFER MINOR ASIAN FUTURE RESERVE LNG RELEASE	FLNG: THE FUTURE FOR OFFSHORE GAS? IN SEARCH OF A NEW ERA FOR THE OFFSHORE GAS THE NOT SO BENEVOLENT LAND OF US	CARIBBEAN LNG: ending the grip of oil in the power sector ARGENTINA WANTS THE GAS BUT THE POLITICAL REALITY NEEDS TO BE IN PLACE TOO DIGITALISATION: saving - or using - energy?	ANTI-FLARING INITIATIVE GAINS MORE US SUPPORT INNOVATION WILL SIDELINE GAS, FOR NOW AZERBAIJAN AT HALF-WAY MARK FOR \$6C TURKMENISTAN PANTS ITSELF INTO A CORNER	TEKAN PROJECTS STAKE CLAIM TO MEDIUM-TERM MARKET PERFECT STORM: NEEDS & SUPPLY ABOVE ASIA GAS SUPPORTS TO SOCIALIZE THE MARKET FOR LOW COST LNG HAS THE ENERGIEWENDE RUN OUT OF STEAM?	TRUMP ROLLS OUT HIS 'AMERICA FIRST' ENERGY AGENDA US LNG IS CIVIL FIRST AMONGST US LNG IS CIVIL FIRST AMONGST
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