

LNG *North America*

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Analysis: 'Supply failures' in Atlantic Basin deprive Europe of US LNG

Dwindling resources in Trinidad & Tobago – once a stalwart LNG exporter – combined with attacks on Nigeria's gas export infrastructure, have cut short supply into the Atlantic Basin. This is creating a short-term window of opportunity for American LNG exporters to supply cargoes to South America, not Europe.

Atlantic LNG Company's 14.8 mtpa Point Fortin 4-Train liquefaction facility (pictured), Trinidad's sole export facility, has been suffering badly from supply shortages. According to Nigel Darlow, Atlantic's CEO, "the plant is now at record low levels of utilisation and we are failing to deliver on our LNG commitment."

Nigeria, meanwhile, had to cut short oil and gas exports due to militant attacks on its infrastructure and ongoing theft from pipelines.

Consequently not much US shale gas exports has found a way to Northwest Europe - on the contrary, the recent supply shortages

in the Atlantic have benefitted mainly Gazprom and Sonatrach. Supplies of pipeline gas into Europe have hit a new gear thanks to the "somewhat erratic availability" of LNG in the Atlantic Basin and noticeably lower output in the Netherlands.

"Russian and Algerian exports benefited greatly from Europe's LNG standstill and they are poised to benefit so long as Atlantic Basin LNG production problems persist and Asian nuclear outages keep shipments flowing towards the Far East," commented Ira Joseph,

head of global gas and power at Pira Energy.

Price risk

Both Gazprom and Sonatrach have "met the challenge so far," Pira Energy said in its latest European natural gas markets report. But as the market tends to reach its seasonal demand peak in February, analysts cautioned "we have to be concerned about the reduced

amount of flexibility in the supply pool and what this means for risk along the forward curve."

"Midstream chokepoints" and "upstream limitations" caused the latest LNG supply constraints but they both mean the same thing when it comes to price;

Pira Energy analysts pointed out that "higher spot prices since mid-December already reflect this issue to some extent."

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Trump's US border tax could slam Canadian gas exports

Investors fear that a proposed US border adjustment tax could slam earnings of oil and gas companies in the Canadian province of Alberta. Industry leaders are wary about a possible negative impact of President Donald Trump's proposed tax on energy costs in the United States and future export volumes of oil products and natural gas from Canada.

"Does it get exempted, or how are the details going to unfold? We're watching it closely," said ConocoPhillips CEO Ryan Lance, whose company reached record production at its oil-sands operation in Alberta.

Republicans in the House of Representatives had proposed the border tax, which would effectively raise the cost of Canadian commodities imported to the United States. The protectionist measure is part

Basinal elements of the Western Canada Sedimentary Basin



Ryan M. Lance

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Trade flows

Just three US LNG cargoes were landed in Europe since exports of American super-chilled shale gas began: the first to Portugal in April, followed by another one to Spain in July, and the latest one to Italy. Two further shipments went to Turkey. In the first month of this year, already nine US ships were tracked heading to northeast Asia, as the latest surge in regional spot LNG prices have now made the voyage through the expanded Panama Canal economic.

The situation is set to turn, however, from summer 2017, analysts believe. By then new LNG production growth from the United States and Australia is an-

ticipated to start spilling over into Europe as new markets will struggle to absorb surpluses fast enough. Some of the new and growing LNG trade flow from the United States will also reach northern Europe where it may help increase competition and lower prices to the benefit of consumers.

By 2020, the United States is said to be able to export up to 100 Bcm/year of LNG - enough to supply a quarter of the EU market. Yet it is far from certain how much volume will end up in Europe, given the fierce competition on cost that has been staged by Gazprom and Algerian state-owned Sonatrach, the two incum-

bent suppliers of pipeline gas to Europe.

Incumbent suppliers

Sonatrach for once, has so far counteracted the threat of US LNG imports to the Iberian Peninsula by stepping up its pipeline exports to Spain up by 2 million cubic meters per day to a total of 40 million cu m/d in the first half of 2016.

Any substantial rise of US LNG exports to Spain and Portugal - an 'island market' due to poor inter-connection to France and the rest of Europe - would be viewed by Sonatrach as a direct threat to Algeria's market share. Gas flows from Algeria to Italy, meanwhile,

have averaged 45.6 million cu m/d - more than double the 2015 average of 19 million cu m/d, according to Eclipse Energy data.

Russia's Gazprom has also increased gas supplies to mainland Europe, with CEO Alexei Miller saying at the turn of the year that Russia's aggregate amount of gas exported to the EU exceeded 179 Bcm in 2016. "That is a historic high," he stressed.

With LNG to seen stay scarce in Europe for at least the next six months, Gazprom - already supplying a third of Europe's gas needs - has been quick to capture more market share through a very cost-competitive sales strategy (see article on page 3). ■

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of a wider tax reform proposal that would also reduce the corporate tax rate in order to give US manufacturing an edge over imports.

While foreign energy executives are concerned about President Donald Trump's protectionist rhetoric, and wary about an adverse impact on their business, some bank analysts take a calmer stance in their outlook. Commodities analysts at Barclays Capital believe that such a tax could be offset by the eventual renegotiation of a lower TransCanada Mainline toll. If both events were to occur in tandem, they would have a minimal effect on Henry Hub prices.

"Generally, we see such a tax as bearish for Canadian gas prices (AECO)," analysts wrote in the latest report of the BarCap commodities division. "Though there

remains a high amount of political uncertainty associated with the implementation of a border adjustment tax, economists believe that some form of country-focused tariff is likely at some point in the early years of a Trump presidency."

On its own, the UK bank sees a 20% tax as "price-neutral" for US natural gas prices and "bearish" for Canadian exports. "Given Canada's limited outlet for its natural gas output, we think prices would have to price low enough to offset the 20 percent tax and support the spread into Midwest US gas markets," analysts argued.

Canadian price takers

Canadian exports accounted for 6-10% of total US supply on a monthly basis last year. This volume of gas, estimated in a range of 4.9-6.8 Bcf/d, "could not be absorbed domestically and has no other export options," hence Canadian producers would continue to be price takers even under a burdensome tax scenario.

A weakening Canadian dollar has also given gas producers in Alberta a much-needed boost but a further depreciation of the currency is not seen likely, or sufficient enough for Canadian southbound gas pipeline exports

to remain competitive.

A lower TransCanada toll would more than offset a tax, analysts argue. And indeed, after failing to reach a deal in November 2016, talks to lower the TransCanada Mainline toll have started up once again. In previous negotiations, TransCanada had been offering shippers a 10-year contract at \$0.57-0.62/mmBtu, depending on their volume commitment. This compares with existing firm transport rates of \$1.30/mmBtu.

Tit for Tat?

Even with a tax and a new tolling structure, Canadian producers are expected to have a hard time trying to maintain their market share in the United States. Negotiations are underway, but if no friendly agreement can be reached it might be 'tit for tat'.

"To keep the playing field level, Canada might consider some retaliatory measures in which US gas exports into Canada were taxed at a similar rate," BarCap analyst said, explaining that "this would allow Canadian producers the benefit of a lower toll on the TransCanada mainline while increasing the cost burden of US producers targeting Canadian markets." ■

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Iberia – a prime outlet for US shale gas?

Spain is expected to take the lion's share of US LNG in Europe as Gas Natural has started to offtake more cargoes on a regular basis in 2017, according to S&P Global Platts analysis. The Iberian Peninsula, dubbed 'island market' due to its poor pipeline interlinks to France and the rest of Europe, has recently imported a number of spot LNG cargoes from the United States – yet the impact on Continental European gas hubs is very limited indeed.

Spain has an annual LNG regasification capacity of 43 million tons per year (59 Bcm/year) at its six LNG terminals, plus 28 Bcm/year of pipeline import capacity, including interconnectors with France and Portugal. That gives Spain a gas import capacity of some 87 Bcm/year despite only having consumption of some 30 Bcm/year. Its import capacity is more than eight times higher than its current export capacity to France and Portugal of just 10.6 Bcm/year.

Even though narrow Henry Hub-NBP spreads have made US cargoes less economic than of late, it still makes sense to ship LNG from the United States' Gulf Coast to Europe on a short-run marginal cost basis. Frontrunner Cheniere sees around half of its total US LNG exports finding a home in Europe, so traditional pipeline suppliers such as Gazprom are getting prepared for new competition.

Russia can compete on cost, and plays with supply volume

Putting on a brave face, Gazprom deputy chairman Alexander Medvedev said there was "no need for a price war" as he claimed that US LNG would "struggle to ever be competitive" because of how low Russia's gas production costs can go.

Russia – like Saudi Arabia in oil – is the only country with significant spare production capacity, estimated at 170 Bcm/year, so Moscow can take a strategic view. It has flexibility on the volumes it can export, and also flexibility on the prices it charges its customers given how low its production costs are. This dual flexibility puts Gazprom in an "enviable position".

Having among the upstream costs in the world, Russia can afford to lower prices – or ramp up supplies to Europe, if needed. Other than a slight lull in supplies

in 2017 and 2018 due to the extremely well supplied European market and the glut of global LNG, Russian supplies to northwest Europe are expected to rise strongly in the 2020s, according to Platts Analytics.

Much depends on how much Henry Hub prices will rise

Meanwhile, US LNG could face also problems of its own – the current low prices are forcing ever growing numbers of US producers into bankruptcy. According to a recent report by Haynes and Boone, a total of 90 gas and oil producers in the US and Canada have filed for bankruptcy between January 2015 and the start of August 2016.

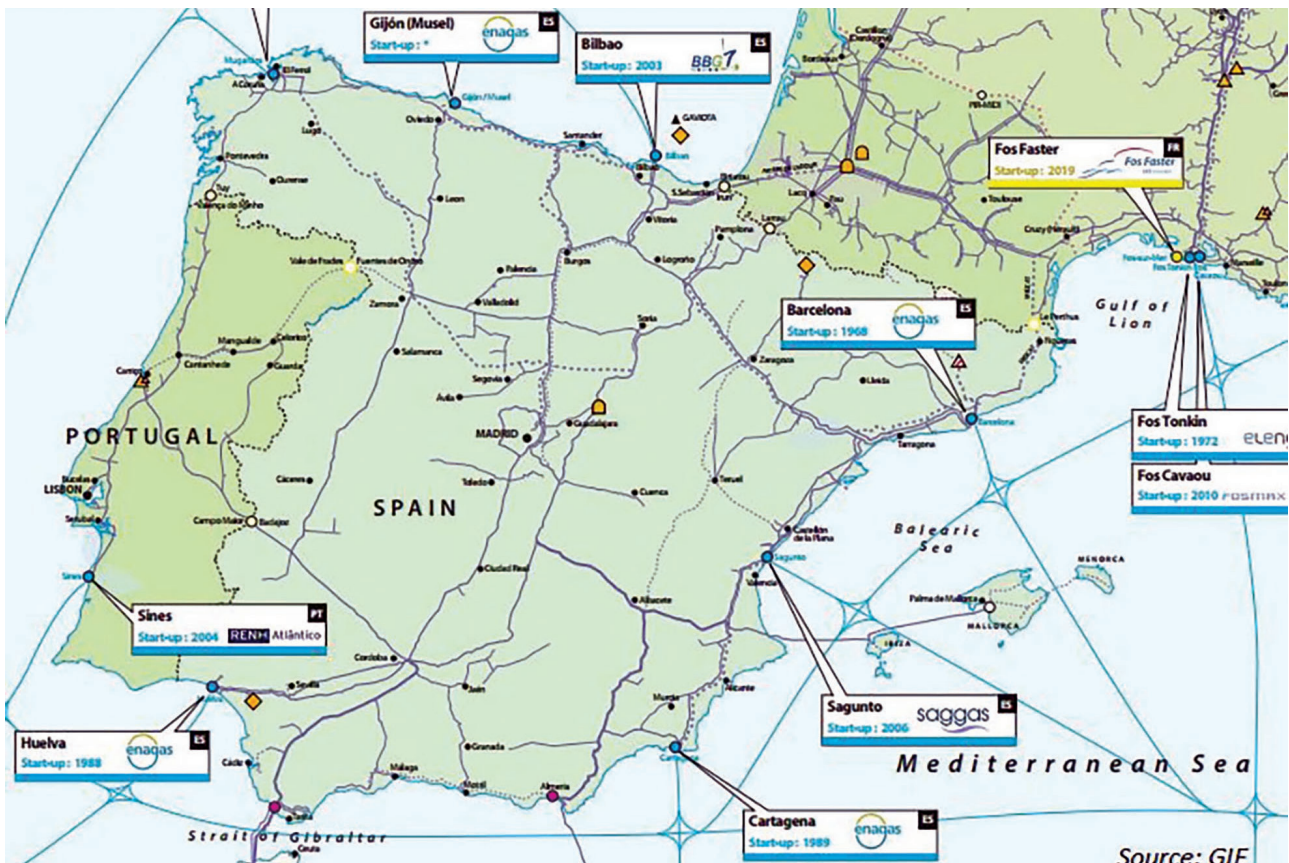
Yet forecasts from Platts Analytics' Bentek Energy suggest that Henry Hub prices are set to rise in the coming years. Reacting to such forecasts, Valery Nemov, deputy head of contract structuring and

price formation at Gazprom Export was quick to point out that "any significant increase in Henry Hub prices would render US LNG exports uneconomic versus European pipeline supplies."

Nemov also tried to make the case that the economics of US LNG look considerably worse as a result. "We would say that investments into liquefaction plants are 'sunk costs', but tolling fees are not," he stressed.

Considering all aspects, analyst at S&P Global Platts anticipate that US LNG imports will in the short-term only be able to make inroads on the Iberian Peninsula and the UK – Continental Europe, by contrast, will remain largely dependent on Russian pipeline gas.

Flexibility in volume and pricing, thanks to very low production costs, still gives Gazprom the upper hand in the competition with exporters of shale gas from North America.



Second wave of LNG “slow to materialize”

With global LNG markets poised to see around a third in LNG supply growth over the next five years – the next wave of supply will be slowly forthcoming. Spencer Dale, BP Energy Group chief economist sees a “temporary lull” while markets try to absorb the initial wave, then he assumes growth to “resume at a more moderate pace.”

“The energy transition that is taking place and is likely to continue to take place over the next 20 years,” Dale said when presenting this year’s BP Energy Outlook.

Completion of a series of “in-flight projects”, notably in Australia and the US, is the cause of the first wave of supply; Demand patterns, meanwhile, are seen “shift away from the US and Europe to fast-growing Asian markets.”

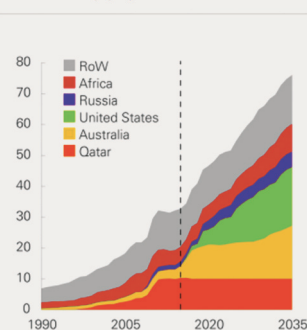
China, India and other emerging Asian economies remain the largest destinations for LNG, while Europe (apart from the Iberian Peninsula and the UK) has been more slow in turning away from traditional pipeline gas supply in favour of importing liquefied natural gas.

Yet, the tide is turning in favour of LNG which is anticipated to grow seven times faster than pipeline gas trade. By 2035 it will account for around half of all globally traded gas - up from 32% now, according to BP Energy projections.

Destination flexibility lies at the heart of the growing LNG-based trade: Cargoes laden with LNG, unlike pipeline gas, can be redirected to different parts of the world in response to regional fluctuations in demand and supply.

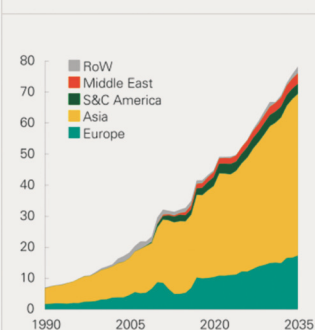
“If prices move further apart than is warranted by transportation costs, there will be an incentive for LNG supplies to be redirected until prices move back into line. Consequently, global gas markets are likely to become

LNG supply (Bcf/d)



Growth in global LNG supply is led by the US, Australia and Africa

LNG demand (Bcf/d)



Demand for LNG is rising; making gas is the fastest-growing fossil fuel among Asian economies

increasingly integrated.

While most of Australian supplies are headed to Asia, the destination of US LNG exports is “more diversified,” as they are providing the marginal source of

gas for markets in Europe, Asia and South and Central America.

“As such, US gas prices are likely to play a key role in anchoring gas prices in a globally integrated market,” Dales forecast. ■

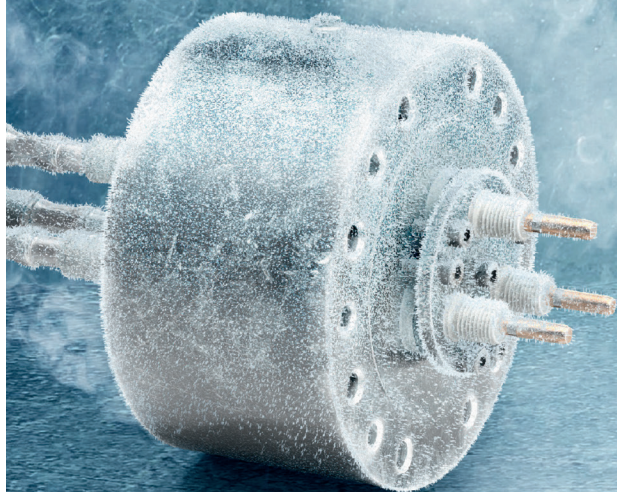
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South Korea's 1st power plant runs on US shale gas

SK E&S, a leading South Korean gas and power company, has become the frontrunner in burning imported shale gas from the United States to generate electricity at its 1,800 MW power plant at Bongam-ri – just a few miles from the border with North Korea.

Delivery of the first US LNG spot cargo took place in early January and SK E&G, part of the conglomerate SK Group is understood to have imported around 66,000 tons of LNG from Cheniere Energy's Sabine Pass terminal in Louisiana.

Price details were not disclosed, however, it is known that the LNG was bought with the purpose to use it for generating electricity. The Bongam-ri power plant

is operated by Paju Energy Service, wholly-owned by SK E&S. With a capacity of 1.8 GW it accounts for around 2% of South Korea's overall generating capacity of 100 GW.

'Direct use' of US LNG

In contrast to other Korean gas-fired power plants that purchase fuel from Kogas, the Paju LNG-to-power plant uses "directly im-

ported US LNG," SK E&G announced in early February. This helps curtail costs, according to the operator.

Yu Jeong Joon, CEO of SK E&S underlined that

"the Paju LNG Power Plant is Korea's first power plant to use US shale gas. By importing an affordable and clean fuel to produce high-quality cheap electricity, SK E&S is contributing to a stable supply of energy to meet demand in Korea."

Prior to snapping up spot cargoes of from Sabine Pass, SK E&G since early 2006 has imported between 500,000 and 600,000 million tons of LNG annually from Indonesia's Tangguh export plant, mainly for use as fuel at its Gwangyang power plant (1,126 MW). British Petroleum helped to set up the Gwangyang LNG Power Plant in 2003 but SK in 2010 purchased all shares from BP.

An SK E&S official stated "Combined with the Gwangyang LNG Power Plant's current capacity of

1,126 MW, the 1,800 MW of the Paju LNG Power Plant has increased the company's total [LNG-fuelled] capacity to 3,000 MW." ■



The 1,800 MW LNG power plant at Bongam-ri, near the border with North Korea

Trafigura mulls revival of Teeside LNG facility

Global commodities trader Trafigura plans to invest in an LNG regasification and import facility in Teesside in northeast England as expands its UK gas business and seeks an outlet for cargoes from the US Gulf Coast.

The Teesport regasification terminal was shut in 2015 after declining usage at a time when fewer LNG cargoes were imported to the northeast Gasport as preference was given to the bigger terminals at Milford Haven and the Isle Grain. Built at a total cost of less than \$80 million, the original infrastructure at Teesside Gasport had cost significantly less than the approximately \$500 million needed at the time to realize a conventional onshore terminal.

Trafigura said that getting access to an import location such as Teesside would give it greater flexibility as global LNG supplies increase.

"Given the growth in volumes globally and the flexibility of US supplies it is likely that LNG shipped from the US will make up the lion's share," Hadi Hallouche, head of LNG trading at Trafigura, said in an interview with the Financial Times. "LNG infrastructure is coming down in cost," he explained, "and liquidity in the LNG market is getting deeper, making these kinds of projects possible." ■

AES Dominican ready to supply gas to Caribbean Islands

Re-load and re-export of LNG cargoes, notably from the US Gulf Coast, is now possible from the AES Dominicana Liquefied Natural Gas reception terminal after the operator modified the terminal accordingly.

Nine million dollars were spent to build new installations and adapt the existing regasification terminal to become a "port of entry and exit." Ships, as small as 10,000 cbm, can now be filled directly from the existing jetty. For smaller customers, AES said it will load LNG into ISO tanks at the terminal so that super-chilled gas can be delivered via container vessels to neighboring countries.

"Exports via ISO containers to the Caribbean have been taken up recently," said George Nemeth, Director of LNG Business Development at AES Mexico, Central America and the Caribbean (MCAC). To that end, the Dominican branch of AES benefits from 13 years experience of operating the terminal, including seven years when the landed LNG was



Terminal-1 within the AES Andres energy complex

used to fill trucks.

"With this project the Dominican Republic becomes the first hub of Central America and the Caribbean for the import and export of natural gas," underlined Edwin De los Santos, president of AES Dominicana.

Commissioning of the AES

Andres Marine Facility, at the turn of the year, is one of several projects of the Dominican state-run utility. Others include a 114 MW combined-cycle gas power plant, addition of 3.5 MW of renewable energy through two solar PV projects as well as a 30 MW battery energy storage array system. ■

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Siemens rolls out micro-scale LNG in Pennsylvania

Dresser-Rand, now part of Siemens Power and Gas, has commissioned its first micro-scale natural gas liquefaction system at the Ten Man LNG facility in Pennsylvania. The modular, portable LNGo technology enables distributed production of LNG and can be installed in a short period of time to meet local gas demand.

This cost-effective solution allows the operator, Frontier Natural Resources, to monetize stranded gas assets at Tenaska Resources LLC's Mainesburg field, located in the Marcellus shale play. Frontier Natural Resources is an independent natural gas producer focused on developing conventional and unconventional resources.

The scope of supply included a standardized LNGo solution with four different modules, each handling one step of the liquefaction process. The whole LNGo system can be transported on eight trucks due to its footprint of approximately 508 square meters, roughly the size of a basketball court. It is deployed directly at the gas field.

Start-up of the Ten Man facility took place just four months from contract signing, and the operator said approximately half a million liters of LNG was produced in the first 20 days.

Michael Walhof, sales director Distributed LNG Solutions for the Dresser-Rand business said the project demonstrates "our unique capabilities to deliver innovative solutions ... that help clients maximize the value of their assets." Frontier Natural Resources was provided with a "reliable, robust solution to liquefy natural gas and cost-effectively move it to market," he underlined.

The LNGo technology makes it

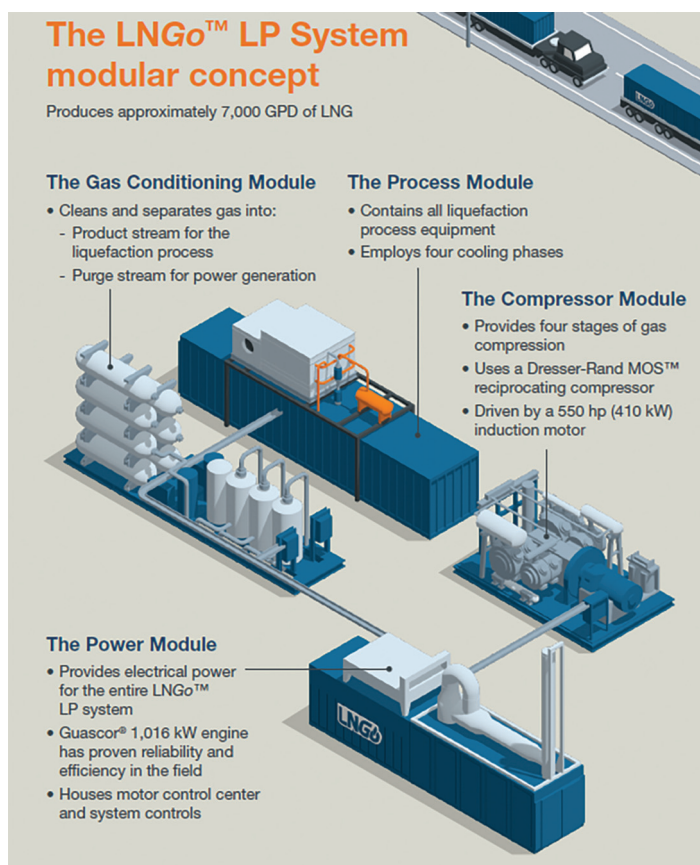


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The facility Mainesburg field produces up to 23,000 liters of LNG per day

possible to monetize stranded gas deposits due to its relatively low capital and operating costs. The micro-scale LNGo solution can be deployed in rough terrain or remote regions, eliminating the need to establish an expensive gas pipeline infrastructure or arrange for long-distance trucking of LNG

from centralized plants to point of use. It can function as a decentralized solution where the requisite pipeline infrastructure is lacking, or as an onsite transformation solution to reduce or eliminate flaring of petroleum gas at, for example, oil rigs or producing gas fields.



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Tenaska Resources' Ten Man project in operation

FERC allows Jordan Cove to re-apply

Jordan Cove LNG, the Canadian-run export project for the US northwest state of Oregon, has been given permission by the US Federal Energy Regulatory Commission (FERC) to file a new application with an amended design. "Through feedback from stakeholders and extensive engineering work, we have designed a more efficient facility that does not require a power plant, and will reduce overall environmental impacts," stated the developer Veresen Inc., based in Calgary, Alberta.

Jordan Cove has now formally removed its proposal to build a 420 MW power plant adjacent to the facility planned for Coos Bay. Veresen said that by doing so the facility could be more efficiently and effectively operated with a smaller infrastructure footprint.

Eagle's Jacksonville LNG project advances

Eagle LNG Partners has filed an application with FERC to site, built and operate natural gas export facilities on the St. Johns River in Jacksonville, Florida. The proposed project consists of three liquefaction trains and, at full build-out, will be capable of producing up to 39,286 barrels LNG per day, or roughly 1 mtpa.

"If Eagle LNG receives permission from FERC to begin construction by the first quarter of 2018, we anticipate completion of the project in 2019," Dick Brown, CEO of Eagle LNG commented. The produced LNG is meant to be transported to markets in the Caribbean and Latin America, mainly for power generation.

Apart from the Jacksonville project, Eagle LNG is also currently constructing the Maxville LNG project and a marine bunkering terminal at Talleyrand, both near Jacksonville, Florida. Both of the latter projects are due operational this summer.

Billionaire Tanoto-backed project seeks LNG export licence

Woodfibre LNG, the privately-held venture firm backed by Indonesian billionaire Sukanto Tanoto and his Pacific Oil and Gas company, has filed for a 40-year export licence to ship cargoes from Canada to Asia. Early works for construction of the 2.1 mtpa liquefaction facility are already underway near the town of Squamish, just north of Vancouver.

Built at the site of an old pulp mill, this brownfield LNG project in 2016 became the first venture in the province of British Columbia to receive its full environmental approval from the federal government in Ottawa. Even before the project received government approval, partners at Woodfibre sealed a supply contract with China's Guangzhou Gas Group for delivery of 1 mtpa of LNG over 25 years, starting in 2020.

Woodfibre has now formally applied to the Canadian National Energy Board (NEB) for its 40-year licence. The project was already granted a 25-year licence in December 2013; however, amendments to the Energy Board regulations in 2015 meant it could increase the maximum term to 40 years.



"This application, if successful, would provide even more assurance to government, First Nations partners, stakeholders and potential customers of the certainty of this project," commented Byng Giraud, Vice President for Corporate Affairs at Woodfibre. "In addition, all of the commitments Woodfibre LNG made in its environmental assessment certificate application, and the regulatory conditions, plans and permits required for construction and operations will re-

main in effect for the life of the project," the company added.

Cooperating closely with First Nation to minimize public opposition and gain what they call a 'social licence', Woodfibre LNG. Squamish First Nations Chiefs and the tribal council in October 2016 selected air cooling as the technique the Woodfibre plant will use to cool its natural gas in the liquefaction process. The choice of cooling technology is one of 13 conditions in the Squamish Nation's environmental

assessment agreement for the proposed Woodfibre project.

Mr. Tanoto is chairman of Pacific Oil & Gas' parent company which has offices in Jakarta, Singapore and three further bureaus in China. His move to appease First Nations and embrace their decision-making has given him credentials with Canada's Minister Justin Trudeau, who is trying to build himself up as a global leader of environmental causes, notably the reduction of greenhouse gas emissions. ■



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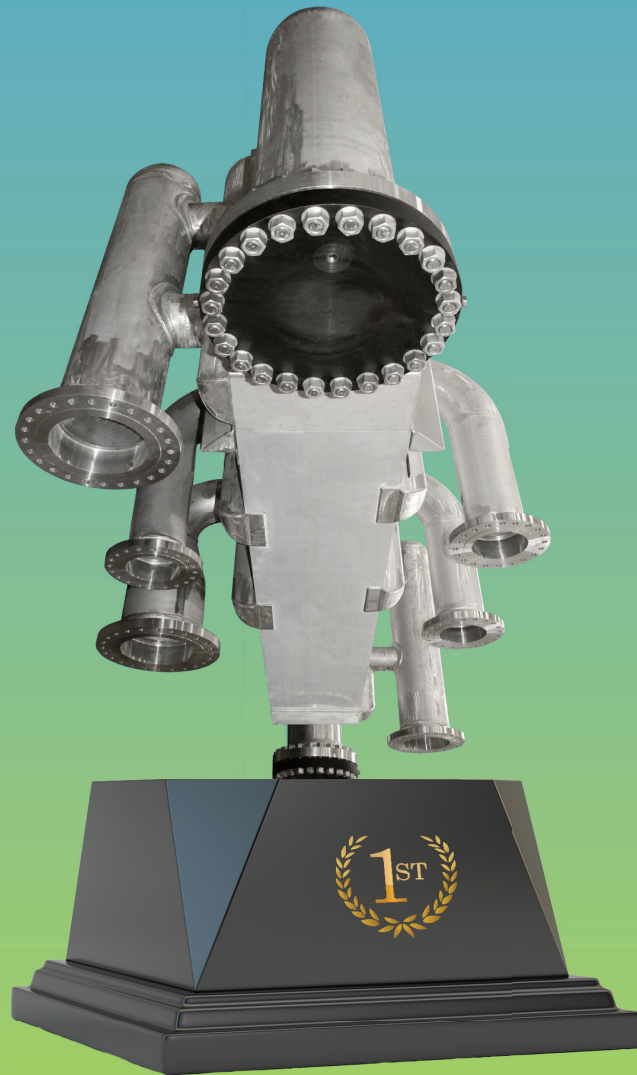
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