

RESOURCE *Connector* 2016

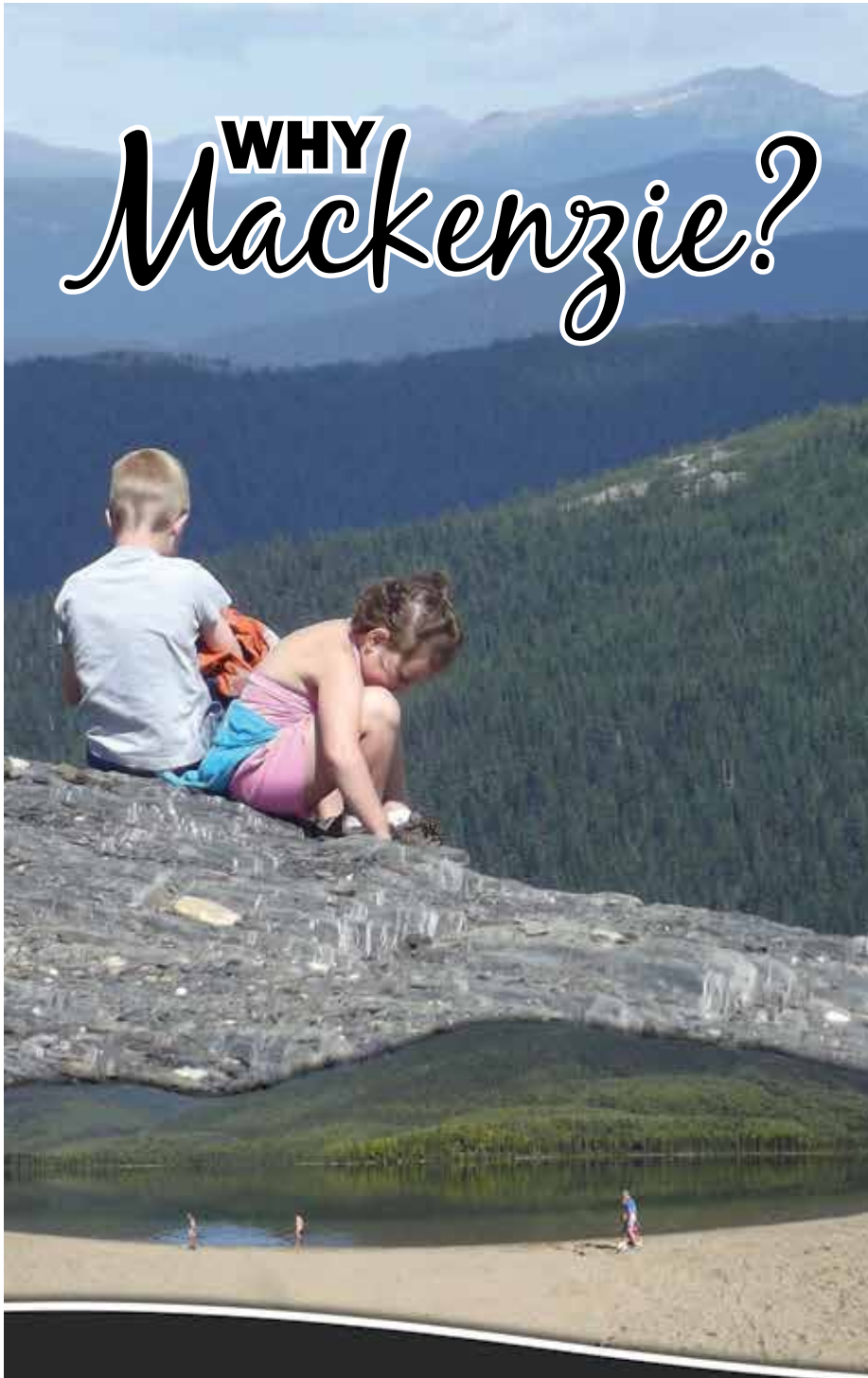


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President
David Langstaff

Publisher
Jason Stefanik

Editor
Lyndon McLean
lyndon@delcommunications.com

Advertising Sales Manager
Dayna Oulion
TF: 1-866-424-6398

Advertising Sales
Robert Bartmanovich
Ross James
Michelle Raïke
Gary Seamans

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Art Director
Kathy Cable

Layout/ Design
Dana Jensen

Advertising Art
Sheri Kidd
Joel Gunter

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RESOURCE CONNECTOR NORTH — MESSAGE FROM THE ASSOCIATION

The economy in northern British Columbia is a diverse one. This past year, the board of directors of the Resource Connector North decided that, in order to connect with all natural resource sectors, they needed to diversify as well.

At their 2014 annual general meeting, the Resource Connector North changed their name from the Northern Interior Mining Group to better represent all industry in northern B.C.

“It’s not just about mining, so our mandate was to have a name that reflected that,” says board member Darren Calhoun of Monster Industries. “Northern B.C. is so rich in natural resources. It’s important that we connect all stakeholders with a wider array of opportunities as companies diversify.”

In an effort to promote and sustain growth in the region, the board feels it is crucial to connect all business to large-scale resource projects, regardless of the sector.

“When you have a changing economy, businesses can refocus some of their time, energy, and expertise to support the more traditional companies,” says board chair Fraser Deacon of WorkBC. “It could be mining, oil & gas, LNG, or Site C.”

To help mitigate this period of change, adaptation and patience are commodities many businesses will have to acquire, if they haven’t already. “Companies will have to diversify in order to keep their doors open,” says Calhoun. “Transitioning industry knowledge from one area and applying it to other resource sectors is something we see happening already.”

With the change in federal government adding to the uncertainty, there is still optimism. “The new government realizes the importance of supporting B.C.’s development,” says past chair David Forshaw of Moose Creek Holdings. “We can use this downtime as an opportunity to build relationships while businesses aren’t in the throws of operation.”

The board members agree in the importance of building relationships. “I think the association as a whole has only scratched the surface on how big our potential network could be,” says board member Norm Adams of Integris Credit Union.

“Most of the people I meet are somehow connected to the forestry industry, LNG, or mining – maybe not directly, but through their subcontracting networks,” he says. “Even our board members come from a variety of backgrounds, from construction to commercial lending and everything in between. We’re all from the industry and work in the field.”

But while the industry waits to hear what direction the new government will go, there are many large-scale projects providing good economic diversification for the north, including Site C, Stewart World Port, and the Red Chris and Mt. Milligan mines.

“We have a variety of visions and ideas around our table and a variety of voices,” says Deacon. “Our goal is to collaborate and support each sector, and be a supply chain of services in northern B.C.” ●





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MESSAGE FROM

The Honourable Christy Clark, Premier of British Columbia



There's no better place in Canada to be than British Columbia. It's not just because of the lifestyle, weather, or scenery – though those are all points in our favour – but increasingly, B.C. is Canada's economic leader.

Our economic growth has been stronger than forecasted, and we're projected to lead the country in growth. That hasn't happened because of luck, but because of B.C.'s resource sector.

Since becoming Premier, my goal has been to expand forestry, mining, LNG, clean tech – all the sectors that make up B.C.'s diverse economy. We've gone about that in two main ways. First, by getting out of your way when we need to; and second, by creating the environment for you to succeed. That means tax and environmental regimes that maintain our world-leading standards, while also rewarding investment and encouraging job creation.

It means relationships with First Nations that are functioning at a high level, from economic development agreements to treaties, and international trade missions and permanent overseas offices to help make new connections, pitch your products, and grow our exports.

It's a proven strategy. For example, B.C.'s forest sector has benefited greatly from expanding overseas markets; since 2001, lumber exports to China have grown 3,800 per cent. Overall, forestry exports are worth \$12 billion per year – and contrary to what many people think, nearly half of that is manufactured products. Exports of mineral products in 2014 were 80 per cent higher than in 2009, an increase of over \$2 billion dollars,

with large increases in exports to countries like South Korea and India.

We're working hard to keep those numbers growing. For example, the new wood showroom and office in Tokyo will highlight value-added B.C. wood products in a market where wood construction is appreciated.

Despite enduring a downturn in commodity prices, mining has double the number of people working since 2001 – over 30,000. Last year, \$338 million was spent on exploration.

And in LNG, there are 20 active projects at various stages of development. Over 30 investment partners are involved, and between them, they have invested some \$12.5 billion.

We need to do everything possible to support B.C.'s resource sector, not just because of the thousands of British Columbians who depend on it – but for the thousands more who could.

According to Resource Works, a 10 per cent boost in B.C.'s natural resource output would have a huge impact not just in B.C., but in Canada.

How big an impact? \$4.5 billion of increased GDP across Canada – with \$3.7 billion staying in B.C. And more than 37,000 jobs added across Canada, with more than 29,000 in B.C. – more than half of which would be in the Lower Mainland.

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MINISTER'S MESSAGE

The Honourable Shirley Bond, Minister of Jobs, Tourism and Skills Training and Minister Responsible for Labour



British Columbia has an abundance of natural resources. These resources have been the cornerstone of B.C.'s economy for generations and, with the right economic conditions in place, it's the perfect time for businesses to work together and take advantage of the vast opportunities available in these sectors. The *Resource Connector* is a valuable tool linking businesses throughout Northern B.C. and across the natural resource sectors.

While economic growth is slowing elsewhere in the country, B.C. is set to be among the provincial leaders in growth over the next two years. The mining and energy, natural gas, forestry and agrifoods sectors all play an important role in diversifying our economy, which gives British Columbia a unique competitive advantage in Canada and internationally.

Developing a provincial natural gas industry is key to future economic growth. There are 20 proposed LNG projects. Thirteen proposals have federal export licences. Four of these projects were issued provincial environmental assessment (EA)

certificates and two received federal EA approval. Provincial EA certificates were also issued to four LNG pipeline projects.

Development of an LNG industry will open new international export markets, leading to further economic diversification, growth and job creation.

The mining and energy sector provides significant opportunities for all British Columbians with more than 50,000 jobs in mining, energy and related sectors across the province. B.C. is internationally recognized for and home to the world's largest concentration of exploration companies and mining professionals. In 2014, mining and electricity exports totaled nearly \$10 billion and contributed more than \$5 billion to B.C.'s economy.

B.C.'s forest sector is globally renowned and recognized as a sustainable renewable resource industry of diversified, value-added forestry products. In 2014, forest product exports totalled \$12.4 billion and accounted for 35 per cent of B.C.'s total exports by value.

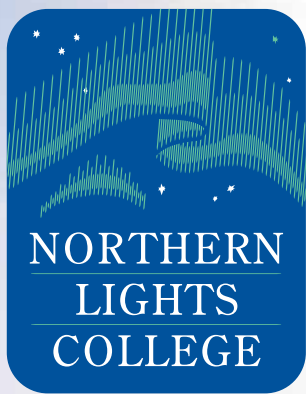
B.C. is home to some of the largest forest companies in the world. Over 40 per cent of the province's regional economies are based on forestry activities, in more than 7,300 businesses, employing more than 60,000 people.

B.C. produces more lumber certified to environmental standards than any other region in the world. In addition to lumber, there are emerging opportunities in areas such as bio-energy, residual fibre use and carbon trading. B.C.'s Wood First Act promotes the use of wood as the primary choice for construction in provincially funded buildings.

British Columbia's agrifoods sector is one of the most diverse in Canada with more than 300 primary, high-quality food and seafood products. It provides the province with a competitive advantage and a wide range of opportunities for growth and innovation in agriculture, commercial fishing, aquaculture and food and beverage processing. Our highly integrated transportation system makes it easy to access high-quality agriculture products and to ship fresh, value-added products worldwide. In 2014, the sector generated \$12.3 billion in revenue, the highest ever, with a record \$3 billion in exports to 150 countries.

With abundant natural resources, unique geographic advantages, and proximity to Asia, we are well-positioned to meet the global demand for energy, forestry products and agrifoods.

The BC Jobs Plan is working. With a record 2.3 million people working, B.C.'s economy is growing and adding jobs. The natural resources sector provides significant benefits for regions, communities and industries across B.C. Northern British Columbia has one of the most talented workforces in the world as well as a host of innovative businesses that support the natural resource sectors. With these assets, natural resources in B.C. will continue to play a critical role in growing our economy and driving job creation in every region of our province. I look forward to the ongoing success of these dynamic and critical sectors of our economy. ●



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SERVING CANADA'S NORTHWEST: STEWART WORLD PORT OPENS FOR BREAK BULK CARGO

By Lisa Fattori



Ted Pickell, president & CEO, Stewart World Port; Shirley Morven, chairperson of the Council of Elders Nisga'a Nation; Her Honour the Honourable Judith Guichon, Lieutenant Governor of British Columbia; Her Worship Galina Durant, mayor of the District of Stewart.

A new commercial wharf at Port of Stewart, B.C.'s most northerly port, is open for business, providing the resources sector with break-bulk cargo services and the District of Stewart with new business opportunities. Strategically situated to service northern B.C., northern Alberta and the Yukon, Stewart World Port has been designed to handle non-container materials such as woodchips, pellets and logs, as well as mineral concentrates from mines and equipment modules for industry infrastructure. Exporters now have easier access to shipping services, while imported materials, destined to support growth in the mining and petroleum sectors, are closer to their intended markets.

Stewart World Port is the inspiration of the company's CEO, Ted Pickell, who also owns Arctic Construction, the company that built the facility. Pickell financed the \$70 million project, which took only three years to plan and construct. In September 2015, residents from Stewart, together with local and provincial dignitaries, gathered to celebrate the grand opening of Stewart World Port and the facility's importance in fostering economic prosperity in Canada's northwest region.

"I saw a need in western Canada for a northerly port to handle break-bulk materials," says Pickell. "This facility is a huge benefit to northern B.C., Alberta and the Yukon because cargo is a lot closer to these markets. Stewart World



Port doesn't have the congestion of Vancouver, and vessels are one-and-a-half days closer to Asia, which is a huge cost savings. Another big advantage we have is storage space – we have in-excess of 100 acres of laydown area, so if customers don't want to move their materials immediately, we can store them right on the premises."

Port of Stewart is Canada's most northerly ice-free port and is located at the end of the Portland Canal, just 90 miles from the Pacific Ocean. It is one of the deepest ports of the west coast, with a favourable climate and low winds. Paved road access from Stewart, across B.C. and to the Yukon, Alberta and Saskatchewan, provides customers with seamless transportation in the shipment of cargo. While the port is also home to a bulk terminal facility, Stewart World Port offers capacity and services beyond container and bulk

A woman with brown hair and glasses on her head, wearing a black top and a blue and white necklace, is looking down at a large map or document on a table. A man with a beard and glasses is also looking at the document. They are in a trade show booth with other people and displays in the background.

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business, to provide a deep-sea wharf that can berth handymax and paramax vessels.

Located within one of the most mineral rich areas of North America, Stewart World Port is ideally situated to service the region's prolific mining industry. "Stewart is located in the lower end of the golden triangle and several large mines are going to be built in this area," Pickell says. "There are some mines producing 150,000 to 200,000 tonnes of concentrate per year, and there are two mines in the 1 million tonnes of concentrate per year category. The Yukon has a mine producing a million tonnes as well. All of this concentrate from mines is destined for the Port of Stewart."

In addition to wood chips and pellets, outgoing forestry products include logs, which would otherwise be transported by barge in Vancouver or bundled and floated out to a vessel, which has the potential to kill the sea bed. At Stewart World Port, logging exports can be loaded

dry, which is much better for the environment. Other outgoing cargoes include LNG and coal, while inbound cargoes include project supply and equipment, pipeline pipe, accommodation modules for work camps, cement powder and mining resupplies.

"Our first customer is Air Liquide, who will start to unload process units for a project in Alberta, starting in January," Pickell says. "We are currently in the process of negotiating three more contracts with other potential customers."

According to Pickell, Stewart World Port is just 140 road miles from the two closest LNG lines proposed for Prince Rupert and Kitimat, which is significantly more convenient and less costly than transporting equipment and materials 1,000 miles from Vancouver. "There's also high-grade coal coming out of Atrium Coal's Groundhog project, which can supply coal for steel making for decades," he says. "I've seen a lot of

interest in extending rail service, to tie-in Stewart with the CN line that connects Prince Rupert and Prince George and can see this happening in the future."

The first two phases in the development of Stewart World Port included construction of the deepest wharf ever built on a B.C. coast, measuring almost 40 metres at the deep end, at low tide. The company is working on Phase 3 construction of concentrate sheds, conveying systems and a travelling bulk shiploader. This phase has been designed by CWA Engineers and will require an additional \$60 million. The travelling bulk shiploader is comprised of very specialized pieces of equipment, including water treatment and piping facilities to capture and treat effluent that is washed from the conveyor system. The portability of the shiploader is one of the key benefits of the system, as it improves loading times and minimizes a vessel's stay at port, for a higher level of service.

“The travelling shiploader allows the port to load large vessels with bulk materials, such as mine concentrates, wood chips and pellets,” says Brad Moffat, chief development officer and corporate secretary of Stewart World Port. “Ships have to berth only one time, which saves the captain and crew the trouble and cost of having to move their vessel. The load-out rate of this shiploader is also five-times faster than competing equipment. When vessels spend less time in port, shipping companies save a lot of money.”

A bustling commercial port will provide economic spin-off opportunities for the District of Stewart and foster greater diversity for the region. Originally founded as a mining town, Stewart enjoyed a strong logging industry in the 1970s but has seen its population dwindle from 2,000 to just under 500 residents. While the town has survived the cyclical ups and downs of the resource sectors, the opportunity to become a supply hub for commercial shipping operations offers stability and a new area of expertise for local businesses.

“Stewart is a small community that has been economically depressed since the mid-1980s, so the Stewart World Port terminal is going to bring enormous benefits to the area,” says Galina Durant, mayor of the District of Stewart. “Forestry has been stable here for the last three to four years, but most workers in the industry don’t live in Stewart. You need steady employment to get people to move their families here. We have another terminal here, which employs the local residents and serves the mining companies, but the Stewart World Port terminal is a bigger facility, with more space and a different clientele. It should attract secondary businesses, such as transportation companies, and we’ve already had a few businesses that are interested in building a pellet plant here.”

According to Mayor Durant,





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without the population to support local businesses, many of Stewart's services were forced to close. The town no longer has overnight hospital beds, a bank, a pharmacy and a barber shop, and there are no restaurants open in winter. The elderly have had to leave their community to access services that they need, and remaining residents have a three-and-a-half-hour drive to the closest services in Terrace.

"The whole town came out for the grand opening of Stewart World Port, which shows how excited everyone is about new opportunities for the

town," says Mayor Durant. "We need industry here to get the population to 2,000 so that we can get our services back. The port has given new hope for the whole town."

Stewart has already benefited from the development of a new terminal. Construction of the Stewart World Port facility created local jobs and there are new suppliers in town that are hiring local people. As key pipeline and mining projects ramp up across Canada's northwest, increased activity at Stewart World Port and the creation of new secondary businesses will help to grow the local workforce

and build a critical mass of expertise within the District of Stewart.

"Stewart World Port has a 150-year lease with the District of Stewart, so it's a key piece of infrastructure that is here to stay," Moffat says. "The port has been built to be multi-purpose, and to withstand economic ups and downs. Ted is a visionary who has invested in many projects, and he continues to invest in B.C. It's about leaving a legacy and wanting to build something for himself, his family and his community." ●

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A MAN WITH A MISSION: IMPLEMENTING CHANGE ONE SMALL STEP AT A TIME

By Melanie Franner

Meet Glen Wonders. He's a man who began his career in the forestry industry in northern B.C. Today, he is the vice-president - technical & governmental affairs, Association for Mineral Exploration BC (AME BC). And the road in between has been interesting - to say the least.

"I don't have the typical history of most individuals in this association," he says. "I came at this more from an administrative perspective. I consider myself a land relationship and management person more than anything else."

WESTERN ROOTS

Born and raised in Alberta, Wonders attained his undergraduate degree at the U of A before seeking a forestry career in B.C. His 15-year stint in the industry was followed by a decision to go back to school.

"The forestry industry was in a downcycle at the time, so I decided to go back and get my masters degree in business," he says, adding that he went to Royal Roads University in Victoria to attain it. "I thought it was an optimum time to repackage who I was and what I could offer. I wanted to

diversify the skills I had, particularly in relation to my business skills."

Upon graduation, Wonders began working in the oil and gas industry. He eventually drifted into the mining industry in northwestern B.C. His résumé now includes a number of impressive positions. These include division manager of the Prince George Division of Allnorth Consultants Limited; general manager of mining for Allnorth Consultants; and vice-president of corporate affairs and sustainability for Terrane Metals Corporation.

While with Terrane Metals, Wonders focused on achieving regulatory approvals for the Mt. Milligan Gold and Copper Mine Project, including First Nations consultant and agreements. He also managed community and government affairs for the Mt. Milligan project.

"Glen was with us for about three-and-a-half years," says Rob Pease, who was president and CEO of Terrane Metals at the time. "He was very committed to his role and gave it 100 per cent. During his tenure there, Glen was an integral part of the team. He dealt with government and local

community groups, including First Nations, to get us through the process of developing a mineral property into a mine. He was very accomplished at his job."

Katherine Scouten, who was vice-president of economic development at Initiatives Prince George (IPG) while Wonders was board chair of the IPG, also speaks highly of him.

"I very much enjoyed working with Glen," she says. "He was very committed to economic development of the region through investment attraction and resource development that would benefit the communities of northern B.C. He provided strong leadership for IPG, and that helped the organization bring important projects to the north."

Wonders came onboard with AME BC in July 2014. And he did so with a very broad and finely honed perspective on the importance of mineral exploration to the continued growth and prosperity of the northern B.C. economy.

INDUSTRY ISSUES

"Northern B.C. has changed in a number of different areas over the



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years,” says Wonders. “The most visible one, I would say, is that industry sensitivity to global markets has become far more acute. Day-to-day markets are governed by the global marketplace.”

Regulatory affairs is another area that Wonders sees as having changed – citing the fact that regulations have

become much more demanding – with far more public scrutiny than ever before.

The other big evolution, says Wonders, is First Nations.

“I believe that the most significant change that has occurred is the focus on aboriginal engagement,” he says. “It is critical to the success of any project.”

Wonders goes on to say that the need to establish effective relationships with First Nations in a manner that is both fair and equitable is “more and more imperative” – not to mention a part of the Canadian Constitution.

“Land management will always be a challenge,” he says. “There are always

INDUSTRY INSIDER

Wonders has spent his entire career focused on industry within British Columbia, most of which involves the mining sector. He has worked hard throughout this time in the many different jobs in which he has been employed. But he has also worked hard behind the scenes toward the betterment of industry itself.

Wonders’ most recent role prior was with the Ministry of Energy, Mines and Petroleum Resources (EMPR), where he was the provincial coal coordinator. While there, Wonders was charged with working with communities and First Nations as the province began to re-establish the northeast B.C. coal-mining sector.

“My primary role was to act as a government representative as coal mine applicants began the Environmental Assessment and Mines Act applications to establish new mines in the region from Chetwynd to Tumbler Ridge,” he explains, adding that he also chaired various mine review committees and spent a lot of time trying to ensure the perspectives of area residents were heard in order to mitigate potential impacts from the new mines. “I also worked with industry to ensure they received fair process as their applications were considered by the Ministry of Energy and Mines.”

Wonders also participated in the volunteer board of IPG, an independent economic advisory agency that had the City of Prince George as its sole shareholder. Wonders sat on the volunteer IPG as a mining representative for around five years, chairing the board in the last two years of his term there.

Wonders also helped establish the Prince George Exploration Group, one of a number of regional exploration groups affiliated with the Association for Mineral Exploration BC. He was one of a small group of other geologists and mineral exploration and service providers committed to the development of the group.

“The aim of that group was to create awareness and understanding of the mineral exploration and



development industry in northeast B.C. and the industry’s relative importance to B.C. as a whole,” he explains.

Wonders’ continued dedication to the B.C. mining industry can also be seen in his role in establishing the Northern Interior Mining Group.

“This was primarily a broad coalition or loose association of mining industry service providers,” he explains, adding that he encouraged this group to organize together, as many of the suppliers were small companies that were niche-focused and wanted to be part of the Mt. Milligan project. “I suggested that many of them might be better served by looking to form strategic partnerships to gain work at Mt. Milligan (and elsewhere) than to attempt to compete against larger, more diversified service providers. A number of great individuals stepped up and organized into NIMG [now Resource Connector North], and have remained supportive of the association ever since.”

All in all, Wonders’ career and history reads like that of a man dedicated to ensuring that northern B.C.’s various industries – including mining – remain viable and profitable and that continue to contribute to a healthy provincial economy.

You need more effective recovery of minerals and higher amounts of recoveries to make the mine attractive.

a number of competing interests in any portion of land. Everyone's needs have to be considered and carefully discussed."

Another immediate challenge that Wonders sees is the current lack of investor confidence in the mining sector.

This, he adds, can be dealt with, in part, by ongoing investment in best practices and innovation.

"The low-hanging fruit of the mining industry, so to speak, has already been discovered or been chosen not to develop," he says. "A lot of the deposits today are harder to find and may

consist of lower-grade deposits. Having the latest technology and processes has become critically important as a result. You need more effective recovery of minerals and higher amounts of recoveries to make the mine attractive. This is certainly true of Mt. Milligan. Their control room is cutting edge. They are using technology that wasn't even heard of 20 years ago."

Wonders also notes that industry "needs to take advantage of opportunities to learn about current trends and new practices in the industry". AME BC's Mineral Exploration Roundup conference covers advances in geological and technical knowledge, as well as practices in aboriginal engagement and corporate social responsibility, for example. It is held in Vancouver and brings hundreds of people from northern and others part of British Columbia, plus attendees from around the world. Plus, it introduces companies based in northern B.C. to an international audience.

ALL IN A DAY'S WORK

In his current position with AME BC, Wonders is faced with industry issues each and every day. And he remains just as driven, if not more so, to create an environment where the mining industry can continue to play a pivotal role to the people and communities who live in northern B.C., creating strong and robust local economies – while proving to be an attractive proposition for potential investors near and wide.

"I face the challenges of this industry every single day," says Wonders. "And I will continue to work on them with vigour and hope – to try to ensure investor confidence and to continue to make northern B.C. an attractive place for potential investors." ●



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GOOD THINGS COME IN THREES

By Tammy Schuster

It has been one year since the Forrest Kerr Hydroelectric Facility began providing electricity to British Columbia. It also marks the one-year anniversary of a fruitful relationship between the Tahltan First Nation, the province of British Columbia, and AltaGas Ltd.

Located approximately 1,000 kilometres northwest of Vancouver, the 195-megawatt project began operating in October 2014. Together with the 16-megawatt Volcano Creek facility, and the 66-megawatt McLymont Creek facility, they are known as the Northwest Hydroelectric Facilities. All three are on Tahltan First Nation territory.

The Tahltan First Nation plays a key role in the success of these three projects and, working with AltaGas,

expects to provide clean energy to British Columbia for the next 60 years.

In 2013, the Tahltan Nation began signing revenue-sharing agreements with the province in anticipation of the three run-of-river hydroelectric projects. Each agreement requires the Tahltan Nation receive a percentage of rents paid by AltaGas to the province in exchange for the use of Tahltan land.

“These agreements ensure First Nations receive a portion of provincial land and water rents levied on new clean energy projects in their traditional territories,” says a spokesperson for the Ministry of Aboriginal Relations and Reconciliation. “By providing capacity funding and revenue-sharing, the fund helps generate jobs for families

and provide opportunities that benefit First Nations and non-First Nation communities.”

The Clean Energy Act, which came into effect in June 2010, created the First Nations Clean Energy Business Fund to promote increased First Nation involvement in clean energy industries.

In December 2014, the Tahltan Nation learned their application made through the First Nations Clean Energy Business Fund awarded them \$500,000. The nation is using these funds as part of a \$2 million equity investment in the Volcano Creek hydroelectric project. The project is expected to produce an estimated \$13 million in dividends to the Tahltan Nation over the next 60 years.



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The ministry says that with the \$500,000 investment, the Tahltan Nation will have an ownership interest in the project and share revenues made selling power to BC Hydro.

"This will mark the first time that we will own a piece of major resource development project in our territory," says a statement from the 2014/2015 Tahltan Central Government Annual Report.

In his message in the *Tahltan Quarterly Newsletter*, Tahltan Central Government President Chad Norman Day called the funding award another high point for their nation.

Additionally, Impact Benefit Agreements signed between the Tahltan First Nation and AltaGas formed a partnership that would generate jobs for families, training opportunities for youth, and help promote economic independence for First Nations communities.

These agreements will also see that Tahltan people are involved in the environmental protection and preservation of the economic resources of their territory. According to a *Tahltan Quarterly Newsletter*, that includes forming an environmental protection committee with both Tahltan and AltaGas representatives on board.

Despite current fluctuations in the mining industry, the Tahltan Nation is optimistic. "Economic activity in our area has remained moderately strong and we expect to see continued employment and training opportunities," says a statement made in the 2014/2015 annual report.

With the Forrest Kerr and Volcano Creek projects running, and the McLymont project scheduled to begin operating soon, the Tahltan Nation referred to the ongoing relationship with the province and AltaGas as respectful and fruitful.

Communities near the hydroelectric projects include Iskut, Dease Lake, Telegraph Creek, Stewart, Smithers, and Terrace. Working together to impact local communities, provide clean, renewable energy to the province, and reduce greenhouse gas emissions in Canada, this harmonious partnership is delivering good news in threes.

A run-of-river hydroelectric project uses natural water flows and gravity to generate electricity. A

small barrier is placed into a section of a river diverting water down through a pipeline and into power turbines, generating electricity. The water is then diverted back to the river through another pipeline. The result is reliable and sustainable energy with very little impact to the surrounding environment.

The Forrest Kerr Hydroelectric Facility redirects a portion of water from the Iskut River to an underground powerhouse containing nine Francis turbines. ●



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JOBS OF THE FUTURE

B.C. Institutions Rise to the Challenge

By Melanie Franner

When the Honourable Christy Clark, premier of British Columbia, announced the B.C. Jobs Plan in 2011, she did so with some noteworthy numbers. One of these is the prediction that there will be a million job openings in the province by 2022. These jobs will come from a variety of sectors, including LNG development, increased trade with Asia, new mines and mining expansions, growing forestry exports, and increased activity in the resources sectors, which include transportation, industry and business.

The LNG sector alone is anticipated to support up to 100,000 jobs (58,700 direct and indirect construction jobs; 23,800 permanent direct and indirect jobs for operations; and thousands more of induced jobs as a result of more household income).

Clark also predicted that 530,000 young people will enter the job market over the next 10 years. She described the province's aboriginal people as the "youngest and fastest growing population group in the province" and committed to having 15,000 more aboriginal youth working across the province.

The outlook for British Columbia's labour market looks good – provided that the province's colleges and universities are up to the task of outfitting these students with the proper skills and training needed to get them ready for the jobs of the future.

INDUSTRY TRAINING AUTHORITY

Charged with managing the apprenticeship system and certified skilled trades people within British Columbia, the Industry Training Authority (ITA) has focused its efforts on several key employment sectors. Among these are the LNG, mining and forestry industries.

In 2014, ITA launched an action plan geared to the LNG sector. The first stages of this plan identify 16 actions, eight of which the organization is delivering on and eight of which are being worked upon in consultation with stakeholders:

- Establish an LNG/natural gas Sector Advisory Group to provide direct input to government and ITA on matters relating to workforce development;
- Finish developing the ITA occupational standards for the Construction Craft Worker (CCW) trade program (13 training providers selected to offer this program);
- Develop a specialized Construction Craft Worker Foundation program targeted at First Nations individuals (two programs in pilot stage);
- Increase youth participation, with a focus on high-demand LNG-related trades;
- Complete the hiring of 15 apprenticeship advisors across B.C., five of whom will be focused on supporting and recruiting the aboriginal community;



Industry Training Authority (ITA).

- Develop a communications strategy focused on trades-related employment and training opportunities in the LNG sector; and
- Conduct further research into an alternative sponsorship/group training model for smaller employers that provide enhanced supports and allows apprentices to complete their apprenticeship.

The mining industry as a major driver of the provincial economy, citing 2013 gross revenues for operating mines at \$8.5 billion and directly employing close to 11,000 workers. As such, the ITA has invested in a total capacity of 16,456 training seats in 2015-16 throughout B.C. for the following trades: boom truck operator-stiff boom unlimited; construction boilmaker; construction electrician; diesel engine mechanic; domestic/commercial gasfitter (class B); gasfitter (class A); heavy-duty equipment technician; heat & frost insulator; heavy equipment operator; industrial electrician; industrial instrument mechanic; ironworker (generalist); ironworker (reinforcing); machinist; mason/bricklayer; millwright; part and warehousing person 1; partsperson; plumber; roadbuilders foundation; sheet metal worker; sprinkler system installer; and welder.

The forestry sector is another key component of the B.C. economy and contributes \$12 billion annually to the provincial GDP, with direct employment in 2013 being 58,200. The ITA has invested in a total capacity of 9,355 training seats in 2015-16 throughout the province for the following trades: carpenter electrician; heavy duty equipment technician; heavy equipment operator; industrial electrician; industrial instrument mechanic;

machinist; millwright; parts and warehousing person 1; partsperson; roadbuilders foundation; and saw filer.

COLLEGE OF NEW CALEDONIA

The College of New Caledonia (CNC) has played an important role in training and educating residents in northern B.C. since 1969. Located in Prince George, with five additional campuses, CNC averages an annual 5,000 students in approximately 90 distinct programs.

“All of our courses are driven by industry,” says Ann McCormick, campus supervisor at the Fort St. James Campus of College of New Caledonia. “We have five regional campuses that work with their local community, industry and municipality. We are primarily resource driven and we constantly conduct research to see how best we can meet the needs of our communities.”

The Fort St. James campus, in particular, is located in close proximity to four First Nation groups and thus, services them as well.

“We have programs that we bring onsite to the First Nation communities to get the students ready for employment,” says McCormick. “We do a lot of outreach programs with them.”

In the past, these programs have included everything from safety training to environmental data programs. New this fall are healthcare and building maintenance.

The Fort St. James campus will also be one of two institutions in the province to offer an Enhanced Construction Craft Worker course for aboriginals.

The CNC programs are targeted to meet the needs of the local community. As such, the campus began offering mining safety programs before the Mount Milligan mine



College of New Caledonia (CNC).

began operations in the area (the first concentrate was shipped in September 2013).

"The mine recognized that entry-level people would be needed for their site and approached us to help design a program," says McCormick.

Other innovative courses offered at the Fort St. James campus include a pipeline training course and a welding course.

"In our area alone, we're seeing a new mine, a new biomass plant and the potential of five LNG pipelines, not to mention tourism and infrastructure," says McCormick. "Our community members who are looking for labour-market opportunities need to be trained so that they can take advantage of these new opportunities."

Over at the CNC Prince George Campus, metal fabrication remains a popular program. Introduced in the spring of 2015, the course is available as an apprenticeship program and as a foundation program. According to Frank Rossi, dean of trades &

technologies, the apprenticeship program has full enrollment (16 seats) and the foundation program has approximately 70 per cent utilization.

"We looked at the apprenticeship numbers in metal fabrication throughout B.C. and noticed a void in our area," says Rossi. "We had a program advisory committee on welding and we're able to purchase equipment and find a qualified instructor so we were able to roll out the program fairly quickly. Unfortunately, the difficulty tends to be finding the capital and the right instructor, as most of the qualified trades people are out working in the field."

Other potential programs in the works include pipefitting and instrumentation & mechanical.

NORTHERN LIGHTS COLLEGE

Northern Lights College (NLC) is B.C.'s Energy College, serving northern British Columbia.

Back in February 2010 when NLC began offering its innovative Wind

Turbine Maintenance Technician program, initial interest wasn't as high as anticipated.

"I think we were a bit ahead of the industry at the time," explains Mark Heartt, dean of trades & technologies, NLC, who adds that the province had only 34 wind towers at that point. "We persevered and our numbers have grown exponentially."

Heartt adds that a lot of the graduates of the program had been finding jobs all across the country but that local opportunities have recently become available.

"We're the only institution in the province that offers this program, and one of a few across Canada," he says.

Students enrolled in the Wind Turbine Maintenance Technician program write the provincial Electrical Level 1 Apprenticeship exam as part of their requirements, giving them skills they can use outside of the wind turbine industry. Graduates are also eligible to write the BZEE Certification Examination, which starts them on the



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"We're seeing about half of our grads find employment in the wind turbine industry," adds Heartt.

The 40-week program includes having to scale the school's 100-foot training tower, as well as an actual 275-foot wind turbine tower – a feat that Heartt admits poses a challenge to the odd student.

UNIVERSITY OF NORTHERN B.C.

Described as a university "both in and for the north", the University of Northern British Columbia (UNBC) offers both graduate and undergraduate studies. Among the programs that have been designed to better outfit students with the necessary skills to secure the jobs of the future is the Natural Resources Planning major, which is part of the Bachelor of Planning Degree.

"The major in Natural Resources Planning is designed to provide students with an understanding of the complexities of including the natural,

built and cultural environment in planning decision making," says Andrew Seidel, professor and chair at UNBC's School of Environmental Planning, who adds that UNBC is the only institution in the province to offer this major. "The major is intended to address both project-level and large-scale environmental planning issues that occur in developments that impact the natural and built environment."

The program, which was introduced over seven years ago, requires 120 credit hours. According to Seidel, all graduates have found work in a variety of related fields.

"The objective of this major is to familiarize students with planning and decision making in a variety of sectors that include provincial land-use planning, environmental assessment, watershed planning and integrated resource and environmental management," says Seidel. "These areas of planning are characterized by complex and intricate problems that



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revolve around how to use our natural resources and who should decide.”

O'BRIEN TRAINING LTD.

A privately owned, but PCTIA-registered school, O'Brien Training Ltd. has been offering advanced training services in equipment operations across several industries since 2005. The company has a 500-acre construction and forestry training site that mirrors a “real-world” work environment. Some training is also conducted at an actual logging operation.

“We have seen a steady increase in program interest since we opened, along with a steady increase in the number of programs we offer,” says Dardo Krueger, sales and marketing manager with O'Brien Training. “We had almost 300

students last year. It's been growing in increments of between 10 to 20 per cent per year on average.”

Recently introduced is the 2013 Pipeline program, which includes a “simulated pipeline course” where students are taken out to a site to build an actual part of a pipeline.

“Our students work hands-on in everything from clearing the right of way to preparing the grade to stringing the pipe and backfilling,” says Krueger, who adds that the three-week program outfits students with a certificate, as well as the ability to know their way around a pipeline crew. “We also have a placement agency where we keep track of our graduates so that companies looking for qualified personnel can approach us for candidates.”

O'Brien Training also works very closely with the aboriginal communities, and Krueger notes that a lot of its students are aboriginal.

“We just had a representative from a First Nation community come in asking about the possibility of having us accommodate 30 people for the pipeline course,” he says.

Other popular programs as of late include various courses in the forestry sector, such as Forestry Equipment Operator; Advanced Forestry Equipment Operator; and Combination Forestry and Construction Equipment Operator. The courses run for five to six weeks and involve between 150 to 200 hours of machine operation.

A new Log-Hauling program is also in the works and will capitalize on the



O'Brien Training Ltd.

TOP 10 LNG OCCUPATIONS IN 2018

- Construction Trades Helpers and Labourers: 11,800
- Steamfitters and Pipefitters: 3,800
- Welders: 2,200
- Concrete Finishers: 1,500
- Transport Truck Drivers: 1,500
- Carpenters: 1,400
- Heavy-Equipment Operators: 1,100
- Gas Fitters: 1,100
- Purchasing Agents and Officers: 875
- Crane Operators: 800

Source: BC Jobs Plan 2011

fact that the company offers its own training, as well as training from Taylor Professional Driving company, which teaches Class 1, 2, 3 and 4 drivers.

"We've had the Log Hauling program for a year now," says Krueger. "Our northern economy is very resource based and in need of heavy-equipment operators, as well as Class 1 drivers with specific skills like log hauling and lowbedding – both of which we offer."


Krueger cites the B.C. Forest Safety Council as having estimated that between 1,500 and 2,000 new log-haul truck drivers will be needed by 2020.

NEW WORLD, NEW FOCUS

With many of northern B.C.'s colleges and institutions well aligned with the needs of industry, it would seem that the province's future workforce will be more than ready to capitalize on the 1 million jobs expected to be available by 2020. Already, many innovative programs are in place and in the midst of training people for both existing and potential opportunities across many different sectors.

There may still be some small measure of uncertainty when it comes to the key economic drivers of the B.C. economy in 2020, but however the situation plays out, one can be rest-assured that the labourers of tomorrow will be able to fill the needs of that industry with a little bit of hard work and a lot of well-planned training on the part of B.C.'s accredited institutions. ●


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MAJOR MILESTONE FOR COMMUNITY: BUSINESS RESUMES AT MOUNT POLLEY

By Melanie Franner



It's been more than a year since the disastrous breach of the tailings pond at the Mount Polley mine. People now are dealing with the fact that the mine has been issued an amended permit to re-start partial operations.

"We have never had an incident of the scope and scale of the Mount Polley tailings pond breach," states David Haslam, communications director, British Columbia Ministry of Energy and Mines. "The breach at

Mount Polley was a rare incident, the likes of which had not been seen in British Columbia."

Steve Robertson, vice-president, corporate affairs, Imperial Metals Corporation, states that the mine's mill restarted operations on August 5th of this year and is running on a one-week-on/one-week-off rotation.

"The mine can process around 8 million tonnes of ore per year when operating at full capacity," he says. "The

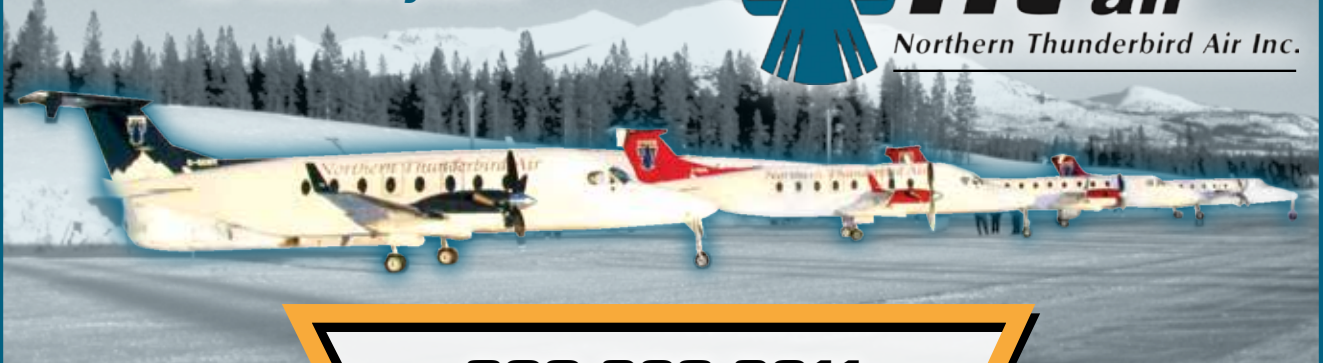
mine is allowed to process 4 million tonnes under this permit. This is due to the fact that we are using the Springer Pit as a temporary tailings storage facility and that is the amount of space that we have demonstrated can be used without interrupting the closure plan, should it be necessary to go down that path."

Needless to say, Imperial Metals is glad that the mine is once again operational.

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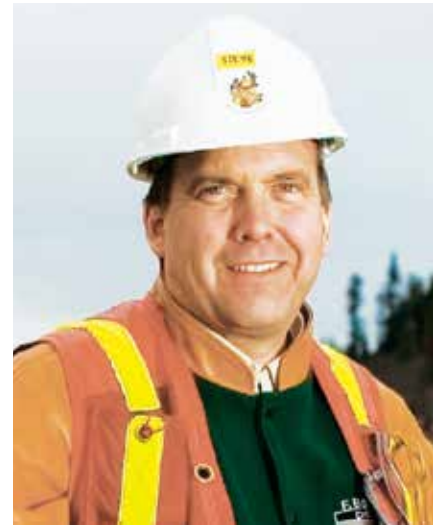
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Angela Sommer.



Paul French.



Steve Robertson.

"We are very pleased to pass this important milestone as we work our way down the path toward a full resumption of operations at Mount Polley," says Robertson.

The company's employees and surrounding communities are also pleased with the resumption in work.

"Mount Polley is a significant employer for Williams Lake," states Angela Sommer, president, Williams Lake and District Chamber of Commerce. "With a population of 12,000 and another 5,000 in the surrounding area, an employer that offers in-excess of 300 well-paying jobs is significant. In addition to workers and their families living in Williams Lake, Mount Polley is also a strong supporter of community groups, events and activities. As a community that is and has been strongly tied to the resource industry, the closure of the mine was a strong blow."

According to Sommer, many of the employees of the mine continued to work there after the event to rehabilitate Hazelton Creek and to rebuild the tailings dam that breached. When this work was completed, many were laid off.

"All businesses and community groups felt the impact of those layoffs," she says. "Retailers saw their sales drop significantly and trades saw less work being required."

Paul French, president of Local 1425 of the United Steelworkers Union says that prior to the breach of the approximate 375 workers employed at the mine, some 80 per cent of them were unionized.

"In all honesty, things went fairly well after the breach," says French. "The mine owners agreed that the clean up and rehabilitation work

would be done by the unionized workers and that work continued until early spring."

French adds that the mine operators slowly began calling people back to work in mid-July, with the granting of the temporary permit.

"Today, there are a little over 200 employees at the mine and about 160 of them are unionized," says French.

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To that end, the community has been very supportive.

"Our hope is that the mine becomes fully operational in early spring of 2016."

French credits the mining company management, the government and MLA Donna Barnett for helping to minimize the impact of the mine closure to the workers.

"As far as I am concerned, they did the best they could under the circumstances," he says.

Also helping out during the disaster was local Cariboo North MLA Coralee Oakes.

NEXT STEPS

According to Haslam, the conditional restricted permit to re-start operations is but the first of three significant steps that the company needs to continue operations – and does not include the ability to discharge water off the site.

"The company will need a second conditional permit in early fall to treat and discharge the water in order for operations to continue," he says, adding that the Ministry of Environment (MOE) has received Mount Polley Mine Corporation's permit application for a short-term water management plan. The MOE's permit application process includes consultation with First Nations, the communities and relevant agencies.

"The company must also submit a long-term water treatment and discharge plan to the government by June 30, 2016," says Haslam. "The mine will not be authorized to continue to operate long term if it fails to complete either of the last two steps."

The community of Williams Lake has high hopes that a complete re-opening of the mine will be possible in the near future.

A LOOK BACK

The August 2014 breach of the tailings storage facility (TSF) at the Mount Polley mine released more than 10 million cubic metres of supernatant water, more than 7 million cubic metres of tailings solids, 6.5 million cubic metres of interstitial water; and more than half a million cubic metres of construction materials into the downstream environment.

According to Imperial metals, the physical impact of this breach included:

- Erosion of the embankment separating the TSF from Polley Lake, as well as along Hazeltine Creek;
- Deposition of trees and woody debris in Polley Lake, along the sides of the erosion path associated with Hazeltine Creek, and into Quesnel Lake at the mouth of Hazeltine Creek; and
- Deposition of tailings and eroded earth in Polley Lake, Hazeltine Creek and Quesnel Lake.

The final report from the Mount Polley Independent Expert Engineering Investigation and Review Panel suggested that the breach was the result of a failure in the foundation of the embankment, a

failure that occurred in a glaciolacustrine (GLU) layer of the embankment's foundation:

"The panel concluded that the dominant contribution to the failure resides in the design. The design did not take into account the complexity of the sub-glacial and pre-glacial geological environment associated with the perimeter embankment foundation. As a result, foundation investigations and associated site characterization failed to identify a continuous GLU layer in the vicinity of the breach and to recognize that it was susceptible to undrained failure when subject to the stresses associated with the embankment."

The report also indicated that the failure was triggered by construction of the downstream rockfill zone at a steep slope. The panel concluded that had the downstream slope been flattened, failure would have been avoided. The slope was in the process of being flattened to meet its ultimate design criteria at the time of the accident.

"At the same time, people want to be sure that a similar accident will not happen again and want the mine to make sure that all precautions are taken and that the re-opening is done properly and safely," states Sommer.

To that end, the community has been very supportive.

"The response from the local community has been very positive," concludes Robertson. "I sense a feeling of relief from many families who are getting back to more normal financial stability, with a paycheque coming in on a regular basis and also, to have a renewed sense of purpose. I'm sure that it must be frustrating to sit around and wait for the recall to happen, which is why we are working so hard to get this next piece of the planning and permitting completed so that we can get the remainder of our workforce back on the job – which is where they should be." ●

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THE MAKINGS OF AN INDUSTRY: B.C.'s PELLETS GAIN WORLD-WIDE ACCEPTANCE

By Melanie Franner



Bulk and bagged pellets.

Canada is home to more than 42 wood-pellet manufacturing facilities, according to the Wood Pellet Association of Canada (WPAC). It's a "seasoned" industry that has established markets all over the world, the largest of which is Europe. And it's an industry that has already proven to be a significant contributor to the Canadian economy and an increasingly robust one for northern B.C.

A GLOBAL PERSPECTIVE

Europe consumes some 80 per cent of the wood pellet market – thanks, in large part, to its Renewable Energy Directive (RED), which mandates (among other things) that 20 per cent of its energy to be renewable. The second largest market is the U.S., followed by Italy.

According to Gordon Murray, executive director of WPAC, Canada

exported 1.6 million metric tonnes (mt) of wood pellets in 2014. This equated to approximately \$276 million. The top three countries on the receiving end of the wood pellets were the United Kingdom at 982,809 mt, or close to \$150 million; the United States at 218,903 mt, or close to \$51 million; and Italy at 204,555 mt, or \$38.5 million.

Wood pellets are increasingly being seen as a way to help fight climate change. According to an industry report entitled British Columbia's Wood Pellet Industry June 2011, wood pellets are "clean-burning", similar to natural gas. They are also said to be carbon neutral in that the carbon dioxide released into the atmosphere

from burning wood pellets is re-absorbed during the next crop's growth cycle. This varies significantly with the one-way flow into the atmosphere of carbon emissions coming from fossil fuel (e.g. coal or oil).

In a May 2015 presentation, WPAC's Murray states that the global demand outlook for wood pellets is a good one. He anticipates that it will jump from 35 million tonnes in 2015 to 51 million tonnes in 2020 and 54 million tonnes in 2025.

"The general market outlook is positive," he says. "Europe will continue to dominate, with the heat and power sectors growing at similar rates. And Asia is showing promise after a slow start."

THE B.C. ADVANTAGE

B.C. is Canada's largest producer of wood pellets. The British Columbia's Wood Pellet Industry June 2011 report states that the province represents 66 per cent of the country's wood pellet production capacity. Atlantic Canada accounts for a combined 18 per cent, Alberta for five per cent and Ontario for one per cent.

A relatively new industry, the wood pellet market now contributes around \$185 million annually to B.C.'s provincial economy. There are seven wood pellet companies that make the province their home: Pinnacle Renewable Energy, Pacific BioEnergy, Northwest Wood Preservers, Houston Pellet, Princeton Co-Generation, Premium Pellet and Okanagan Pellets.

Together, according to the June 2011 report, they produce close to 2 million tonnes per year, employ more than 350 workers in processing and manufacturing, more than 400 workers in woodlands and harvesting, and more than 350 workers in truck driving and transportation.

AT THE TOP OF ITS GAME

Pinnacle Renewable Energy Inc. is the largest producer of wood pellets in B.C., generating the equivalent of 3.5 million cubic metres of wood each year, or 1.5 million tonnes, and accounting for 56 per cent of Canada's total pellet production. Its facilities operate 24/7 and employ approximately 300 people full time. The company started in 1989 as Pinnacle Feed and Pellet and was incorporated as Pinnacle Pellet Inc. in 1993.

"The wood pellet industry in B.C. pre-dates the pine beetle infestation," explains Leroy Reitsma, president and COO of Pinnacle Renewable Energy. "Its roots lay in the efforts to shut down beehive burners in B.C. communities."

According to Reitsma, the company got its start as a provider of home heating products. It also



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went through a phase where the business was focused on producing environmentally friendly kitty litter and high-end horse-bedding material.

"In 2004, we saw the market for wood pellets start to emerge in Europe," says Reitsma. "We saw that the company had the ability to grow by taking a lot of material that had previously been directed to beehive burners."

When the pine beetle infestation spread to epidemic levels, Pinnacle Renewable Energy realized that they could bring economic value to the wood being impacted by the pine beetle. Although the wood couldn't be used for the manufacturing of structural components, it proved ideal for the wood pellet industry.

AN EXPANDED OUTLOOK

Today, Pinnacle Renewable Energy operates seven production facilities throughout B.C., along with a special-purpose port in Prince Rupert, British Columbia.

The production facilities are located in Burns Lake, Strathnaver, Quesnel, Williams Lake and Armstrong. Additionally, Pinnacle is the operating partner of both the Houston Pellet Limited Partnership (a partnership with Canadian Forest Products [Canfor] and the Moricetown First Nation) and the Lavington Pellet Limited Partnership (a partnership with Tolko Industries Ltd.), which is set to commence operations in the Okanagan Valley in the fourth quarter of 2015.

According to Reitsma, the outlook for the wood pellet industry in northern B.C. – and for Pinnacle Renewable Energy in particular – is solid and strong.

"We firmly believe that this industry will grow much larger," he says. "The fact that there has been a demonstrated ability to convert existing coal-fired facilities to pellets without the need to incur significant capital costs is an important factor that we think will bode well for the industry. Not only are the pellets displacing carbon but, as a result of converting to wood pellets, the emissions from those plants that have converted will also improve dramatically – to the point where they can avoid the high cost of upgrading their emission control systems."

MARKET HEATS UP

Northern B.C. has established strong roots in the growing global wood-pellet industry. Home to the majority of the country's manufacturing, B.C. has set the stage for robust growth in the years ahead – one that will continue to contribute to the provincial economy while providing for employment and opportunity for the people who reside here. ●

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BLOWING IN THE WIND: B.C. FALLING BEHIND ON WIND ENERGY

By Melanie Franner

Despite 2014 being a “record year” for wind-energy development in Canada – according to the Canadian Wind Energy Association (CanWEA) – the province of B.C. continues to be outperformed by its neighbours. New installed capacity in the country reached 1,871 MW in 2014, with wind energy projects built and commissioned in Ontario, Quebec, Alberta, Nova Scotia and Prince Edward Island.

With Canada having surpassed the 10,000 MW threshold in May 2015, CanWEA states that we are now seventh in the world for installed capacity. The organization goes on to say that Ontario leads the provinces with 76 wind farms and 4,042 MW of installed capacity. Quebec follows at 37 wind farms and 2,883 MW of installed capacity. Alberta has 37 wind farms and an installed capacity of 1,471 MW. But the commitment to phase out its coal-fired generation facilities can help put Alberta on the fast-track for future installations. The province has the potential to bring more than 2,357 MW of wind energy on-stream between 2016 and 2018.

B.C., by comparison, is expected to add 210 MW during this same period. This will be in addition to the existing five wind farms and 489 MW installed capacity that currently exists in the province.

THE NUMBERS HAVE IT

One of the companies that will be bringing wind energy on stream in B.C. in the near future is Pattern Energy Group LP (Pattern Development). The company completed its \$393 million in financing for its 180 MW Meikle Wind power project, which will be located approximately 33 kilometres north of Tumbler Ridge on Provincial Crown Lands and lies within the traditional territory of the Treaty 8 First Nations.

The Meikle Wind project will involve 61 turbines and, once operational, increase the province's existing wind-power capacity by 38 per cent.

"We expect to be operational in late 2016," says Matt Dallas, spokesperson for Pattern Development. "It will be the largest wind power project in B.C. and will be able to generate clean energy for up to 54,000 homes in the province."

The project has a 25-year power purchase agreement with BC Hydro. Meikle Wind received its Environmental Assessment Certificate in June 2014 and its lands license in September 2014.

EMPTY FIELDS

"Once the Meikle Wind project comes online, no further large-scale wind projects can move into the construction phase of development without a power purchase agreement from BC Hydro," says Ian Baillie, B.C. regional director for CanWEA. "The provincial B.C. government has committed to building its large Site C hydro-electric power dam. We need policy makers to make sure there is room for wind technology."

According to Baillie, the cost of wind energy has decreased significantly in the last five years.

"We've seen some incredible reductions in pricing and competitive forces around wind-energy generation," he says. "Regardless, B.C. is nearing the back of the pack compared to the rest of the provinces – even though we have tremendous wind resources."

On a brighter note, Baillie believes that there are a couple of factors that may drive policy makers toward greater adoption of wind power.

"One, I think there is a lot of opportunity in B.C. with the extra load demand that will come from industry, like LNG," he says. "The second factor is dependent upon what we're going to do about climate change. How far and how fast does the province want to reduce GHG emissions? If any of these potential LNG facilities were to come on stream, they would significantly increase GHG emissions. What will the province do to try to mitigate this? How big of a push are we going to make for renewable energy?"

Baillie adds that there are several companies in B.C. that would like to be active in the wind energy market.

"There are at least 10 to 12 companies that have expressed interest and/or have projects under development," he says. "But until there are power purchase agreements in place with BC Hydro, these projects will not go forward."

WAITING IN THE WINGS

EDF EN Canada is one of the companies waiting for the green light from BC Hydro before moving ahead with its Taylor Wind and Sundance Wind projects. The former is a proposed 250-400 MW wind-energy project located on private land between Taylor and Dawson Creek, while the latter is a 250 MW wind-power project located on public land between Tumbler Ridge and Chetwynd.

Both projects have been going through a B.C. Environmental Assessment process since 2012.

"These projects have been developed in anticipation of a future power call from BC Hydro," explains David Warner, developer with EDF EN Canada. "Without the certainty of a power purchase agreement from BC Hydro, these projects won't go forward."

Both the Taylor Wind and Sundance Wind projects are "sweetening" the deal to be ready if and when BC Hydro puts out that power call.

"Some of the other projects picked up by BC Hydro ran into problems with permitting and First Nations," he says. "Part of our plan is to attain the approvals ahead of time to provide more certainty."

Warner concedes that BC Hydro's current plan of purchasing power on an as-needed basis is a compelling argument and one that makes sense. At the same time, he believes that wind energy deserves some attention.

"Obviously, BC Hydro has invested significant resources in the Site C



Building a turbine at Meikle Wind.

Both the Taylor Wind and Sundance Wind projects are “sweetening” the deal to be ready if and when BC Hydro puts out that power call.

hydro-electric dam,” he says. “But we believe that renewable energy can play a key role in providing power to the B.C. grid. For one, wind energy is at an all-time low cost. And two, it is incredibly modular and can be built on an as-needed basis.”

Not to mention that load demand may increase at any time in the near future. Site C won’t be operational until at least 2024. And the movement to renewable energy is one that continues to gather speed.

The city of Vancouver, for example, has defined itself as a proponent of renewable energy, committing to obtain 100 per cent of its energy from renewable sources by 2050 – and reducing GHG emission by 80 per cent (over 2007 numbers) in the process.

“I think has been a lot of interest in B.C. in wind power over the last few years and frankly, I think there still is,” concludes Baillie. ●

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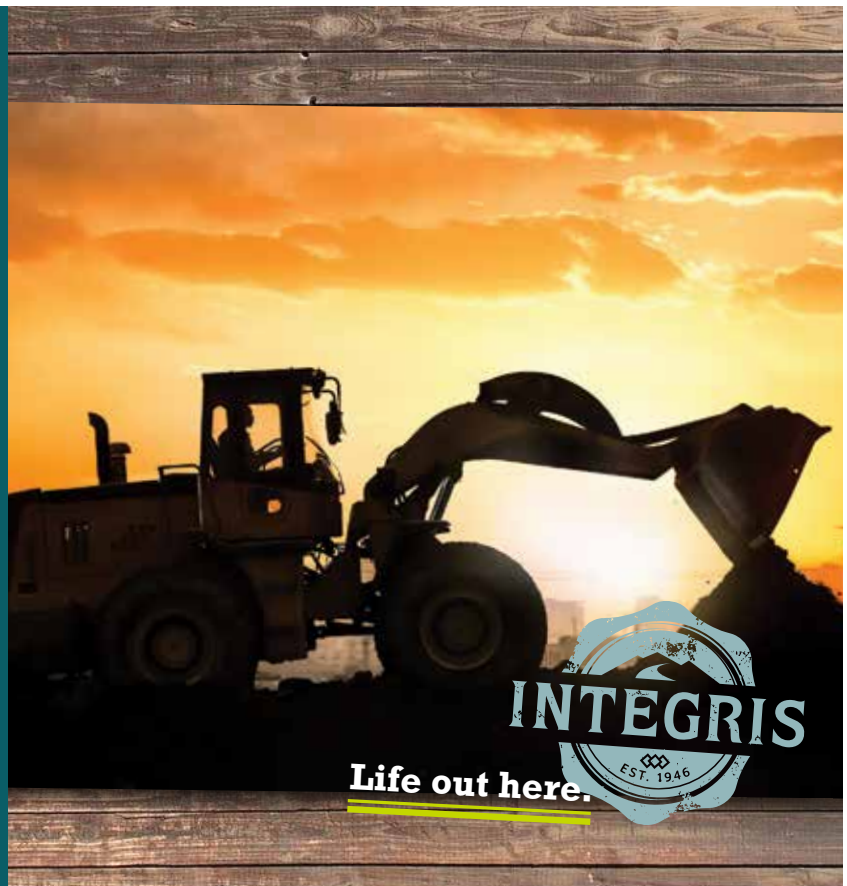


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LNG PROJECTS MAKING AN IMPACT IN B.C.

TransCanada Pipeline's Prince Rupert Gas Transmission Project and the Coastal GasLink Project Mean Jobs and Economic Boost to Northern B.C.

By Emily Pike



The Prince Rupert Gas Transmission Project and the Coastal GasLink project are two potential natural gas pipeline projects in British Columbia that will connect to liquefied natural gas (LNG) facilities. Proposed by TransCanada Pipelines Limited, a North American company with over 65 years' experience, the two projects combined would operate approximately 1,570 kilometres of pipeline across B.C.

The Coastal GasLink pipeline proposes to construct a 670-kilometre-long natural gas pipeline from an area near the community of Groundbirch, B.C., about 40 kilometres west of Dawson Creek, to the proposed LNG Canada Development Inc. liquid natural gas export facility near Kitimat. The Prince Rupert Gas Transmission project, would start near Hudson's Hope and run 900 kilometres of pipeline across

to the proposed Pacific NorthWest Liquid Natural Gas facility on Lelu Island, in the District of Port Edward.

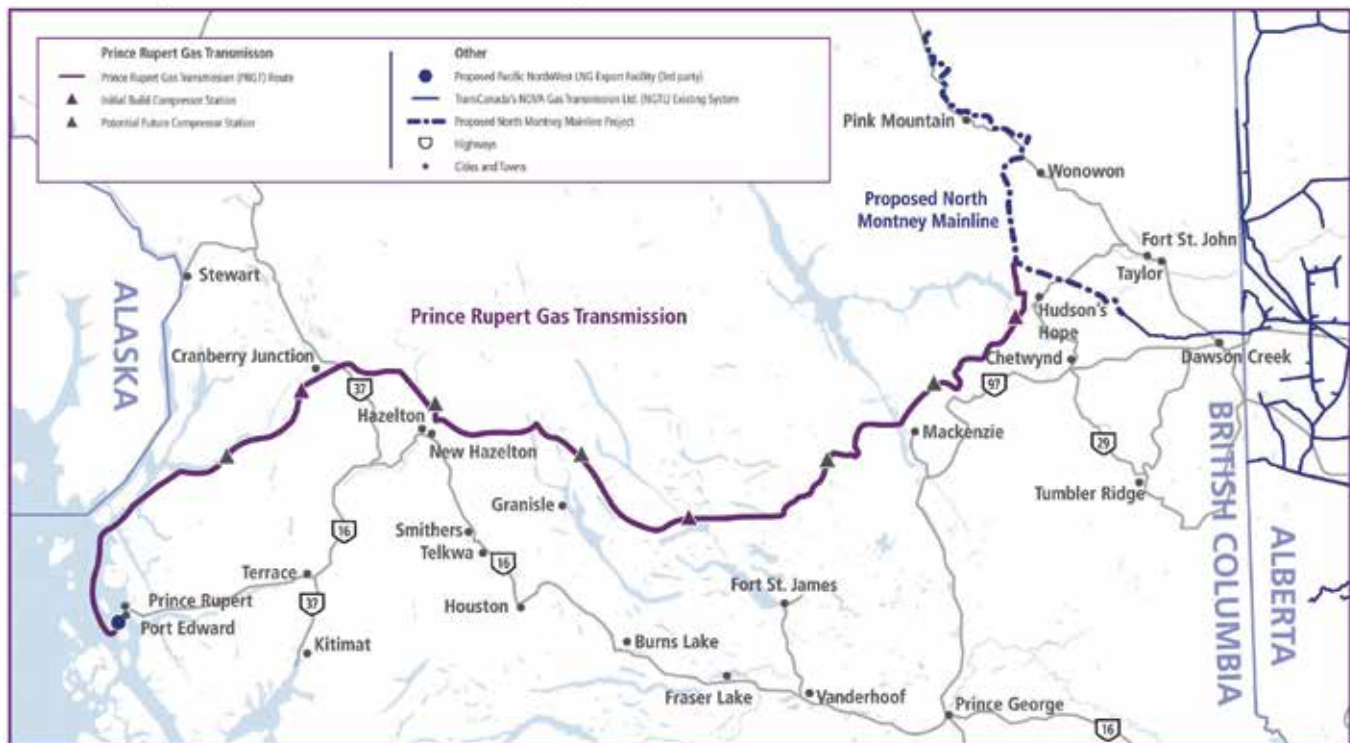
TransCanada Pipelines Ltd., which earned a position on the Dow Jones Sustainability Index World and North American Indices in 2015 for the 13th time, operates a network of pipelines that extends more than 68,000 kilometres. They tap into virtually all major gas supply basins in North

America and this infrastructure delivers approximately 20 per cent of the continent's natural gas supply.

The two pipeline projects are in various stages of the approval process.

"The Prince Rupert Gas Transmission Project is now fully permitted, having achieved approvals from both the British Columbia Environmental Assessment Office and the British Columbia Oil & Gas

Prince Rupert Gas Transmission Project



Commission,” says John Dunn, vice-president for TransCanada’s Prince Rupert Gas Transmission project. “Our customer, Pacific NorthWest LNG, made a positive Final Investment Decision in June of this year, subject to two conditions. The first condition was approval of the Project Development Agreement by the B.C. Legislature, which was satisfied in July. The second condition is approval of the Pacific NorthWest LNG facility by the Canadian Environmental Assessment Agency (CEAA). Once CEAA approval is given, Pacific NorthWest LNG will confirm their positive Final Investment Decision, and work on the project can begin.”

The Coastal GasLink project is also awaiting approvals – in their case, final permits from the BC Oil & Gas Commission. As Greg Cano, director of project planning and execution for TransCanada’s Coastal GasLink, notes, “We are working to be ready to start construction in 2016, conditional on regulatory approvals from the BC Oil & Gas Commission and a positive investment decision by LNG Canada, our customer.”

The two proposed pipelines run generally from the eastern side of B.C. to the west coast, somewhat parallel to one another, but through very challenging and different geographies to access different delivery points on the west coast. Cano assures that both pipelines are required. “Each project was created to meet the needs of our individual customers. Recent advances in drilling technology have dramatically increased recoverable natural gas reserves in Northeastern British Columbia and elsewhere in the Western Canada Sedimentary Basin. Future production from these reserves will significantly exceed domestic demand. Other existing and currently proposed pipelines do not provide sufficient capacity to transport all of the natural gas expected to be required to satisfy export demands.”

Both the Prince Rupert Gas Transmission Project and the Coastal GasLink Project have engaged extensively with the public since the projects were first announced, and Dunn is proud of the continuing work to ensure they have community support. “We have

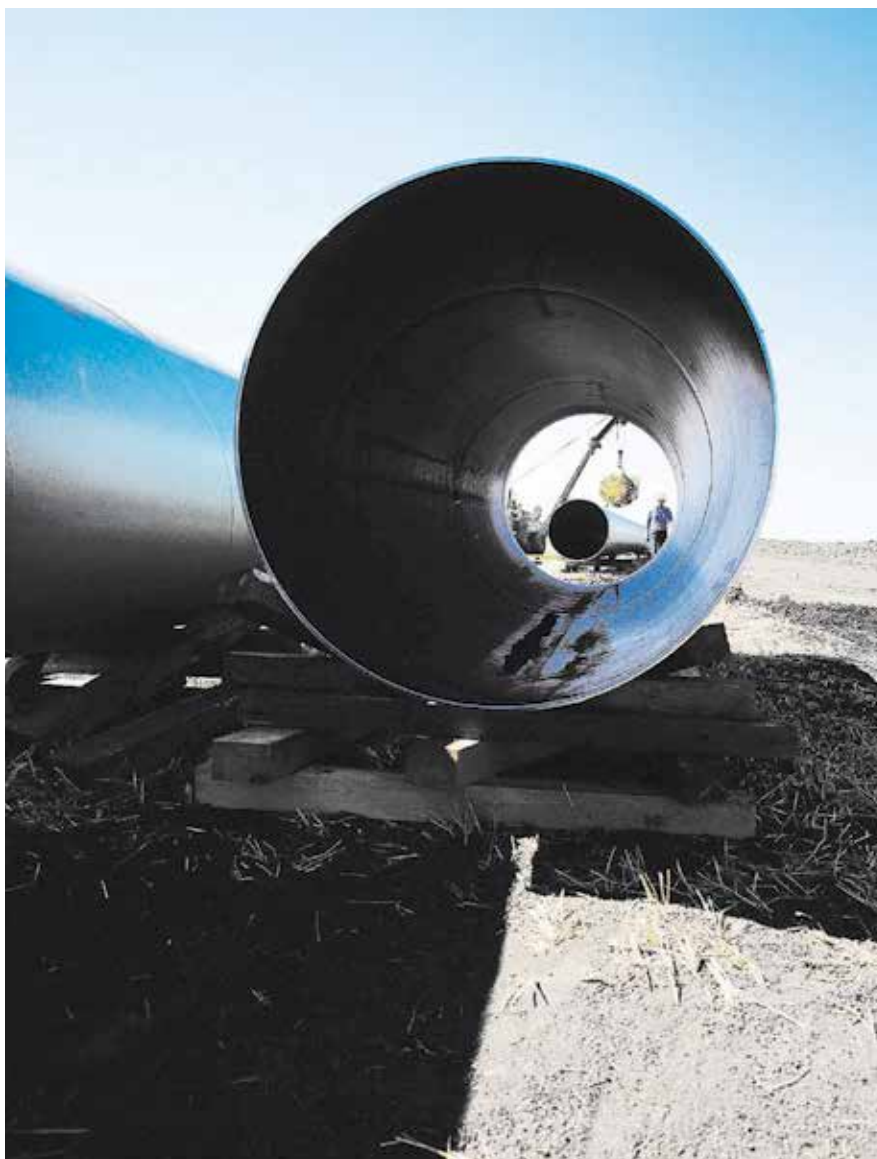
very broad community and aboriginal support. Both projects continue engagement with aboriginal groups and stakeholders along the pipeline routes and are making steady progress in concluding long-term project agreements so project benefits will be shared with First Nation communities. Both projects have also received extensive written support from mayors and councils, and chambers of commerce along the route.”

Dave MacDonald, mayor of the District of Port Edward, is one of the many who have extended support to the PRGT project. “They’ve done open houses in our community, which we appreciate because we are a municipality that wants to hear first-hand what is going on. We’re confident and very hopeful that they will address any community concerns and safety issues associated with the installation and operation of these pipelines. We want to see the plant and the pipeline, but we want to see it be as environmentally friendly as possible.”

MacDonald also touches on another hot issue: that of not only construction employment opportunities, but also



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long-term operational jobs that will be created as a result of the pipelines. "We know that there are jobs in the future, in the plant in particular, and we want to see families coming home and kids able to come back and live in their home community, but they need there to be work here for that to happen. The liquid natural gas processing facility will provide that opportunity."

Throughout the course of construction, TransCanada will require several thousand workers for each of the natural gas pipeline projects, and they will focus on making those jobs available and accessible locally, as Cano shares. "We want to ensure that as many of the available construction jobs are given to local workers as possible. We have made investments in skills training – partnering with northern B.C. colleges and First Nations training organizations to increase capacity in this region."

TransCanada expects that these projects will require a large number of skilled workers during the construction phase, which will pump billions of dollars into provincial and local economies and provide high-paying jobs to support families and their communities.

Through surveys and discussions with TransCanada about the projects, environmental impacts have consistently shown up as the number-one concern for the public. "We are committed to protecting the environment, not just because we have to, but because we want to," Dunn says. "Indeed, we have made substantial changes to the project route in direct response to feedback from First Nations and communities along the route, and those changes will help ensure that the project's environmental footprint is minimized. Our applications to the BC Environmental Assessment Office – which are available on their website – reflect our extensive awareness of environmental issues and our plans to mitigate any effects of our pipeline construction."

Both the Prince Rupert Gas Transmission Project and the Coastal GasLink Project are committed to reclamation of the environment along the pipeline, which means they return the disturbed land to a capability similar to what existed prior to construction. The projects create rights-of-way during construction, return the areas to as close to their original condition as possible, then maintain the rights-of-way so that they are able to monitor and inspect the pipelines once operational.

“Following construction, we’ll reclaim the land to an equivalent land capability by implementing measures identified in the approved Environmental Protection Plans. We take significant measures to prevent erosion and establish and maintain vegetative cover that is compatible with surrounding land use,” Dunn notes.

Before reclamation is necessary, and before a pipeline path was proposed, extensive research went into the best possible routes – both to minimize



Members of the community relations team connecting with public at open house.

potential environmental concerns and to ensure preservation of plants and animals in the region. The Prince Rupert Gas Transmission project proposes things like drilling under rivers and streams so as to not disturb the fish or habitat.

On the Coastal GasLink project, over 330,000 hours of fieldwork has been completed so far that includes studying fish, wildlife, terrain, soils, vegetation, wetlands, water bodies, archaeological resources, traditional ecological knowledge and timber. Fieldwork



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was also done to identify, locate and respect rare plants that need special protection, such as berry patches that are important as aboriginal food sources and used as medicinal sources for the aboriginal people. Recently, the project announced its intent to apply for an alternate route, after feedback was received from aboriginal groups about the potential impact of pipeline construction and operations on ground water flows into the Morice River.

Even though environmental impacts are the biggest concern on projects like this, they aren't the only one. Safety in the construction and maintenance of the pipeline, as well as processing and transportation of the gas, are obvious concerns with such a project.

TransCanada is focused on pipeline safety, Cano explains. "Safety of the public and the environment is a top priority for TransCanada. Through our integrity management program – which includes ongoing maintenance and inspection, combined with investment in pipeline research and development to continually improve our materials and processes – we are focused on preventing pipeline incidents. We have a strong interest in making sure that our pipelines are designed, constructed and operated safely and reliably. The public and our shareholders expect it, because it not only makes good business sense, it is just common sense. Safety and reliability are key to operating and

building the energy infrastructure North Americans need for years to come.

"The most critical threat to buried pipelines is damage resulting from third-party excavation," Cano says. "This threat is reduced through design, construction and operation of the pipeline and through TransCanada's voluntary participation in various 'one-call' and 'call before you dig' programs across North America."

The immediate benefits during the construction process would be the demand for local goods and services, such as lodging and accommodation, and construction-focused needs like gravel supplies



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and construction equipment, on top of the aforementioned employment opportunities.

"These two projects will provide significant economic benefits for British Columbians, local and provincial governments, and aboriginal communities as it supports the export of surplus natural gas to global markets, including millions of dollars in annual taxes to help support local services such as schools, policing, fire protection, and waste management, and billions of dollars in new investments for the province," Dunn says. "There will be thousands of high-quality jobs during construction, business opportunities both locally

and for the aboriginal community in local goods and services including food and accommodation, hardware, fuel, and parts and servicing during construction. There has already been over \$6.5 million invested in B.C. communities, and there will be billions of dollars in new investments for the province.

With a view to helping improve the communities they impact wherever possible, Dunn shares what TransCanada's vision is for opportunities and business in northern B.C. for the two proposed routes: "During construction and operation, B.C. will benefit from hundreds of millions of dollars in contracting and

thousands of jobs. Most business opportunities and jobs on the projects will be provided through prime contractors or their sub-contractors."

"It is our objective to have a large portion of the construction-phase jobs made available to B.C. residents, and we will need qualified B.C. labour during the construction period. Every prime contractor will have a local and aboriginal participation plan that will address their approach to maximizing local contracting and employment. Importantly, specific opportunities for clearing, camp management, security and medical services have already been committed to for aboriginal business." ●

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NORTHERN B.C. READIES FOR INDUSTRY AS BC HYDRO MOVES INTO ACTION

By Melanie Franner



Much has been made of the potential LNG industry and its effect on northern British Columbia. But regardless of if and when this sector materializes on the horizon, the fact is that northern B.C. is poised for significant development from a range of industries, be they forestry, mining, natural gas – the list goes on and on.

To help prepare for this wave of industrial development, BC Hydro has

set a couple of significant projects in motion – not the least of which are the Site C Clean Energy Project and the Dawson Creek/Chetwynd Area Transmission (DCAT) Project.

YEARS IN THE MAKING

The Site C Clean Energy Project is the third dam and hydro-electric generating station to be located on the Peace River in northeast B.C. When

operational in 2024, it will provide 1,100 megawatts (MW) of capacity and about 5,100 gigawatt hours of energy each year to the province's electrical system. This will provide enough energy to power the equivalent of about 450,000 homes in the province per year.

"The load forecasts show that the long-term need for this project is driven by the projected population

growth, which Stats Can identifies as a growth of 1 million people, and by the economic development expected for that region,” states Dave Conway, BC Hydro’s community relations manager for the Site C Clean Energy Project.

BC Hydro began review of the Site C Clean Energy Project in 2004 and has been working on the project – in earnest – since 2007. But the road thus far has been anything but easy.

“From a regulatory perspective, we have a number of the authorizations and permits that we require,” explains Conway, who adds that the utility received the federal environmental certificate and provincial environmental certificate in October 2014. The provincial financial approval came in December of that same year. The utility also has the prerequisite federal fisheries and navigable authorizations. It has also received a number of the permits required to work on the Crown and BC Hydro-owned lands surrounding the dam site.

“There is a judicial review hearing underway in the B.C. Supreme Court regarding permits issued in the summer of 2015,” says Conway. “The judicial review of the provincial permits was filed by the West Moberly First Nation and Prophet River First Nation.”

In addition to their court case in respect of the provincial permits, the West Moberly and Prophet River First Nations and Peace Valley Landowners Association filed four judicial reviews in federal and provincial courts challenging the federal and provincial environmental approvals for the project. All four of those cases have been heard and dismissed by the federal and provincial courts. West Moberly and Prophet River Nations have now filed two appeals and PVLA has filed one appeal.

“We have been engaged in consultations with First Nations and aboriginal groups since 2007,” says Conway. “To date, offers of accommodation have been made to all aboriginal groups significantly affected by the project.”

At a cost of \$8.35 billion, the Site C



BY THE NUMBERS SITE C CLEAN ENERGY PROJECT

- Creation of approximately 10,000 person-years of direct employment during construction;
- 33,000 total person-years of employment through all stages of development and construction;
- Construction will contribute \$3.2 billion to the provincial GDP;
- During construction, \$40 million in tax revenues will be generated for the local governments;
- Once in operation, Site C will generate \$2 million in revenue from grants-in-lieu and school taxes;
- Over the first 50 years of operation, ratepayers will save an average of \$650 to \$900 million each year, compared to alternatives; and
- Site C will be a source of clean and renewable electricity for more than 100 years.



Clean Energy Project is among the largest of the utilities to date.

“With a large hydro project like this, you have high upfront capital costs,” says Conway. “But, you also have low, predictable operating costs in the long run. This project has a financial lifespan of 70 years and a physical lifespan of 100-plus years. Other alternative energy sources – like gas-fired generation, wind, biomass and micro-hydro – can have lower upfront capital costs but they can have high operating costs, shorter lifespans, and some – like solar, wind and micro-hydro – are an intermittent resource. They aren’t a dependable resource. You can’t count on them to supply electricity on a set date and time in the future when it’s 15-degrees below outside, people need dependable power.”

Conway goes on to cite the provincial examples of Quebec, Manitoba and British Columbia as currently having the lowest electricity rates in North America.

“We all have large hydro-electric facilities that are 30 to 40 years old, which means that our operating costs are low,” he explains “Consumers and industry are reaping the benefits of that.”

DCAT UP AND RUNNING

Another significant BC Hydro project focused on delivering electricity to the northern area of the province is the Dawson Creek/Chetwynd Area Transmission (DCAT) project. DCAT will help to meet the demand for clean energy in the Dawson Creek and Groundbirch area of the province by doubling the system capacity in the area. The project – which became fully operational in November 2015 – includes a new substation, expansions to two existing substations and two new 230-kilovolt double-circuit transmission lines.

“The western segment of DCAT – from Sundance Lakes Substation to Shell Groundbirch Substation – was energized in July 2015,” says Lesley Wood, stakeholder engagement manager for BC Hydro. “The remaining parts of the line were energized in October and November.”

According to Wood, the electricity demand in the area is growing at an unprecedented rate due to natural gas exploration and development in the nearby Montney shale gas deposits.

“Over the next decade, annual load growth in the south Peace area is expected to be about 10 times that of the rest of B.C.,” she says. “This is some of the most dramatic single

industry regional load growth that BC Hydro has seen in the last 50 years.”

Construction on the DCAT project began in November 2013 and came with a \$296.4 million price tag. It involved the erection of 240 steel poles, about two-thirds of which are monopoles; the rest are lattice towers.

Mike Bernier, minister of education and MLA for Peace River South, speaks of the benefits of the DCAT project to his region in particular.

“This is a very important project that will help facilitate present and future growth in the South Peace area,” he says. “DCAT allows for compressor and production facilities to run on hydro power rather than natural gas, which means fewer greenhouse gases. Without DCAT, many companies would have been forced to locate in other regions or even outside of British Columbia. The economic benefits will mean tens of millions of dollars being invested in the South Peace.”

Mayor of Dawson Creek, Dale Bumstead, also speaks to the benefits of having the added electrical capacity.

“The DCAT is very important for a number of reasons,” he explains. “The demand for on-grid power into our region is vital to economic development opportunities. It is also necessary in

order to grow our community and provide a quality of life for our residents. This community is built on agriculture, transportation, tourism, forestry and now, thanks to DCAT, natural gas operations powered by clean energy from BC Hydro. Having such broad diversification keeps us strong.”

Bumstead also refers to the economic spinoff gained from the construction of the DCAT project – up to 110 jobs per year during the construction phase.

Although the DCAT project will help to meet electricity demands in the south Peace area of the province, BC Hydro is already looking beyond to meet future growth.

“DCAT is a very large transmission line and will double the amount of electricity that we can deliver into the area,” explains Wood. “But the line can carry a lot more power than we can currently put into it. And we know that a lot more industry wants to connect. That’s why we’re now working on a second project: the Peace Region Electricity Supply Project. In a nutshell, this project will bring more electricity from BC Hydro’s northeast generating facilities to the DCAT line. It will more than double electricity supply to the south Peace area, as well as improve the reliability of service to existing customers.”

According to Wood, there are currently five alternatives on the table, with several routing and design sub-options, taking the total to 11 possible ways of doing the project. “We’re expecting to have a leading alternative by the end of 2015,” she says, adding that if all goes according to schedule, construction could start as early as 2018, with an in-service date of 2022.

“Both projects are extremely significant,” concludes Wood. “And both are exciting projects to work on because they will play such an important role in the provincial economy going forward.” ●

100 DAYS AND COUNTING

Despite the court challenges still underway, the Site C Clean Energy Project is moving ahead on site preparation. November 2015 marked the first 100 days of construction activity. This work entailed cleaning trees and vegetation at the dam site; upgrading public roads; building access roads at the dam site; constructing a 1,600-person worker accommodation facility; excavation and slope stabilization; and the start of work on a temporary construction bridge across the Peace River.

HIGHLIGHTS OF THE FIRST 100 DAYS INCLUDE:

- More than 600 people currently working at the site;
- More than 1,000 people and over 200 businesses participated in job fairs and business-to-business networking sessions;
- 900 metres of public road improvements completed, with another 1.6 kilometres of roadwork underway;
- Over 530 hectares of land cleared in preparation;
- Approximately 13,000 m³ of timber delivered to local mills for processing;
- More than 1 million m³ of material has been excavated and relocated on the north bank of the dam site;
- A temporary 300-person work camp has been set up while the 1,600-person lodge is constructed; and
- The first concrete pour for the lodge has taken place and the first dorms have been delivered to the site.

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MADE IN B.C.

LNG-Buy BC Program Connecting B.C. Businesses with LNG Opportunities

By Jillian Mitchell



Minister of Jobs, Tourism and Skills Training and the Minister Responsible for Labour, Shirley Bond, who says that the LNG-Buy BC program was created to connect LNG project proponents with B.C. companies.

The world-wide demand for Liquefied Natural Gas (LNG) is rising, with a projected 250 per cent increase over the next 20 years—and B.C. is touted as having the supply. Ensuring B.C. businesses are first in line to harness this opportunity is the LNG Buy BC Program.

“LNG has the potential to unleash incredible opportunities for our province, as well as B.C. businesses,” says the Honourable Shirley Bond, Minister of Jobs, Tourism and Skills Training and the Minister Responsible for Labour. “The LNG-Buy BC program was created to connect LNG project proponents with B.C. companies large and small in every corner of British Columbia.”

The LNG-Buy BC program was announced by Premier Clark in the fall of 2013 with a mandate to link major investors across a range of industries with local B.C. businesses.

The complementary online tool (www.LNGBuyBC.ca) was launched in November 2014.

A kind of LinkedIn for the LNG industry, the user-friendly website has attracted a total of 610 companies, as of July 2015, and subsequent opportunities for business.

“As proponent LNG companies select their prime contractors, B.C. businesses are able to engage through the LNG-Buy BC program,” adds Minister Bond of the online tool. “In addition, connections are also being achieved through direct consultation with business and community information sessions.”

Since June 2014, the provincial government has hosted 26 workshops aimed to prepare British Columbians for these opportunities, with more than 800 participants taking part. Bond confirms that plans were in place to increase outreach to the business community in



Liquefied Natural Gas (LNG)

- Natural gas is a by-product of decaying plant and animal matter left deep underground millions of years ago.
- This natural gas is trapped or isolated in rock formations which prevents it from surfacing.
- Hydraulic fracturing is a process that pumps fluid and sand down a well at high pressure to break apart rock and release natural gas.
- When the pressure is relieved, the water and gas flow up into the well. It is then sent to a processing facility by pipeline.
- The fracturing process has been used for over 60 years.
- British Columbia has enough natural gas to supply domestic and international markets for over 150 years.

Converting Natural Gas to a Liquid

- Natural gas turns into a liquid when chilled to -160° Celsius.
- In liquid form, natural gas compresses, taking up 1/600th less space.
- Once compressed, **LNG** can be securely stored on a ship and safely transported overseas to markets.



advance of the International LNG in B.C. conference that took place in October.

Last year's strong participation at the International LNG in B.C. conference, along with significant interest through the many LNG-Buy BC workshops, indicates that local companies are interested in learning about how to benefit from LNG-related business.

The minister continues: “As industry moves toward a final investment decision, the advantages of B.C. company engagement have been embraced by most engineering, procurement and construction (EPC) companies, giving the program and B.C. business a real boost. This is particularly

A WORD FROM THE ONLINE COMMUNITY

Dr. Zoher Meratla of CDS Research Ltd.

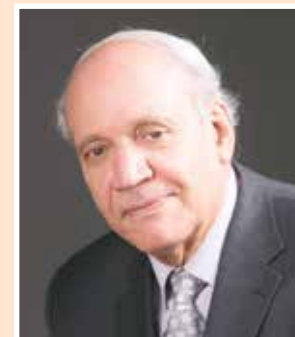
"As a B.C.-based company, we have been privileged to perform the pre-FEED (Preliminary Front-End Engineering Design) and subsequently oversee FEED for the KM LNG project in Kitimat, the first LNG export prospect in Canada. During pre-FEED, we canvassed the lower mainland for fabrication capabilities and were amazed by the tremendous capabilities available here in

B.C. In the Kitimat area, we experienced firsthand the high expectations of the local communities.

When LNG projects move to implementation, schedule and cost-cutting considerations can override proponent promises on local content. Qualified labour and hourly rates are common excuses. During our work on the Peru LNG export project, we saw an exceptional

integration of local labour and content into the project, to the credit of both the proponent and EPC contract. Ironically, the Peru LNG project was completed on budget and on schedule, and is commonly referenced as a success story.

In B.C., the government adopted, at the outset, employment of British Columbians and local content as key cornerstones of LNG development in our province. Equally important, participation in the early LNG projects will cultivate skill development for subsequent projects. The endeavours already in place for labour training gives B.C. workers a clear advantage. Given the expected access to opportunities, local fabricators and service



providers will no doubt be competitive.

The LNG-Buy BC online tool offers a unique platform for British Columbians to access, network and partake not only in LNG projects, but also pipelines. We have used this platform from the outset and found it extremely useful.

The Ministry of Labour is to be particularly commended for including the WorkSafeBC Health & Safety Requirements so that prospective suppliers become aware of and comply with these requirements."



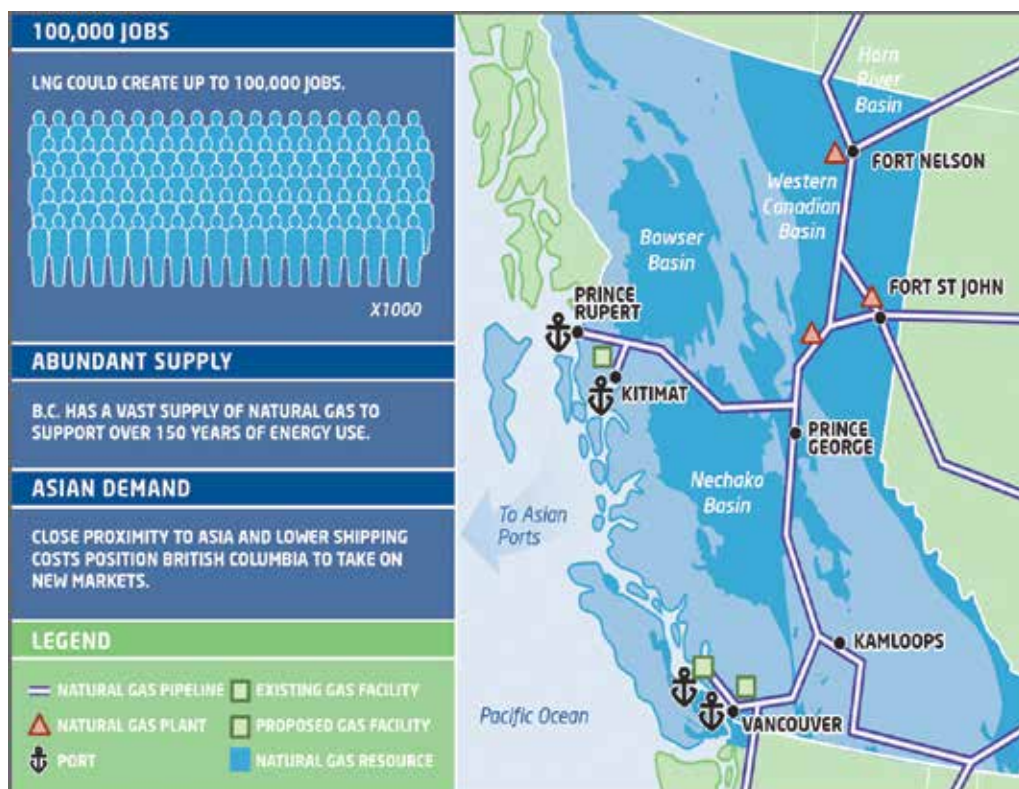
CDS Research Ltd. project map.

true of aboriginal-owned businesses."

The LNG-Buy BC program has been touted as a valuable way to help B.C. businesses raise their profile to connect and benefit from LNG investments once projects move forward. Add to that, the program is also helping B.C. companies identify and remove deficiencies from their business, and additionally, helping to connect fellow local companies. Bond confirms that joint ventures and partnerships are being encouraged, while supplier development support is provided.

An estimated 2.933 quadrillion cubic feet of natural gas rests in northeast B.C. alone. For Bond, numbers like these hint at a bright future.

"We are in the early stages of LNG opportunities within the province," she says. "LNG projects will span many years." ●



CONIFEX TURNS SAWMILL RESIDUALS INTO CLEAN ENERGY

By Lisa Fattori



Power plant at site.

Once disposed of as residual waste, sawmill byproduct is now valuable fuel at Conifex's 36-megawatt (MW) biomass power plant in Mackenzie, B.C. Completed in May 2015, the facility is producing 230 gigawatt (GWh) hours of clean energy per year to over 20,000 homes in B.C., creating a new revenue stream for the company, all the while contributing to the province's goal of reducing greenhouse gas emissions.

As a wholly owned subsidiary of Conifex Timber Inc., Conifex Power Limited Partnership complements the company's forestry and lumber

operations. Since 2008, Conifex has specialized in timber harvesting, reforestation management and sawmilling logs into lumber and wood chips, which are sold in Canada and around the world. Headquartered in Vancouver, the company operates sawmills in Fort. St. James and Mackenzie, with residual byproduct at its Mackenzie facility used to feed the power plant. Dry shavings and hog fuel (bark) from Conifex's own sawmill and others in the area supply approximately 172,000 tons of fuel, per year. Conifex envisions sourcing in-forest fiber residuals in the future.

"In 2010, the province encouraged companies to come forward with good proposals for independent power production," says Sandy Ferguson, VP of corporate development for Conifex Timber Inc. "We saw this as a great opportunity to expand our operations to include bioenergy. We have a 20-year Electricity Purchase Agreement with the British Columbia Hydro and Power Authority, as well as a Load Displacement Agreement. This enables us to use the electricity generated to offset our operations, with the balance sold to the B.C. grid."

Situated close to Conifex's Mackenzie sawmill, Conifex Power occupies space that was once a newspaper facility, and incorporates the original building footprint and some equipment of the former plant. Construction of the retrofit project began in August 2012, with the bulk of construction activity taking place between September 2013 and October 2014. Following the completion of a continuous 72-hour run test in April 2015, the plant received approval to commence commercial operations.

Given the complexity of the retrofit and the required expertise in power generation, Conifex called on Spectrum Energy and Clean Energy Consulting Inc. to design the new facility. The \$103.5 million project maximized cost-efficiency by using existing assets, refurbishing equipment that needed upgrading and adding on new equipment, such as a state-of-the-art Dresser Rand steam turbine.

"We had this big asset, with several pieces in good operating condition, and some that required refurbishing and repurposing," Ferguson says. "There was an ABB boiler, for example, that was still in good condition and we refurbished it for our needs. The biggest challenge was determining what to keep and integrate, and what to buy new. Still, when compared to building a brand-new facility, we probably saved half by retrofitting."

The biomass power plant is comprised of two separate receiving areas: one for the wet, hog fuel and the other for kiln-dried shavings and wood chips from the sawmill. The wet fuel is screened to remove large pieces of material and then it is processed in a hogger, where it is consistently sized down. The material is transferred to a fuel shed the size of a football stadium, which stores a fuel supply for 10 days of operations. The dry fuel is also processed into smaller material and then is hammered and pulverized before being stored for three days.



Hog fuel on conveyor.



Close-up silo.

The plant's boiler house processes the wet and dry fuel together, achieving the right recipe for optimum efficiency. The resulting steam is then piped to the electricity-producing turbine generator that feeds the power to the substation before it is transmitted to the grid.

"This is a state-of-the-art fuel-handling facility, with two fuel systems for a more appropriate mix," Ferguson says. "We're the only saw mill operation that has a stand-alone biomass facility and, it's particularly unique because it integrates the old with the new." ●

UNDERCOVER WITH ENVIRONMENTAL DYNAMICS INC.

By Melanie Franner



Darren Wiens is one of 70-plus full-time environmental professionals at Environmental Dynamics Inc. (EDI), a provider of professional consulting services in aquatic and terrestrial science, environmental impact assessment, environmental planning and permitting, habitat mitigation,

compensation and restoration, and construction monitoring.

Born and raised on a farm outside of Kipling, Saskatchewan, Wiens was drawn to wildlife and nature from an early age. He started with EDI in 2013 as a GIS analyst/project manager, after working at the Foothills Research Institute in Hinton, Alberta.

He comes to EDI with a bachelor of science degree in biology from Simon Fraser University, a master's of science degree in wildlife from Louisiana State University, and an advanced diploma in GIS from BCIT.

"My responsibilities at EDI focus on GIS duties, like mapping, spatial analysis and data management," says Wiens. "I have worked on hundreds of projects across western Canada, primarily in

the Prince George and Grande Prairie offices, but I have also travelled to our offices in Vancouver, Whitehorse and Nanaimo."

It is while being employed at EDI that Wiens has been able to take advantage of cutting-edge technology to better perform his project management duties – planning, field co-ordination, and reporting – for various wildlife-related projects possessing a strong GIS focus.

"One of our innovative uses of technology involves remotely monitoring wildlife using trail cameras," he explains. "We have used trail cameras to monitor habitat use by large mammals and trumpeter swans, as well as to confirm songbird nest attendance."

According to Wiens, the use of trail cameras enables wildlife monitoring



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without disruption to the population being monitored.

"Trail cameras provide value because they are cost effective," he adds. "It costs a lot less to inspect photographs than to provide continuous field-monitoring services in person. But other benefits include the ability to function 24 hours a day without fatigue or distraction, in darkness or in other potentially hazardous conditions. Uniformly collected photographs also serve as valuable, unbiased, permanent scientific data."

One of Wiens' recent projects that involved the use of a trail camera involved the assessing of trumpeter swan use of a large lake in western Canada.

"We used trail cameras to determine which areas of the lake were least used by the swans throughout the 2014 breeding season," he explains. "Trumpeter swans are very easily disturbed, so monitoring them without affecting their behaviour was an important consideration."

To accomplish this, Wiens used the Recyonix HyperFire Series Game Camera. The camera is capable of holding up to 32GB, which equates to several thousand photos.

"We started using the trail cameras in 2013 and they have since become a vital part of our tool kit," he says.

The trail cameras have also been put to good use in the Murray River Project, a proposed underground coal mine located southwest of Tumbler Ridge, BC. EDI's role in the project includes:

- Development of wildlife habitat suitability ratings for the purpose of: quantifying the ability of ecosystem capability for specific wildlife species; and providing information to plan mitigation and monitor potential effects of development;
- Determine use of project area by migratory waterfowl during spring and fall staging;
- Year-round water quality sampling within the project area; and
- Aquatic resources baseline sampling or primary (perphyton,

phytoplankton) and secondary (zooplankton, benthic invertebrates) producers.

Thanks to the use of innovative technology like trail cameras, EDI can continue to lead by example – demonstrating its commitment to the sustainable practices while answering the needs of its customers.

And, having been in business since 1994, EDI has had a lot of customers. Based in Prince George, the company also has locations in western and northern Canada, including Vancouver, Nanaimo, Grande Prairie, Calgary,

Whitehorse and Saskatoon. EDI has over 70 full-time environmental professionals dedicated to providing high-quality services to private, public and First Nations clients, including those in the mining, renewable energy, oil and gas, transportation, urban development and forestry sectors.

EDI has won several awards over the years, including the 2011 and 2012 Canadian Environmental Employer of the Year award by ECO Canada. It was also selected by *Up Here Business* magazine in 2010 as one of six top northern employers. ●



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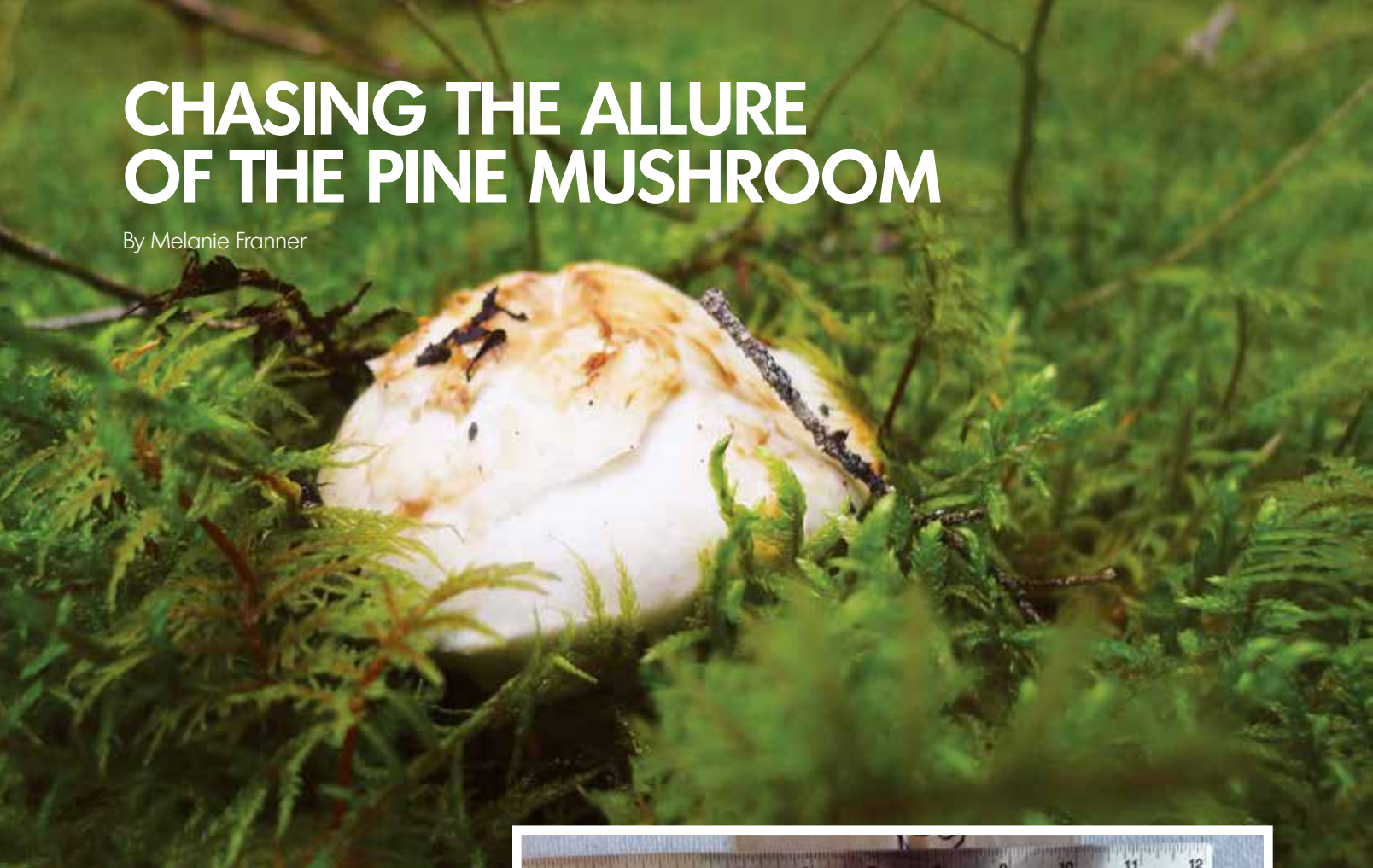


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CHASING THE ALLURE OF THE PINE MUSHROOM

By Melanie Franner



Old Japanese legend has it that the common-variety, B.C.-grown pine mushroom – also known as matsutake – has special medicinal qualities, not to mention some mythological ones as well. Regardless of whether this is true or not, there is no doubt that the Japanese have enjoyed eating them since ancient times.

“The fact is that 99 per cent of the older Japanese people enjoy the taste of pine mushrooms,” says Brent King, president of Pacific Rim Mushrooms Ltd. “It’s like caviar – a delicacy.”

And thanks to a dwindling supply in native Japan, many Japanese business people are now importing these culinary-exquisite mushrooms to help meet demand. British Columbia has long been recognized for its hearty pine mushroom stock, one that stretches through Terrace, the Nass River Valley, Bella Coola, the Anahim Lake Basin, the Sunshine Coast, Vancouver Island, Pemberton Valley and the West Kootnays.



“Northern B.C. has a good pine mushroom crop nine out of 10 years,” says King, who says that about 40 per cent of his business is based on the export of pine mushrooms. “Crops in the rest of B.C. are less predictable, maybe every three to six years out of every 10.”

The pine mushrooms season in B.C. is a short one that runs from September through to November. And the industry itself operates on

secrecy and protectionism.

“It’s a tough market to get into,” adds King. “It’s a bit like the mafia. If a new guy shows up, the other players put the pressure on and try to block him. It’s a close-knit group that doesn’t look favourably on newcomers.”

STATE OF THE INDUSTRY

Statistical information on the pine mushroom industry in British Columbia is like the pine mushroom itself: elusive.

Information from Japanese reports suggest that the average volume and value of pine mushrooms imported from Canada averages out at around 100,000 kilograms per annum, which is worth approximately \$3 million. Some years, such as 2013, have seen totals as high as 172,000 kilograms, while others have been considerably less.

Joe Salvo, president of Ponderosa Mushrooms and Specialty Foods, has been exporting pine mushrooms since 1988.

"In those days, we used to wrap every individual mushroom in tissue paper," he says, adding that the commodity currently represents about 10 to 20 per cent of his overall business. "The numbers in our industry are often overblown. The real size of our industry is about 40 to 100 tonnes a year of exports to Japan. The value of that varies, depending on what the market conditions are. The pricing has been very low over the past few years."

Like other major pine-mushroom players, Ponderosa Mushrooms and Specialty Foods employ field agents who are charged with buying the mushrooms from the local "pickers" – most of whom are freelance and sell to the highest bidder. It's a cash-based business that can cost dearly if the market crashes.

"It's a very volatile situation," says Salvo. "We have had years where we've lost significant money. You can have a two- or three-day turnaround from the time you buy the mushrooms until they get to Vancouver and are shipped to Japan. A sudden drop in the market could mean that our investment of \$50 a kilo has dropped to \$40. You can lose a lot of money in a hurry."

Losing money on pine mushrooms is something that the CEO of Mikuni Wild Harvest Inc. experienced first-hand in September 2011. He and his brother got into the business early on in 1982, after making \$200,000 in one season. Pine mushrooms continued to represent 100 per cent of the company's revenue through to 1998.

"We started getting into other mushrooms at that point to try to

diversify the business and introduce some more stability," he says. "Over the last five to six years, we've changed the business dramatically."

This change stems from 9/11.

"When the planes were stranded on the runways for four days during 9/11, we ended up with \$400,000 in compost," he explains. "We had been doing about \$14 million in exports back then and about \$5,000 a month to high-end restaurants in the U.S."

The company has changed its business model and now sells exclusively to high-end restaurants throughout North America and the Caribbean.

That restaurant business in wild mushrooms has since been built up to about \$14 million. Wild mushrooms represent only 20 per cent of that, with pine mushrooms currently representing about three per cent of the total.

UNREGULATED INDUSTRY

Despite numerous efforts on the part of the Canadian and provincial governments, the pine mushroom industry in B.C. remains an unregulated and unusual one.

"All of the wild mushrooms in this province are unregulated," says Salvo. "The harvest is limited and somewhat controlled by what access the pickers have to good picking grounds. Every year, we lose more and more ground to logging."

Salvo points to the U.S. as a country that has a very good permitting system in place for the harvesting of pine mushrooms. He attributes this to the fact that every state forest district has a ranger station to control the state forest lands and monitor any activity on those lands. In this case, both the pickers and buyers are required to purchase permits. In exchange, the state offers designated camp grounds for the pickers, some with running water and other amenities.

"I think that the B.C. government simply doesn't have the resources to manage a similar permit program," Salvo says.

But this may change – especially

if new research finds that pine mushrooms have some inherent cancer-fighting qualities.

The University of Northern British Columbia (UNBC) has just announced the launch of a new study to investigate the use of local mushrooms in potential cancer prevention and treatment. Genome British Columbia has provided \$52,000 in funding. UNBC has agreed to match the funds. The research project will be led by biochemistry professor Dr. Chow Lee.

"The project will run for one-and-a-half years," says Lee. "It's only for screening crude fractions for biological activities from each mushroom. It doesn't involve the actual purifying and identifying of the responsible bio-active compounds; this work would require additional funding."

According to Lee, the project will involve up to 100 mushrooms, all of which are native to B.C. "We have just finished the collection of mushrooms, including the pine mushrooms, but have not yet assessed them for biological activity," says Lee.

Lee and his team are operating on the premise that mushrooms have the potential to contribute positively in the prevention and/or treatment of cancer.

"Two compounds that have been isolated from mushrooms are already in use as an adjuvant for chemotherapy in Japan," Lee says. "These compounds have been shown to be capable of stimulating the immune system."

The research project began in July 2015 and is expected to wrap by the end of 2016. If successful, it could point the way to additional research that may improve the course of cancer prevention and treatment here in Canada – and beyond.

Until then, pine mushrooms remain a potentially lucrative commodity for both the high-end North American restaurant industry and the high-end Japanese market.

"If it's a good season, everyone wins," concludes Salvo. "If it's a bad season, everyone loses." ●

FORESTRY SECTOR IMPROVES PRODUCTIVITY AND DIVERSIFICATION IN WAKE OF PINE BEETLE EPIDEMIC

By Lisa Fattori



Red trees approximately 30 miles southeast of Williams Lake, B.C.



A replanted stand surrounded by red attack mountain pine beetle infested trees southeast of Williams Lake, 2006.

B.C.'s interior timber supply is in the last phase of transition from the impacts of the Mountain Pine Beetle (MPB). As timber supply in certain regions declines, the industry is grappling with how best to mitigate the inevitable decrease in pine volumes in the province's interior. The Ministry of Forests and Range calculates that 67 per cent of the interior's pine volume will be killed when the epidemic reaches an end in 2020. During the mid-term, in the next 20 to 50 years, timber supply in B.C.'s interior is projected to be approximately 40 million cubic metres. These are lower than pre-epidemic levels, but are on par with 2008/09 recession levels.

In order to capitalize on the commercial value of MPB trees, allowable harvest levels were increased by B.C.'s chief forester, and from 1999 to 2010, about 45 per cent of mature trees harvested were affected by the

beetle infestation. Once killed, the trees have a shelf-life of 12 years, or longer, if the standing dead pines are located in dryer areas. Increased harvest volumes not only maximized the economic benefits of leveraging dead trees into marketable products, the strategy reduced the risk of wildfires and fast-tracked the re-forestation of affected areas.

Because MPB wood retains the same strength properties as healthy timber, the epidemic has not negatively impacted demand for B.C.'s wood products. In fact, increased timber harvest volumes coincided with a housing boom in the U.S. in the early 2000s, with a reported 2 million housing starts in 2004. According to an October 2015 report by the Ministry of Forests, Lands and Natural Resource Operations, in 2005, B.C. timber harvest volumes were 83.6 million cubic metres with 61.9 million cubic metres of that

volume supplied by the interior. By 2009, interior supply had dropped to 37.7 million cubic metres in response to the U.S. recession and collapse of the housing market. Since then, timber volumes have crept upward, with a reported interior harvest level of 47.1 million cubic metres in 2014.

"At the same time that the province's log supply increased due to the mountain pine beetle epidemic, the U.S. economy grew and we saw a rapid increase in the number of housing starts," says Peter Jacobsen, executive director of forest sector strategies for the Ministry of Forests, Lands and Natural Resource Operations. "The U.S. was our biggest market, so there was a natural trend downward into the recession in 2009. As the U.S. economy faltered, we had already harvested most of the pine beetle trees. In 2014, timber volumes were 66.4 million cubic metres, which is where we were pre-

beetle uplift. Overall, we're returning to a more stable environment."

While the value of timber exports to the U.S. has fallen, from \$4.3 billion in 2006 to \$3 billion in 2014, exports to China increased from \$82 million to \$1.43 billion in the same time period. "The U.S. had only 1.1 million housing starts in 2014, which is just half of the starts 10 years ago, so exports are still down," Jacobsen says. "Our key markets remain split between the U.S. and Asia, including China and Japan. As demand in Asia grows and as the U.S. economy continues to improve, exports will increase."

The pine beetle epidemic has fostered new initiatives to increase forest productivity, including silviculture practices, which promote fertilization, species diversity and establishing managed forests with a shorter rotation. The province has also funded a number of projects, including the Northern Development Initiative Trust and the Southern Interior Development Initiative Trust, to assist those communities hardest hit by the pine beetle epidemic. Regional groups are also working to help forest-dependent communities to diversify and seek out new opportunities for economic growth and stability.

B.C.'s growing bioenergy industry is a prime example of diversification within the forestry industry. The burgeoning sector creates a new revenue stream by utilizing beetle wood residuals from harvested areas. In the last few years, wood pellet production capacity has doubled, with large forest companies investing over \$157 million into the pellet industry in 2014. The province now has 13 pellet mills, including the September 2015 opening of a new Pinnacle Pellet plant in Lavington.

With declining sawlog harvest in the interior, due to the MPB infestation, there has also been a reduction in the amount of sawdust available for pellet mills. In an effort to increase the supply of usable forest residuals and streamline the relationships between primary harvesters and secondary users,



The newly opened joint venture pellet mill developed by Pinnacle Pellet and Tolko Forest Products in Lavington, B.C.

the province announced a Fiber Action Plan in September 2015. The plan contains the recommendations of the Forestry and Fiber Working Group, who was mandated to find ways to increase the efficiency and recovery of low-quality fiber from B.C.'s forests. This includes pine beetle wood that's not suitable for lumber production but can be used in pulp and paper mills, oriented strandboard mills and pellet plants. The Fiber Action Plan encourages business connections between forest residuals sellers and mill

feed buyers, which will increase fiber utilization and support forestry-related jobs.

"The largest market for pellets is Europe, although Korea and Japan are signalling an increased interest in biofuels," Jacobsen says. "The Fiber Action Plan promotes better access to fiber residuals so that these plants have a continuous supply of materials. The pellet sector presents tremendous opportunities, and the goal is to help pellet producers to make connections so they can continue to grow." ●

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FINANCIAL INCENTIVE FOR B.C.'s LNG INDUSTRY

By Melanie Franner and Tammy Schuster

The B.C. government's plans to have at least three LNG facilities operational by 2020 may be a little closer to becoming a reality – thanks in part to the federal government's recent announcement of tax breaks for the LNG industry. In February 2015, former Prime Minister Stephen Harper announced a capital cost allowance rate of 30 per cent for equipment used to liquefy natural gas and a 10 per cent rate for infrastructure at the export facility. The tax relief measures will be available for capital assets acquired after February 19, 2015 and before 2025.

But since the federal election in October, some may be wondering whether the Liberal government will follow through with these incentives.

In a commentary made by Stikeman Elliott LLP, they say that many of the proposed BC LNG facilities are largely unaffected by the federal election. Unlike many of the oil export pipeline projects, which cross provincial and national borders, LNG projects and pipelines are all within one province.

At the time of the announcement, B.C. Premier Christy Clark said it was

great news for the creation of LNG jobs in British Columbia, and great news for all of Canada. "We have been working with the federal government and industry for some time to achieve this outcome, and I am pleased they have delivered today."

Deputy Premier Rich Coleman, Minister of Natural Gas Development, echoed the positive sentiments.

"B.C. is already a safe, certain, competitive jurisdiction for LNG investment," he said. "With today's good news, B.C. is even better positioned to take advantage of this generational opportunity."

PROJECTED GROWTH

The Conservative government's decision to enhance the competitiveness of B.C.'s LNG industry through the new tax relief incentive is expected to spur growth in a still-developing industry.

"B.C.'s LNG industry is poised to result in some of the largest private-sector investments in British Columbia's history, stimulating economic activity across the province

like never before," says Minister Coleman, who adds that there are 20 LNG proposals currently in the works, with more than 30 investment partners. "Canada's change to the Capital Cost Allowance will allow LNG proponents to recover their capital investments sooner. This means proponents are more likely to make the large upfront capital expenditures necessary to build a LNG export facility, accelerating the growth prospects of B.C.'s natural gas sector."

The province of B.C. has an enormous supply of natural gas – an estimated 2,933 trillion cubic feet. This is said to be enough natural gas to support current and future energy needs for more than 150 years.

Minister Coleman cites a recent KPMG LLP assessment that illustrates how the construction of five LNG plants within the province between 2015 and 2024 will create a total investment of \$175 billion and create up to 100,000 jobs – 58,700 direct and indirect construction jobs, 23,800 permanent direct and indirect jobs for operators, and thousands more of

induced jobs as a result of households having more income.

"The economic activity will contribute up to a trillion dollars to the province's GDP," he adds.

The B.C. LNG Alliance was quick to respond to the federal government's announcement, citing it as a good move for continued investment in B.C. that will also contribute to Canada's economy as a whole.

"The federal government's CCA ruling encourages the development of a robust LNG industry in British Columbia," states Jas Johal, director of communications, B.C. LNG Alliance. "Developing B.C.'s LNG industry will create thousands of new jobs for Canadians, jobs that will last for generations to come and guarantee the investment of tens of billions of dollars into Canada's economy."

The B.C. LNG Alliance was launched in October 2014 with the specific goal of fostering the growth of a new, safe, environmentally responsible and globally competitive LNG industry in B.C. There are currently seven members.

One of these members is Pacific NorthWest LNG. The company has proposed a natural gas liquefaction facility on Lelu Island within the District of Port Edward on land administered by the Prince Rupert Port Authority. The facility would liquefy and export natural gas produced by Progress Energy Canada Ltd. in northeast B.C. The facility represents an estimated \$11 billion initial investment.

"Pacific NorthWest LNG welcomed the proposed changes to the LNG Capital Cost Allowance announced in February 2015 by the Government of Canada, as these changes create a more competitive tax environment for proposed LNG projects in Canada," notes Michael Culbert, president of Pacific NorthWest LNG. "Pacific NorthWest LNG has the potential to generate over \$1 billion in tax revenues to all levels of government each year, contribute up to \$2.4 billion

to Canada's GDP once in operation, as well as create up to 4,500 jobs during peak construction activity, and up to 330 long-term careers operating at the facility."

SLOW AND SURE

The B.C. LNG Alliance's Johal speaks of the industry's already large investment that has been made to date.

"Already, northern B.C. residents have witnessed a significant amount of work – in the tens of millions of dollars – being done by our members," he says. "These investments have already created jobs and spin offs in First Nations communities, Prince Rupert, Terrace, Kitimat, Port Edward and Squamish."

At the same time, Johal acknowledges that further progression may be slow.

"LNG projects are large undertakings that require tens of billions of dollars of capital investment," he says. "Projects therefore must have a strong business case and meet stringent economic tests before they proceed. We will continue to work with the provincial and federal governments in developing a regulatory and fiscal framework that sets the right conditions in place to establish a globally competitive and thriving LNG sector in B.C."

Unfortunately, the high capital costs associated with building LNG facilities have recently been combined with lower oil prices. This, in turn, has impacted the global LNG market.

A recent report from the International Energy Agency speaks to an increasingly uncertain long-term outlook for increased demand for gas in Asia – an area of the world that was previously considered to grow its demand by as much as 40 per cent.

The Agency's Medium-Term Gas Market Report 2015 also states that gas markets will need to cope with a flood of new LNG supplies in the short term, projecting global LNG export capacity to increase by more than 40 per cent by 2020. The majority of these additions –

some 90 per cent – is expected to come from Australia and the United States.

Lower oil prices, adds the report, will mean that new projects may struggle to get off the ground.

Although there aren't any LNG companies as of yet that have made a final investment decision about proposed operations in Canada, the B.C. government remains very optimistic.

"We have ambitious goals for LNG," states Minister Coleman. "We have put policies in place to give LNG proponents long-term certainty; policies building on our competitive advantages. Just last month, we signed a long-term agreement and MOU for a project development agreement with Pacific NorthWest LNG, which shows a lot of promise to be one of – if not the – first, large-scale export operations in the province."

MORE TO COME

The B.C. LNG industry continues to move forward – holding out the promise of more than a billion investment dollars and a hundred-thousand new jobs – and that's if just five of the proposed 20 facilities come onboard between now and 2024.

A total of 11 LNG proposals have already received export approval by Canada's National Energy Board. And the Province of B.C. has already issued environmental assessment certificates to seven LNG projects (including pipelines).

While the industry waits to see what, if any, changes will come to LNG with the new federal government, the benefits to both B.C. and Canada make it difficult to doubt.

"Industry's response has been positive," concludes Minister Coleman. "LNG proponents have told us that B.C. is competitive. The new tax treatment strengthens B.C.'s position to grow the economy and create jobs in the province by attracting investment for a new LNG industry." ●

UNMANNED AERIAL VEHICLES SERVE NICHE MARKET IN THE RESOURCE SECTORS

By Lisa Fattori



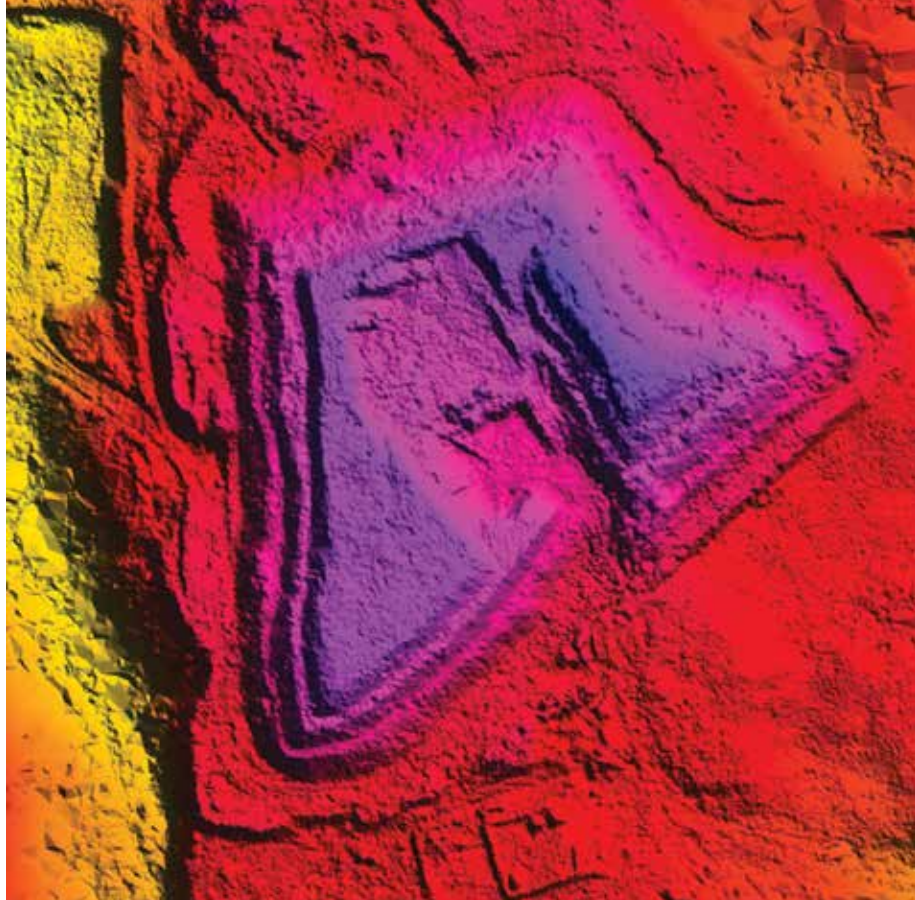
New applications for drones, or unmanned aerial vehicles (UAVs), are providing companies within the resource sectors with timely and cost-effective mapping services that deliver a higher level of accuracy than traditional surveying methods. UAVs fly in a pre-programmed flight pattern to collect data, which is then processed to create 3D products. Ideal for capturing images and data from targets that are difficult to reach, UAVs have access to tight spots to gather data of an entire area safely, with no risk to ground personnel.

While the technology behind UAVs is impressive, 3D spatial projects still require the processing and analytics of geospatial professionals to deliver useable information to clients. "The UAV does very little; it's essentially a flying camera that flies a pattern and takes photographs," says John Rankin, president of J. R. Canadian Mapping Ltd. in Prince George, B.C. "Data is locked into those photographs, and the value is in extracting and processing the data. Overlapping photos can be used to create a point cloud where we can see a three-dimensional model of everything in the photography. We can physically strip away trees and buildings to reveal the bare ground, and we can add points as well."

A full-service mapping company since 2001, J.R. Canadian Mapping introduced UAV services two years ago to service a niche market – projects that are too small to warrant the cost of hiring a photogrammetric aircraft but that still require 3D spatial data collection. The company received funding from the National Research Council of Canada for the development of UAVs and experimented for two years, before perfecting the design. With a fleet of six UAVs, J.R. Canadian Mapping can maintain, repair and adapt its aircrafts at a much lower cost than if the company was using commercial UAVs.

"Right now, early adopters are using UAVs, but there are still some on the sidelines," Rankin says. "Approximately 30 per cent of our business is UAV customers, but that number is increasing."

"One of the greatest benefits of UAVs is that it enables us to be independent of flying companies, so that we can do our projects from inception to completion. To cover a few hundred hectares, it can cost \$7,000 to \$8,000 to contract a full photogrammetric aircraft. We can do a whole project for that cost and the data is much more accurate. It's about economy of scale. It would be costly



Digital elevation model (DEM).

to collect data from a 10,000-hectare area using UAVs, but it would be much more economical for sites up to 1,000 hectares."

Customers using J.R. Canadian Mapping UAV services include BC Hydro, CN Rail and regional districts. The service is effective in surveying municipal landfills, measuring stockpiles for aggregate suppliers and assessing forestry operations. To ensure that railway tracks don't get washed out, a UAV can provide slope analysis. A high-demand application is digital elevation modelling for a variety of purposes, including identifying the direction of water flow and measuring slope in road design.

Recent projects include measuring the re-vegetation program at Williston Reservoir for BC Hydro, to measure erosion and sedimentation. For Canfor, J.R. Canadian Mapping used UAVs to produce orthophotography and digital elevation models of seven of the forestry company's major sawmill sites, to check pile volumes, as well as on-site drainage and the location of utilities.

While the deployment of UAVs doesn't replace traditional surveying, the service bridges the gap between surveying and aerial photogrammetry by airplanes and helicopters. "We integrate traditional surveying techniques with boots on the ground control work, before the UAV goes up," says Peter LeCouffe, operations manager for Harrier Aerial Surveys in Nelson, B.C. "Typically a land surveyor would spend up to eight hours a day to collect 1,500 points, but with a UAV, we can pick up 15 million points in 15 minutes. In measuring stockpiles, it takes just as much effort to send a UAV over a site as it does to have someone do a visual inspection, but the results are much more accurate."

In operation for just over a year and a half, Harrier Aerial Surveys is breaking into the resources market and has already helped mining companies to improve the efficiency of their operations. A good portion of the company's work is providing precise calculations of stockpile volumes and removal volumes of open pit mines.



Photogrammetric point cloud.

UAVs measure the ongoing build-up and depletion of stockpiles, which means that there is no downtime to accommodate in-person inspections.

“These piles move around very quickly, and mining companies need to be on top of this,” LeCouffe says. “One company we worked with had a million dollars worth of material that was unaccounted for because volume calculations were off. We improved the accuracy by 20 per cent and better calculations translate into dollars. Companies are getting better information for an improved bottom line.”

Other mining applications include the use of multi-spectral imagery and the development of terrain models in exploration projects. Harrier Aerial Surveys is also working with B.C.’s

Ministry of Forests, Lands & Natural Resource Operations to monitor roads and provide data on slope stability. The company is also in partnership with Selkirk College in Castlegar, assisting in a research project to measure timber volumes.

“A large area of interest to us is corridor mapping for the oil and gas industry,” LeCouffe says. “We can collect visual data as well as information that falls outside of the visual electromagnetic spectrum to detect any deformations in pipelines.”

New on the horizon for UAVs is sense-and-avoid capabilities, for more autonomous missions. LiDAR systems, which provide UAVs with another remote sensing option, continue to get smaller, and more specialized cameras will enhance

accuracy even further. UAVs are currently limited by line-of-sight regulations by Transport Canada, which requires UAV operators to have a visual of their aircrafts at all times. Enabling UAVs to cover a wider geographic area will foster new opportunities in pipeline mapping and monitoring work in very remote areas.

“There are several deaths a year related to corridor monitoring by helicopter and fixed-wing aircraft,” Rankin says. “When you’re flying that low and make a mistake, it can be deadly, so there’s a real safety issue. There is talk that Transport Canada will allow more beyond-line-of-site flying in very remote areas. In the U.S., there are cases where UAVs have the right of way for companies who own a corridor, and I imagine that that will happen here in Canada. Also, when we have fuel cell batteries, we’ll be able to fly for 10 to 12 hours at a time. When this happens, we will compete with full-scale aircraft for pipeline and corridor monitoring.” ●

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ONGOING IMPORTANT PROJECTS CONFIRM OPTIMISM AMONG B.C. MINERS

By Leonard Melman

Anyone who doubts the resiliency of the Canadian mining industry should take a good look at ongoing activity in northern B.C. Despite numerous obstacles – particularly including low precious and base metals prices – a cadre of geologists, management personnel and support workers are steadily advancing three mining projects within that region: JDS Silver's Silvertip Mine, Imperial Metals' Red Chris Mine and Pretium Resources' Brucejack Project.

All three projects are set to make important contributions to their area's economic activity, as well as offering both employment and economic advancement for area First Nations peoples.

SILVERTIP MINE

The Silvertip Mine is located in far northern British Columbia, just below the Yukon Territory border, 15 kilometres east of the hamlet of Rancheria, YT and 125 kilometres west-southwest of the Red Chris Mine's operations centre in Watson Lake, YT. A 25-kilometre-long gravel road provides access from the famous Alaska Highway to the property. The closest major airport is in Whitehorse, about a 4.5-hour drive from the project.

Although the region has severely cold winters, snowfall accumulations are normally about one metre in depth, and, historically, operations have been able to continue throughout the year with no significant operational problems.

The Silvertip Mine is situated within the northern Omineca Belt of the Canadian Cordillera, which is composed of Upper Proterozoic

through Middle Devonian carbonate and clastic sedimentary rocks. The initial discovery at Silvertip took place in the mid-1950s, and drilling programs were begun by Conwest Exploration, followed by additional drilling programs under a joint venture by Noranda Mines, Canex Exploration Ltd. and Bralorne Mines. Additional exploration programs during this era included AFMAG and IP surveys; photo and geological mapping; rock and soil sampling and trenching and stripping.

While some good anomalies were found, results failed to prove up economic deposits and the property generally remained idle through the 1970s. Renewed exploration began in 1980 by Regional Resources Ltd., and base metal anomalies were discovered in soil and stream sediments. Encouraged by those findings, the company then followed up with a 170-hole, 12,383-metre underground drilling program, but results turned out to be somewhat erratic and the property lay idle until 1996, when new owner Imperial Metals acquired the project.

A large exploration program in 1997 discovered the new Silver Creek Extension, which added significantly to the geologic resource. Subsequent exploration continued through 2013, when JDS Silver acquired Silvertip; by that time, over 70,000 metres of drilling has been completed. Based on those results, JDS filed a Mine Act Permit application, which was approved in late June 2015.

The company's current plans call for a high-grade silver-lead-zinc mine to open in early 2017, operate approximately 150 days per year and employ about 15 to 200 workers.

JDS has successfully negotiated a Social Economic Participation Agreement with the nearby Kaska First Nation which will allow the Kaska FN to benefit from successful operation of the proposed mine. Watson Lake Mayor Richard Durocher issued a statement declaring that the granting of the mine permit was "great news for Watson Lake because it's right on our doorstep and we'll benefit greatly from it."

RED CHRIS MINE

Imperial Metals' Red Chris copper/gold mine is located in northwest B.C. just off Highway 37, which extends from the town of Stewart all the way to the Alaska Highway. This is an area with a history of important mining projects, such as the Eskay Creek Mine to the southwest of Red Chris and the Kemess South Mine to its southeast.

The mine is connected to Highway 37 via 23 kilometres of gravel roads, the last 17 having been constructed by the company in 2008. Infrastructure includes regularly scheduled summer air service into Dease Lake, as well as a gravel air strip in the nearby village of Iskut. Electricity is provided by a hydroelectric line into the property which was completed in 2014 and supplies are available in the town of Dease Lake, approximately 80 kilometres to the northwest.

The southern half of the Red Chris Property, which contains the Red Chris deposit, lies on a broad physiographic plateau called the Todagin Plateau, which is underlain by the Stuhini Group. Bedding in the Stuhini Group is typically steep and variable. Intrusive rocks in the region range from large composite intrusions or stocks to dikes

a few metres thick, with the largest intrusion being the Red stock which hosts the Red Chris deposit.

Although the first recorded exploration in the area began in the mid-1950s, the first extensive drilling program took place from 1974-76 when Texas Gulf drilled 67 diamond-drill holes and 30 percussion holes, which resulted in the Main and East zones being outlined.

The property was idle during the metals bear markets of the 1980s and, following an ownership reorganization that saw American Bullion obtain 80 per cent ownership with Teck retaining 20 per cent, extensive exploration work was accomplished, including an additional 58 HQ and NQ diamond drill holes. Another drill program of 112 holes was carried out in 1995. Additional exploration work was carried out until 2007, at which time Imperial Metals Corp. acquired control of Red Chris following a bidding war.

In February 2012, an updated Red Chris Mine Report was completed which showed 301.5 million tonnes grading 0.359 per cent Cu and 0.274 g/t Au. Projected production in concentrates was estimated at 2.08 billion pounds copper and 1.324 million ounces Au, with an estimated mine-life expiration in 2043.

Following approval of permits, mine construction took place from May 2012 through November 2014. The first shipment of concentrates by road to Stewart took place in February 2015, and commercial production was achieved on July 1, 2015. The signing of an Impact, Benefit and Co-Management Agreement with the Tahitan Nation was celebrated on July 27, 2015.

An area of controversy has developed with the Alaska state government due to the possible release of heavy metals and acidic draining into area rivers, but Bill Bennett, B.C. Minister of Energy and Mines, released a statement in June 2015 saying that he was confident there

would not be a tailings breach because “the tailings facility has undergone three independent reviews.”

BRUCEJACK PROJECT

Pretium’s Brucejack Project is the most southerly of the three projects, located just 65 kilometres north of Stewart. Owned 100 per cent by Pretium, Brucejack is a sizeable land package that spans 103,000 hectares in northwest B.C. The company’s primary focus at this time is the Valley of the Kings, a region comprised of high-grade visible gold stringers within a lower-grade quartz stockwork system.

Vehicle access to the project is provided by a 74-kilometre road from a security gate alongside Highway 37, which includes a transit of the Knipple Glacier from a roadside staging area. Air access is limited to helicopter flights primarily from the Town of Stewart, a trip of about 30 minutes. Supplies and personnel are available on a limited basis from Stewart, with additional provisions available from the larger area communities of Terrace and Smithers – both of which are served by daily flights from Vancouver. Electricity for mine operations will be provided by planned transmission-line construction.

The area’s mining history began late in the 19th century with the discovery of placer gold in area streams. Placer activity continued intermittently until the 1930s, and some minor exploration activity took place in the mid-1930s. The first concerted exploration work began under Granduc Mines Limited, which staked an area known as the

Sulphurets Property in 1960, and various operators continued to explore for copper and gold-silver occurrences.

Underground exploration took place late in the 20th century in an area known as the West Zone, now a part of Brucejack, and in 1999, Silver Standard Resources took control of the project joint venture. Serious exploration, including a large drilling program and resampling of historic core, was undertaken in 2009. These efforts and subsequent work resulted in the identification of Proven and Probable reserves estimated at 13.6 million tonnes of ore, grading 15.7 g/t Au and containing 6.9 million ounces of gold.

By September, 2015 Pretium had received all the major permits required to begin development work toward commercial production at the Brucejack Project and, as noted in a recent press release, “Brucejack is expected to produce an average of 504,000 ounces of gold a year over the first eight years and an average of 404,000 ounces of gold a year over the 18-year mine life.”

Pretium also negotiated a Project Cooperation and Benefits Agreement with the Nisga’a Nation, and Nisga’a president H. Mitchell Stevens noted that “the benefits from the Brucejack Project will make an important contribution to our quality of life.”

These projects clearly demonstrate that in spite of periodic difficulties, the mining industry stands ready to continue making important contributions to British Columbia’s economic and social progress. ●



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ACCENT ON ASIA: B.C. HAY FINDS NEW MARKETS

By Melanie Franner



The development of the export forage industry could have a positive impact on the existing industry and livestock sectors within British Columbia's interior – so says the Final Report: Emerging Markets for Interior B.C. Forages Project.

In essence, the report found that improved forage production practices would result in an increase over the existing regional hay supply. And with only a portion of the total yield in any given year going to export markets, the domestic market would not suffer.

The report stated that “The requirement needed to meet the current plant capacity (40,000 tonnes) could be met with existing forage surplus currently produced in the region, assuming some of the quality issues can be addressed.”

A greater emphasis on hay quality and grade is expected to lead to a more developed domestic market – which, in turn, will help buyers from different livestock sectors find the quality and price points that meet their needs.

In the end, the report concluded that “Overall, the domestic forage market should be strengthened and enhanced with the development of export hay markets.”

A VIABLE BUSINESS MODEL

Jason Hawkins is general manager of Nechako Valley Agri, a company that purchases, presses and exports forage products to world markets. Nechako Valley Agri was founded in 2012 in



Vanderhoof, B.C. Although the three owners (two brothers and a nephew) operate about 8,000 acres between them, the company's business model also includes the purchase of hay from local farmers, the pressing of that hay and the sale of it to export markets.

“We shipped about 4,500 tonnes during the first year of operation,” says Hawkins, who adds that his biggest export markets are Korea and Japan. “The following year we did 6,000 tonnes, and this year, we hope to ship about 8,000 tonnes.”

According to Hawkins, the better quality the hay, the easier it is to sell. The company encourages local producers to invest in upgrading their product and getting better pricing as a result.

“We've helped to change the dynamic in Vanderhoof,” says Hawkins. “Some farmers were getting less than \$100/tonne for their hay five years ago. Now they are getting almost

double that amount. Farmers are able to reinvest the extra money to make higher quality crops, purchase more land and buy more efficient equipment. It's a positive cycle where everyone wins.”

The quality of the product undoubtedly remains of uppermost importance to the forage export market.

“Canada has an agreement in place with China to sell them only our top-end alfalfa product – the type that has more than 20 per cent protein, for example,” explains Garth Healey, B.C. director of the Canadian Forage and Grassland Association (CFGa). “But in Canada, we tend to grow a mixed blend of alfalfa and grass. What China would like to see is a pure alfalfa or timothy.”

Also of concern in B.C. and Canada are the 28 regulations inherent in the agreement between the two countries. Healey states that the U.S., in comparison, only has nine regulations.





Another contentious point is that the product tests being conducted in Ottawa, as mandated in the agreement, aren't the same tests being used in China – thus providing an opportunity for the Canadian product to be rejected without compensation.

"We've essentially tied our own hands," says Healey, who adds that there are many counties that put in requests for quotes with less to no testing required.

"We get calls for 100,000 to over 3 million tonnes per year," he adds. "With many countries experiencing restrictions on how much water they can put on their fields, I see Canada becoming a source for their needs."

That being said, Healey does describe the current B.C. forage export industry as being "only on the doorstep" – with a lot of growth potential ahead. To do so, however, will

require Canadian industry to either step up the quality of its product or educate the Chinese on the benefits of using a mix-blend product.

ONE MAN'S DREAM

China-born Judd Wu operates another forage export business in Vanderhoof. He started Tophay Agri-Industries Inc. in 2012 with 4,000 acres. Today, he has approximately 12,500 acres.

In 2015, Wu will have shipped 95 per cent of his hay harvest – about 10,000 tonnes – to Asian countries that include China, Japan, Korea and Singapore. He hopes to increase that to 25,000 tonnes by the end of 2017.

According to Wu, the product is used primarily on dairy farms, with some horse farms as well. Sheep farms represent another potentially lucrative market.

"Shipping is a major cost in this business," he says. "By compressing the hay into bales, the transport is easy and the freight cost is reduced by about half."

Although Wu hasn't had a second thought since he started his business three years ago, he does admit that he hasn't – as of yet – made a profit.

"We have been putting all of our money back into expanding and growing the business," he says. "But I am more than happy with the results to date and continue to believe that this is a good business venture that will pay big dividends in the end." ●



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EARTH SCIENCE FOR EVERYONE: UNDERSTANDING THE EARTH BENEATH YOUR FEET

By Kylie Williams

British Columbia's economy relies heavily on the resource sector and, despite global economic struggles, has grown in 2015, largely due to contributions from the mining, forestry, oil and gas, and energy sectors.

First Nations and rural communities rely on a vibrant and environmentally sound resource sector to support their local economies, provide for jobs and fund social projects and community growth. Increasingly, the people living close to resource projects are engaged from early stages and play a key role in providing input, guidance and information to guide the decision-making process. These communities are reaching out for credible sources of technical information and access to baseline data to truly participate in sustainable resource development conversations and to make informed decisions. Geoscience BC is not-for-profit organization that has fulfilled this role, generating and delivering independent, unbiased earth science information since 2005.

"Over the past decade, we have stepped up our efforts to reach out and engage with First Nations and local communities throughout B.C. to listen to concerns and suggestions, and to provide information. These important outreach efforts guide our priorities," explains Robin Archdekin, president and CEO of Geoscience BC since 2013.

"Our reputation as a trusted partner is important to us. We provide unbiased data to the public through our

website, publications and outreach activities to help them make sound, informed land and resource management decisions."

Traditionally, Geoscience BC has generated minerals and oil and gas data. In recent years, they have expanded into geothermal, water monitoring and mapping projects, responding to the needs and requests of First Nations, local communities and the resource sector.

PEACE REGION GROUNDWATER SURVEY

In early March of 2015, Geoscience BC announced the Peace Project to better understand the surface and groundwater resources in the Peace Region. The project is generating vital new information about groundwater within an 8,000-square-kilometre region that stretches from Hudson's Hope and Fort St. John northwest to between Pink Mountain and Trutch.

The Peace Project is a collaborative effort that includes input from First Nations, local communities and is supported by the BC Oil & Gas Commission, the BC Oil and Gas Research and Innovation Society, ConocoPhillips Canada, Progress Energy Canada Ltd., the Province of British Columbia, and the Northern Development Initiative Trust (NDIT).

"The collective effort in support of the Peace Project is a testament to the importance and growing recognition of groundwater protection to everyone," says Archdekin, "This work will provide the necessary framework for effective

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By fall 2015, over 80 per cent of the survey area had been flown by B.C.-based Precision GeoSurveys Inc.

groundwater stewardship by all groups and enable informed and responsible resource management decisions.”

Phase 1 of the project was an airborne mapping survey completed by SkyTEM Canada Inc. in summer of 2015. SkyTEM flew 21,000 line kilometres, covering 8,000 square kilometres in only 43 days.

Additional areas were included in this phase at the request of local First Nations, who are interested in better understanding the water and geothermal resources in their traditional territories.

IN SEARCH OF NEW MINERAL DEPOSITS

Geoscience BC launched a second major project in 2015. The \$2.4 million Search Project was formally announced at an event held in Terrace, B.C. in September.

The area has also recently seen Pretium Resources Inc.'s Brucejack project begin development work toward commercial production. The Search Project will bring renewed exploration interest to northwest British Columbia to help explorers identify new mineral deposits and diversify the local economy. The Search Project also provides important information to First Nations and local communities to guide land use and management decisions.

“This project is gathering information to give opportunity in the northwest for another 60-plus years, maybe another 150 years,” said Carol Leclerc, mayor of the City of Terrace.

The project's first stage involves a 6,700-square-kilometre airborne magnetic survey between Terrace and

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Smithers. This survey is being flown at much closer line spacing than previous surveys to fill in the gaps left by older surveys and provide more detailed information to attract investment.

By fall 2015, over 80 per cent of the survey area had been flown by B.C.-based Precision GeoSurveys Inc., despite the notoriously challenging weather in the Terrace area.

EARTH SCIENCE FOR EVERYONE

Explorers working in the Terrace area are excited about the new data that will come from the Search Project. Airborne geophysical survey data released by Geoscience BC has traditionally stimulated renewed exploration interest, evidenced by jumps in mineral claim-staking. Exploration also leads to local procurement of goods and services to help stimulate and diversify local economies and the information is used to help guide land use and management decisions.

"As a mineral exploration company focused on the Terrace area, we

congratulate Geoscience BC and the Province on undertaking this important survey work. Like many B.C.-based explorers, we use the research findings from these area-wide efforts to guide our exploration activities," says Dale McClanaghan, president and CEO of BCM Resources Corporation.

"Rural and northern communities benefit from mining development by way of diversification of the economic base, expanded job opportunities and community development, particularly for remote First Nations," says McClanaghan.

2016 AND BEYOND

Geoscience BC received \$5 million in interim funding from the Province of British Columbia in June 2015. They will be working closely with the B.C. Government to explore long-term predictable funding to continue its work generating mineral, water and energy earth science to support sustainable resource management into 2016 and beyond. ●





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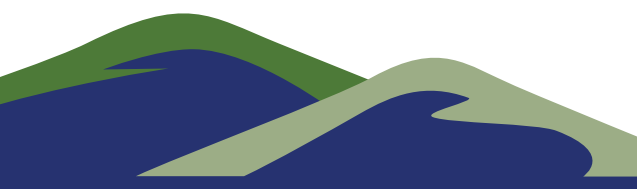
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PUTTING ECONOMIC DEVELOPMENT IN THE FAST LANE ON BOUNDARY ROAD

By Ashlee Espenell

Construction of Prince George's Boundary Road Connector was a long time coming. It had spent several years on the City's transportation wish list before funding was finally secured to begin construction in 2010. Three years and \$28 million later, Boundary Road officially opened in November 2013.

Boundary Road established a direct route between Highway 16 and Highway 97, providing a new dangerous goods route and a traffic connector road. Those weren't the only benefits it provided.

INCREASES IN AIR CARGO

The opening of Boundary Road has meant new business opportunities for the Prince George Airport. Now that there's increased access, Rosenau Transport Ltd. has recently moved their base of operations to the airport. Not only does the operation see more than 24 cargo trucks per day in and out of the airport, but their new facility is also

an attractive selling feature for the airport's cargo business.

"We now have an agreement with Rosenau Transport that when freighter air cargo comes in to the airport, they'll handle the warehousing of the cargo," says Al Ridgway, directory of cargo business development for the Prince George Airport Authority. "They'll be handling transportation as well as freight ground handling."

The Rosenau Transport warehouse will be a bonded facility, and the airport's Canada Customs space will soon be expanding into the warehouse to serve the cargo business. Ridgway hopes that will help increase the amount of freight cargo running through the facility.

"Now that we have a facility with full warehousing capabilities, the cargo carriers want to know about it," says Ridgway. "When freight comes in and is unloaded, it needs to go somewhere to wait until people can come and pick up their shipments. It's a major draw to have that available."



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IN-DEMAND INDUSTRIAL SPACE

The opening of Boundary Road also meant new access to several thousand acres of prime, undeveloped land between Highway 16 and Highway 97, adjacent to the airport. Three-thousand acres of that land is owned by Vancouver-based developer Henry Rempel, who has invested millions of dollars and more than 10 years into preparing it for industrial development.

"The city of Prince George had a lot of residential and commercial land, but there was a short supply of light-industrial land available," says Harry Backlin of Team Powerhouse Realty. "The city planning department wanted to open up a large amount of land for that purpose."

"Prince George is really focused on the future and putting an emphasis on economic planning," said Melissa Barcellos, manager of economic development for the City of Prince George. "Most other industrial areas in Prince George are already developed so increasing access to new industrial spaces was important in making us more competitive for investors."

Now that Boundary Road is complete, Rempel is turning his land into a first-class, modern light-industrial property called the Prince George Global Logistics Park. Phase 1 of the park contains 25 acres of serviced property subdivided into lots at the south end of Boundary Road, near Highway 97. Lots ranging in size between 1.5 and two acres went on sale in June 2015.

An additional 150 acres in the Global Logistics Park are currently being developed closer to the airport. Looking forward, Backlin said that another 300 acres are being cleared next to the Phase 1 lots and will be developed in the next year or two.

The Prince George Global Logistics Park isn't the only development on Boundary Road. Inland Kenworth purchased 44 acres of land at the junction of Boundary Road and Highway 97. They will be relocating from the Carter Light Industrial area and into a new 75,000- to 80,000-square-foot building to go up on 14 acres of the land on Boundary Road. They will also be developing their remaining land on Boundary Road, which has been zoned for highway commercial sites, to attract international hotels and other businesses catering to traffic on Highway 97.

Backlin also said that lower-mainland-based Fraserway RV has bought out 42 acres of land from Happy Trails RV. Those acres are located on Boundary Road at Highway 97, across from the In-land Kenworth property.

The enhanced development around Boundary Road will go a long way to helping Prince George attract new investors and provide access to new markets.

"This fulfills what the city has been wanting to do for 10 to 12 years now," said Backlin. "There's been enough new light industrial land cleared to serve Prince George for decades to come." ●



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WRITING A NEW CHAPTER IN THE HISTORY OF THE NORTHWEST

By Ashlee Espenell

The story of the Canadian boom town is one that never fails to find an audience. Terrace, B.C. was already the service and supply centre of the Northwest, but a decade ago no one believed it had a future as a boom town.

Once the cedar pole capital of the world, forestry had usually been the lifeblood of the region. In the early 2000s, the forestry industry began to decline. Jobs were lost, the population decreased and so too did revenue to the city.

Despite being located on the region's major transport arteries, Terrace remained an untapped base of operations for industrial development for many years. They wanted to change that.

The new goal became to diversify the local economy and attract industrial investment. Increasing industrial development would not only create new employment opportunities, it would also provide an industrial tax base that could reduce the reliance on residential and business taxes to fund city services. But first they needed somewhere to put it all.

The City of Terrace had its eye on several hundred hectares of Crown land near the Northwest Regional Airport. In 2005, the City of Terrace signed an Agreement in Principle with the Province of B.C. for an option to purchase 900 hectares of the land, which is in Tsimshian First Nation's traditional territory.

The acquired space became known as the Skeena Industrial Development Park (SIDP) and would be used to market Terrace to new heavy-industrial investors. The SIDP is managed through a joint-venture partnership between the Kitselas First Nation and the City of Terrace.

In 2009, the federal, provincial and municipal governments promised \$2 million for infrastructure improvements. An intersection was built at Highway 37, and a new 700-metre access road was added with the hopes it would promote the property as a viable industrial development site.

The investment paid off and, in August 2013, the first parcel of SIDP land was sold. Edmonton-based Global

Dewatering Ltd. bought 4.3 hectares of space for \$250,000. They specialize in the removal of ground water at industrial sites and plan to build an office and a shop on the site.

In February 2014, the Kitselas Development Corporation (KDC) purchased 66.7 hectares for \$1.6 million. KDC has leased 26.1 of their hectares to Prince George-based Falcon Camp Services, and have been meeting with other potential tenants. Falcon Camp Services is building a camp to house approximately 400 workers on the land.

The largest sale in the SIDP came in July 2014, when Burnaby-based Taisheng International Investment Services purchased 480 hectares for \$11.8 million. The company plans to build factories, beginning with a 13-hectare alfalfa protein extraction plant that's anticipated to bring 170 new jobs. Taisheng is in the process of completing the development design for the site infrastructure with the plan to begin installing the infrastructure in 2016. Construction on the plant is



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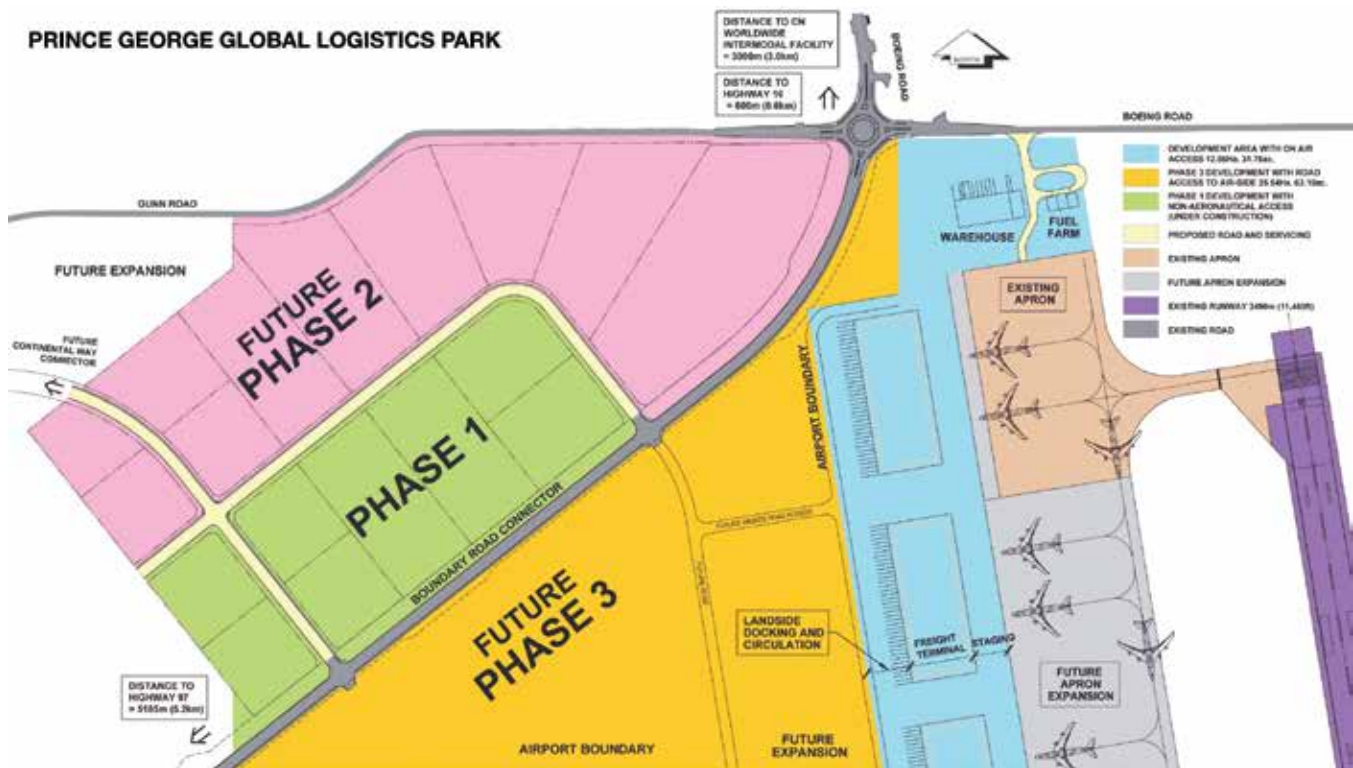
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expected to begin in the next few years. As for the remaining hectares, Taisheng plans to build a heavy industrial park for manufacturing facilities. They will be leasing serviced land parcels ranging between eight and 20 hectares to international and local investors.

Businesses interested in owning smaller land parcels will soon have the opportunity to purchase 0.8- to four-hectare lots at market value in the SIDP's new 101-hectare "small lot" subdivision on the east side of Highway 37.

As work in the SIDP gets underway, Terrace now finds itself at the beginning of what they hope will be a development boom. What a difference a decade can make. ●



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LNG IN PRINCE RUPERT

The Birth of a New Industry in British Columbia

By Deb Smith

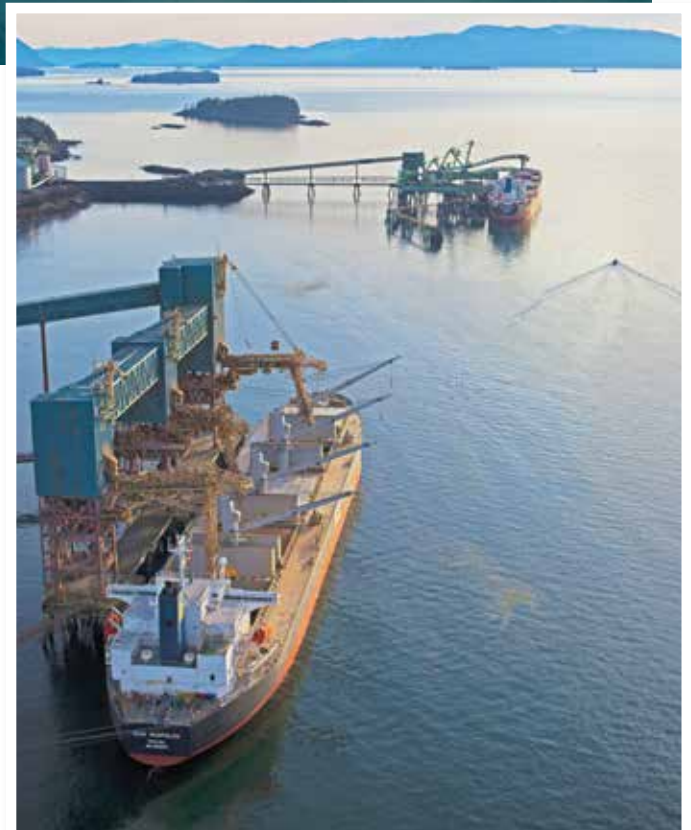


Strong growth in the global natural gas market has spearheaded 19 proposed Liquid Natural Gas (LNG) projects in the province. Estimated investments of US\$36 billion will create thousands of jobs with huge economic benefits for B.C. and Canada.

An accessible harbour is key to getting the product to the global markets. According to Paul Vendittelli, Prince Rupert Economic Development officer, “Prince Rupert has one of the naturally deepest harbours in the world – it is ice-free, uncongested and closer to Asia than any other North American port, a three-to-four-day round-trip savings in shipping time. The advantages of the harbour are one of the main reasons why there are currently four LNG projects at the forefront here, looking to move forward.”

The city of Prince Rupert is working with all the proponents, including the camp operators who have secured land to develop camps for workers, explains Vendittelli.

“But it is the Prince Rupert Port Authority (PRPA) that is the ‘landlord’ over Crown land involved in the proposals,” he explains.



With approximately 1,000 hectares of federal Crown land, and the associated harbour and coastline under its jurisdiction, the PRPA works to fulfill its mandate of supporting Canada's trade activity.

FOUR LNG PROPOSALS

Once completed, Pacific Northwest LNG, under the majority ownership of Petronas, will export 22.2 million tonnes (mmt) per year from a facility on Lelu Island near the community of Port Edward and under the administration of the PRPA. The final investment decision waits upon completion of the Canadian government's Environmental Assessment, estimated for the first quarter of 2016, and B.C. legislative acceptance of a project development agreement to stabilize taxes and environmental requirements.

The facility will feature two liquefaction trains, two LNG storage tanks, a marine infrastructure with two berths for LNG carriers and a 250-metre suspension bridge and trestle connecting to the main terminal. Commercial operation is targeted for 2020 with a \$9-11 billion investment.

Progress Energy, wholly owned by Petronas, is developing natural gas production in the Montney region of northeast B.C. and northwest Alberta. TransCanada Corporation will build and operate two pipelines: the 305-kilometre North Montney mainline and the 900-kilometre Prince Rupert Gas Transmission Line from the Hudson's Hope area.

WCC LNG, put forth by Exxon, is located on a piece of property called Lot 444 along Tuck Inlet.

"Although the City of Prince Rupert owns the property, it will work with the port authority as the governing body for the harbourmaster and to ensure safe egress and access to water," says Vendittelli. At an investment of \$15-25 billion for Phase 1, the two-train design, with potential for a third, will ship 15 mmt of LNG from its three-berth jetty, the natural gas coming from reserves in the Western Canadian Sedimentary Basin.

In December 2014, Exxon submitted its proposal for environmental assessment to the federal and provincial governments. Upon completion of the environmental engineering studies by the fourth quarter of 2017, the company will make its final investment decision, planning for operation by 2024.

Nexen owns 60 per cent of Aurora LNG, along with Japanese companies INPEX Corp. and JGC Group. The facility will sit on Digby Island (known as Airport Island), approximately three kilometres southwest of Prince Rupert.

Processing natural gas from northeastern B.C., Aurora LNG will cost between \$17 and \$20 billion with a projected completion date of 2021. Nexen anticipates making a final investment decision in 2017 and is undergoing environmental assessment by the B.C. government. Once up and running with two trains, it will ship 12 to 24 mmt of LNG.

Prince Rupert LNG, proposed by BG Group (through BG Canada) received the National Energy Board Application approval in December 2013. The design features two LNG

processing units, two storage tanks and shipping terminal. When finished, it could achieve a production capacity of 21 mmt per year from its \$10 billion investment.

Spectra Energy will build and operate the pipeline from northwestern B.C. onto the Tsimshian traditional territory of Ridley Island near Prince Rupert. The BG Group feels it has the best site for LNG development and is moving forward with community consultation and the environmental assessment, which it hopes to file in the first quarter of 2017.

The global LNG trade is intensely competitive, and new facilities along the west coast will build Canada's position in the market, delivering huge economic growth to the province of B.C.

"LNG is very big to the area," says Vendittelli. "All these projects are within \$10 to \$15 billion; all are going to require about 5,000 workers at peak construction and three to four hundred for operations." Each LNG proponent is working with First Nations and the local community to reduce the project's environmental footprint, conducting extensive field environmental baseline studies.

Within the jurisdiction of an already growing and diversified port authority, Prince Rupert and Port Edward are looking to be great host communities for the LNG industry in Canada as it works toward the challenges and rewards of the future. ●

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