

LNG *North America*

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U.S. shale gas exports threatened by oil price plunge

As the collapse in oil prices dampens demand for Henry Hub-indexed LNG exports, analysts at Sanford C. Bernstein & Co. warn most of the proposed US liquefaction capacity will “never be built.” Exelerate Energy’s Texan LNG export project has become one of the first high profile victims.

The floating 8 mtpa terminal, moored at Lavaca Bay, was initially due to start up in 2018. Now developers have put it on hold as project economics simply don’t add up any more. In a filing with FERC, Exelerate asked for its export application to be placed in abeyance until April 1.

A halving of the oil price since June 2014 has scattered developers’ plans that cheap U.S. shale gas could be sold at a profit into high-value energy markets in Asia – an assumption that relied on high oil prices for U.S. Henry Hub-indexed LNG to compete with traditional supply sources of Japanese Crude Cocktail (JCC) linked LNG. Now that Brent crude

has seen record lows near \$45/bb, these assumptions are out of the window.

Most US LNG plants will “never be built”

As the collapse in oil prices dampens demand for Henry Hub-indexed LNG exports, analysts at Sanford C. Bernstein & Co. warn most of the proposed US liquefaction capacity will “never be built.” Long-term price differences between oil and natural gas are converging, so hub-indexed US LNG has lost most of its competitive advantage.

Asked how low oil prices can go, Bernstein’s senior oil and gas

analyst Neil Beveridge said “We would say \$40 is about the bottom; once oil prices go below that producers will start shutting in.”

Morgan Stanley cut its 2015 forecast for Brent saying that in a worst case scenario crude prices could fall to \$43 per barrel in 2015, although its base case scenario was for \$70/bbl. HSBC is more optimistic and told investors to prepare for oil rebounding to \$95/bbl by the end of this year.

“The Saudis are pushing prices

down to force the marginal producer out of the market, but we don’t know if this will be Venezuela and Iran or the E&P companies that extract shale oil and gas,” Beveridge said.

Gauging marginal costs of shale gas drilling

Notwithstanding the record low oil prices, there has not yet been a substantial reduction in U.S. production of shale gas and liquids.

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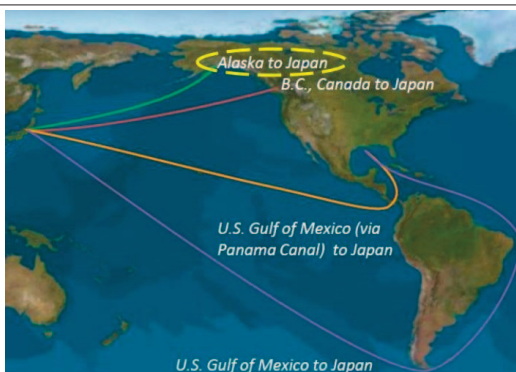
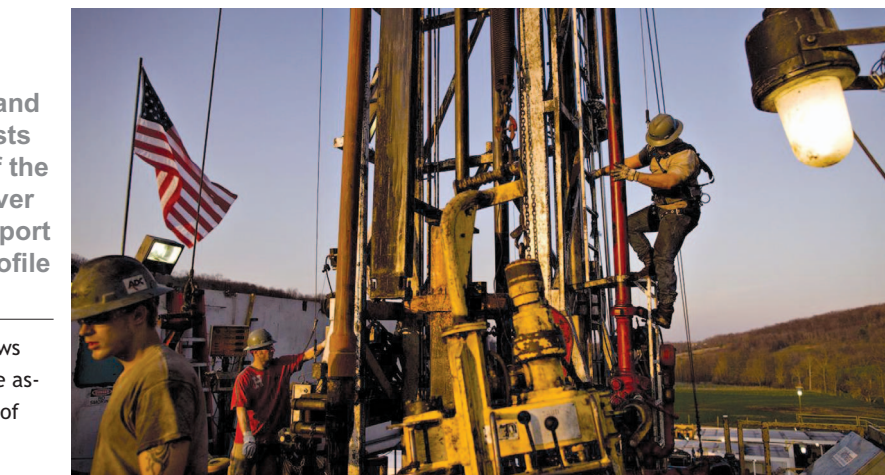
Alaska LNG gains momentum

With oil prices in the doldrums well below \$60/bbl, a Japanese LNG venture is gearing up to buy existing gas reserves at wellhead prices to ship up to 3 mtpa from Cook Inlet to a new import terminal in Japan. This REI project can be advanced faster and at lower costs than a 18 mtpa project near Kenai proposed by TransCanada, BP, ConocoPhillips, Exxon Mobil, which hinges on pipeline gas from the Alaskan North Slope resources.

The new Alaska Governor Bill Walker has signed a Memorandum of Understanding on the Cook Inlet project with the Japanese investment group called Resources Energy Inc. (REI), which comprises a wide range of investors from Mitsubishi to Toyo Engineering to the Kyoto Prefecture and some municipalities.

Potential partners for the Cook Inlet venture include the Alaska Industrial Development and Export Authority (AIDEA) as well as at least one US energy major.

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Analysts at Rice University's Baker Institute Center for Energy Studies extensively researched U.S. shale gas play breakeven prices. "Some wells are profitable at \$2.65 per thousand cubic feet, others need \$8.10 ... the median is \$4.85," said Ken Medlock, senior director at the institute. Determining cost factors are whether

there are any liquids, but also infrastructure access, lease costs and local fiscal conditions.

If oil prices stay in the doldrums, some U.S. shale drillers will feel the pinch. Some have lost out already: Citing debt between \$10 million and \$50 million, WBH Energy, a private company that drills for shale gas and liquids in

Texas, had to file for bankruptcy protection after a key lender refused to advance more money.

"Current oil price levels near \$50/bbl are pushing a number of developers to the edge of profitability which should result in a reduction in drilling activity for liquids," said Tavor Sikorski, Energy Aspects' lead analyst on natu-

ral gas, coal and carbon.

Asked to gauge the reaction of the industry, he said: "Sustained low oil prices are worrying but we expect to see two responses - one is a reduction in absolute levels of drilling activity which will reduce the level of associated gas production and two is a shift from drilling for liquids back to drilling for gas." ■

Bipartisan bill aims to speed up American LNG exports

The LNG Permitting Certainty and Transparency Act was launched as a bipartisan bill by Senators Martin Heinrich (Democrat- New Mexico) and John Barrasso (Republican - Wyoming), calling on the Secretary of Energy to make a decision on any LNG export application within 45 days after the environmental review document for the project is published.

The bill is meant to speed up the approval process for exports of liquefied natural gas (LNG) to countries that do not have free trade agreements with the United States.



"Right now, LNG exports are being stalled by Washington red tape and permitting delays. Our bipartisan bill fixes this by creating clear deadlines that force

Washington to make timely decisions on these critical energy permits," said Senator Barrasso, suggesting this is "a win-win for our economy and America's national security interests."

"Improving the process for reviewing permits to export U.S. natural gas to our allies would create jobs in states like New Mexico because we're rich in the resource. If the U.S. does not aggressively market LNG abroad, many of these countries may have no choice but to purchase energy from Russia or other nations that are not aligned with our own national interests," added Senator Heinrich.

If implemented, the bill would provide an applicant with expe-

ditioned judicial review if the Secretary fails to act within 45 days or if the project is subject to a legal challenge; and require LNG exporters to disclose the countries to which LNG has been delivered.

In addition to Heinrich and Barrasso, Senators Cory Gardner (R-Colo.), Heidi Heitkamp (D-N.D.), John Hoeven (R-N.D.), Tim Kaine (D-Va.), Shelley Moore Capito (R-W.Va.), and Michael Bennet (D-Colo.) are original cosponsors of the LNG Permitting Certainty and Transparency Act. ■

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The Cook Inlet project will have an initial capacity of 1 mtpa based upon 160 million cubic feet per day of feed-gas and reserves of 1.5 trillion cubic feet, regarded as a minimum for an LNG project.

Financing will be partially provided by AIDEA and the state of Alaska promised to help facilitate the REI project through a coordinated permitting system.

REI prefers LNG from Alaska over Russian supplies

Shunichi Shimizu, REI's president and chief executive, stressed the urgency of Japan for new LNG supplies from North America by saying: "For emergency purposes, Japan has oil reserves to last for six months but its LNG storage reserves is only for two weeks."

REI chose Alaska over Russia as a partner, Shimizu disclosed after conducting studies on diversified power generation. "Russia or Alaska [was discussed] for gas supplies or LNG. After discussions with prefectural governments and industries in Japan, REI decided to develop an Alaska LNG project," he said.

The Kyoto Prefecture and the State of Alaska agree to closely exchange information to promote a "Japan-Alaska LNG Project". The

REI project stipulates a new import terminal for the Alaskan cargo on the Japan Sea side of the island nation rather than the Pacific Ocean side because it is less earthquake-prone.

"This agreement is an extension of Alaska's longstanding partnership with Japan in energy markets," Walker said, referring to the 40 years of LNG exports to Japan from Marathon Oil and ConocoPhillips' Kenai plant which previously produced just under 900,000 tonnes per annum.

First cargo envisaged by end-2018

Partners in the liquefaction plant at Cook Inlet will apply for US Department of Energy approval as soon as possible. The venture will start front-end engineering and

design by mid-2015 as it aims to start producing LNG from the new plant by the end of 2018 or mid-2019 at the latest.

REI said it will gather and purchase feed-gas at wellhead prices. It also plans to develop Alaskan LNG storage ports in Japan for domestic direct sales of LNG into the Japanese market.

The Japanese group said project costs are estimated at \$1.35 billion for the liquefaction facility and an adjacent power plant, while a further \$1.5 billion will be spent on feed-gas supply and related infrastructure, giving at total of \$2.85 billion.

Once the 1 mtpa facility has come on stream, the Cook Inlet plant is earmarked for expansion to 2 mtpa by 2023 and to 3 mtpa by 2026. ■

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Publisher
Stuart Fryer

Editor
Anja Karl
Tel: +44 (0)207 0173417
anja@lngjournal.com

Layout
Vivian Chee
Tel: +44 (0) 20 8995 5540
chee@btconnect.com

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LNG supply overhang set to last – but for how long?

Bearish sentiment will prevail on global LNG markets, as current liquefaction capacity of around 300 million tons per annum is set to grow by another 180 mtpa and in ten years by 230 mtpa, with increases being led by Australia and the U.S. Analysts say the supply overhang will persist as Asian demand is faltering.

“The demand side of the market looks rather light,” Energy Aspects analysts said, suggesting that even though 82 million tons of regas capacity will be online by 2017 and another 90 million tons are likely by 2020 – “the actual demand behind that is less convincing.”

“Even on just a capacity increments basis, the market looks long,” said Trevor Sikorski. “We expect the supply overhang to average as much as 38 mtpa in the coming three years and increase to an average of 66 mtpa in the last three years of the decade.”

Glut of firm supply faces ‘speculative’ regas capacity

Only China has a very good demand story to support such capacity increases, however, the recent deal with Russia to build a second gas pipeline is feared to substantially reduce its hunger for higher-priced LNG. Though China has built 18 mtpa of regasification capacity in the 2012-14 period and has another 12 mtpa under construction, it remains questionable how much of this capacity will actually be used.

The market is currently running with a 2:1 ratio of regas to liquefaction capacity. “So, just comparing the headline suggests the market metrics will be loosening,” Sikorski warned, suggesting much of the proposed regas capacity is “speculative at best.”

Japan’s nuclear restart – with six reactors expected to come back both in 2015 and 2016 –

Global liquefaction expansion, Mtpa

Country	Export volumes (Mtpa)			Total
	2015-2017	2018-2020	2021-2025	
Australia	60.0		12.0	72.0
US	18.0	62.0		80.0
Russia		16.5		16.5
Canada			17.5	17.5
Mozambique			10.0	10.0
Tanzania			10.0	10.0
East Med		7.5		7.5
Indonesia			2.0	2.0
Malaysia	2.0			2.0
Algeria	9.0			9.0
Angola	5.0			5.0
Total expected	94.0	86.0	51.5	231.5

makes it unlikely that the largest LNG importer will keep up its current demand. Japanese LNG imports lately declined y/y by 0.59 million tons, or -7.9% to 6.94 million tons, the strongest decline since May 2013. Gas for power use was down 4% to 68.9 TWh which meant Japan’s top utility companies burned 0.17 million tons (-4%) less LNG year on year.

South Korea is adding additional 8 mtpa of regas capacity between 2014 and 2017, but has nuclear issues lurking in the background. Three new reactors that have been put on hold due to a forged certificate scandal, but that could all be on line next year – reducing the need to import LNG for power generation.

Though India added some regas capacity, its actual demand is forecast to stay at 14 mtpa. LNG prices have been too expensive for India to buy big volumes in the last few years.

Remedies: supply restraint vs LNG price drop

To balance the market, global LNG prices would have to drop to make gas an attractive baseload fuel in NE Asian or European power markets. Another option would be to discourage supply by closing the arbitrage window between Henry Hub and NE Asia first and then to Europe.

“The arbitrage window will close and this is likely to happen for US projects as not many projects outside of the US are likely to have short-run variable costs of \$4/MMBtu and upwards,” Sikorski forecast. “Say the US is exporting, conservatively, 40 mtpa and Henry Hub rises to \$5, then the FOB cost might be \$5.75,” he forecast.

Once the US starts being able to export significant volumes, its LNG exports are likely to get priced out of the Asian market at around \$9.75/MMBtu and the European market at around \$7.30/MMBtu. ■

Supply-side looks very heavy

By 2020, global liquefaction capacity is about to increase by 60% as 180 mtpa are coming online, with Australian projects first in line.

After a hiatus of a few years, capacity increments are returning Down Under with 60 mtpa of liquefaction capacity under construction. Of that, 40 mtpa is expected to be operational by the end of 2015, the rest by 2017.

Another tidal wave of new LNG supply is on its way from the U.S., starting in early 2016 with Cheniere’s 18 mtpa Sabine Pass project. Permitting delays have meant that the next ones will be around two years after that, so 2018-2020 look to be a key period for capacity additions.

“While the US has some 310 mtpa of proposed LNG export projects, we think that some 80-100 mtpa could be operational by the end of 2020,” Sikorski said.

East Africa holds out plenty of promise as the next big, new area for LNG production. Anadarko/Eni-lead 10 mtpa Mozambique project could take FID in 2015, as it is moving slightly faster than BG and Statoil’s project in Tanzania.

Landlocked shale gas reserves in Alberta, Canada, need to be transported over the Rocky Mountains for liquefaction and exported from British Columbia. This weighs heavy costs for upstream development, extends project lead times and complicates investment decisions. Energy Aspects forecasts there will be no exports of Canadian gas via LNG by 2020, but that 17-20 mtpa of export capacity could be seen by 2025.

Some less significant volumes might come from the East Mediterranean as well as from South East Asia, notably from Indonesia and Malaysia. ■

US Arbitrage window closing prices, \$/mmbtu

Henry Hub price (\$/mmbtu)	Transport to NE Asia (\$/mmbtu)			Transport to NW Europe (\$/mmbtu)		
	3	4	5	1	1.5	2
4.0	7.6	8.6	9.6	5.6	6.1	6.6
5.0	8.8	9.8	10.8	6.8	7.3	7.8
6.0	9.9	10.9	11.9	7.9	8.4	8.9
7.0	11.1	12.1	13.1	9.1	9.6	10.1

Note: Green highlight = prevailing prices.

Source: Energy Aspects

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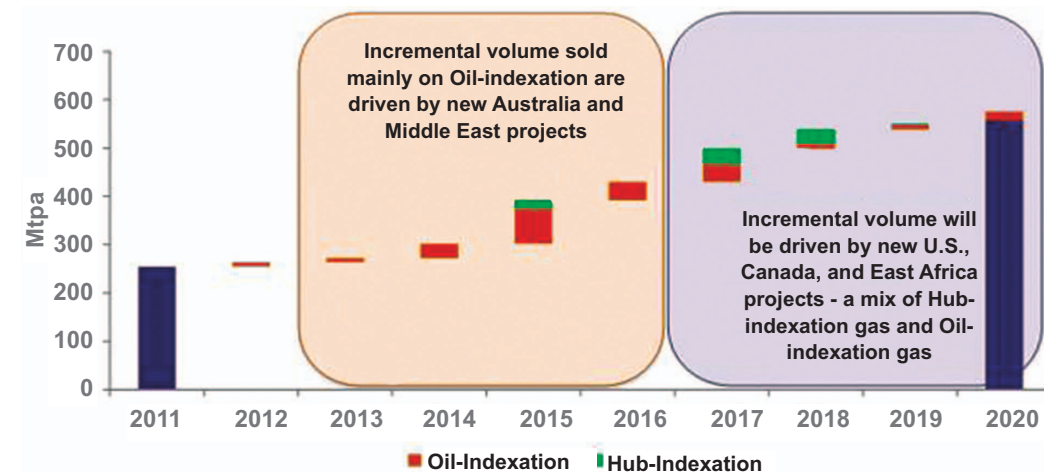
A halving in the oil price since June has toppled the expectations of exporters that cheap U.S. LNG would flow to energy hungry Asian markets. Now the landed cost of LNG from North America looks likely to be inconsistent with the existing price level in Asia.

The oil price plunge makes U.S. LNG, with prices linked to Henry Hub, less competitive with cargoes sold on an oil-indexed basis. This is likely to push back Canadian export projects until at least the end of this decade.

The emergence of new LNG supply based on the U.S. shale gas revolution comes at a time, when Asia's major consuming countries Japan, South Korea, and China are seeking to offload some of their long-term LNG supply commitments, contributing to the glut.

As a result, U.S. LNG flowing to Asia will be limited and more than half of the cargoes will have to make their way to Europe and Latin America. Not only has Asia's gas demand declined, buyers now prefer cheaper oil-indexed gas.

Cheniere's marketing proposal



Incremental LNG Supplies, 2010-2020

Note: Facilities includes that existing, under-construction, and proposed

Source: CAPP and MarketsandMarkets Analysis

for Sabine Pass says that a fee of \$1.75/MMBtu and a 10% fuel surcharge would be sufficient to cover the cost of turning gas into LNG. At current spot freight rates,

transport costs would add about \$3.75/MMBtu to deliver Sabine Pass gas to Asia. This suggests that at \$4.0/MMBtu cost of the feed gas, Gulf Coast LNG delivered to

Asia would cost about \$10.0/MMBtu. At Henry hub gas price \$6.0/MMBtu, the delivered cost would be around \$12.1/MMBtu.

Playing off LNG import versus pipeline gas

China's growing energy hunger has spurred national oil companies (NOCs) to move aggressively to increase access new supply sources. Regasification infrastructure has been rapidly expanded and ownership interest in Canadian LNG projects acquired, while the government kept a tough stance in price negotiation for pipeline gas imports from Russia.

Cash-strapped Gazprom ultimately bowed to CNPC's pressure and signed a second major gas supply accord in November, just month after the landmark \$400 billion deal. The latest agreement will see Russia deliver up to 30 Bcm of gas to China for 30 years through the Altai pipeline - adding to the 38 Bcm/year agreed back in May.

Shigeru Muraki, Vice Chairman of the board at Japan's Tokyo Gas, said that the U.S. LNG export projects coming on stream in the next years will have to compete against the price set by pipeline imports. Apart from Russia, China has agreed to import pipeline gas from Turkmenistan and Myanmar.

An estimated estimated long-term price of \$10/MMBtu renders

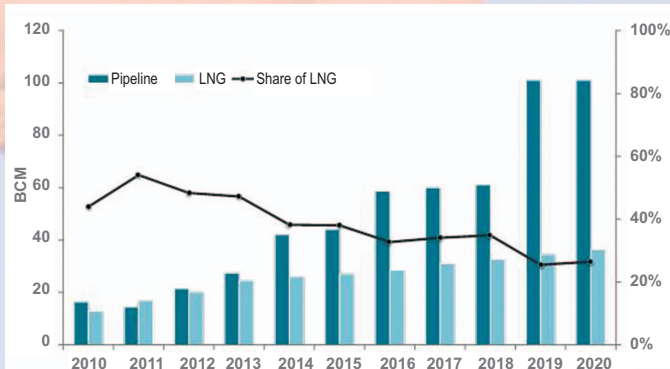
Russian gas deliveries to China very competitive. Though Russian gas will arrive via pipeline in northern China and still needs to be transported to urban centres such as Shanghai or Beijing on the eastern coast, pipeline gas may well remain favourable over LNG imported at spot markets.

Analysts at the Australian bank Macquarie forecast Russia will supply 35% of China's gas demand for power generation by 2023. Chinese National Development and Reform Commission said it aims to increase overall natural gas supply to 250 Bcm this year and 330 Bcm in 2017.

MarketsandMarkets Analysis sees China's gas demand reach 400 Bcm by 2020, while imports are seen reaching nearly 138 Bcm by the same year

Pipeline gas is likely to form a sizable portion of Chinese natural gas imports. Under a high supply scenario for pipeline gas, the aggregate pipeline imports could amount to up to 101 Bcm or about 73% of total gas imports in 2020.

LNG will cover the remaining 27% of the gas imports, however Russian supply will force the price of LNG delivered to China down to between \$10 and \$11/MMBtu - too low for U.S. LNG exports to be profitable. ■



Pipeline & LNG Trade in China, 2010 - 2020

Source: MarketsandMarkets Analysis

However, the cost advantage of U.S. LNG has vanished. Already with oil at \$70.0/barrel, Asian buyers would have to pay around \$10.5/MMBtu for oil-indexed LNG – just a notch above prices for competing cargoes with Henry Hub at \$4.0/MMBtu. Now that oil is trading below \$50/bbl, the tide has turned against LNG supplies from the U.S.

Asian LNG markets to stay mostly oil-indexed

Spiraling cost to develop new liquefaction terminals in remote locations has prompted most new Australian projects to sell their LNG supply on an oil-linked basis. Projects partners in Canada and East Africa are also considering to sell their LNG on an 80% oil-indexed and 20% hub-indexed basis.

U.S. developers have so far been adamant that they will liquefy and sell their shale gas linked to Henry Hub prices, even though analysts have cast some doubt that this will be the case for all volumes.

Buyers of LNG typically sign cost-plus contracts. In the U.S., that would be the cost of Henry Hub natural gas plus the cost of liquefaction and transportation. With no assurances and a good

deal of evidence to the contrary that Henry Hub gas will remain at prices around \$3.0 - \$4.0/MMBtu for the long term, it is difficult to see how there will be many long-term buyers of U.S. LNG at least until the second half of the 2016, when oil prices are expected to recover to \$85/barrel.

From 2016, Henry Hub-indexed LNG will have a more prominent influence on global gas markets as more projects from Canada and the U.S. will come online. However, hub-based LNG will still be relatively small in volume, with no guarantee that all U.S. exports will be sold on a Hub basis.

Though end-users such as India's GAIL and South Korea's KOGAS hope to benefit from a direct Henry Hub linkage, most of LNG will continue coming to Asia on an oil-indexed basis as project developers need this type of linkage to justify multi-billion dollar investments. The paradox is, that though the drop in oil prices also hurts traditional liquefaction projects developed as selling oil-indexed LNG now gives lower returns.

Slump in landed prices for LNG to Asia

The most recent estimated landed prices (January, 2015)

for LNG to Asia are sobering: It is \$9.8/MMBtu for China, \$10.0/MMBtu for South Korea and Japan, and \$9.5/MMBtu for India as reported by the Federal Energy Regulatory Commission.

Weak demand across Asia push LNG prices down to around \$10.0/MMBtu at the end of last year, almost half of the \$19.0/MMBtu spot cargoes were selling in June, 2014.

Yet new supplies are starting to come online. A massive build out of LNG export capacity is still underway, with earlier projects now reaching completion. Tepid demand growth cannot keep pace with the glut in supplies, heralding further a fall in prices to levels much lower than anticipated.

That spells trouble for the spate of U.S. projects under construction as well as the ones set to begin operations this year. Some projects might have to be shelved.

All eyes are on Saudi Arabia, but it is very unlikely that the world's largest oil exporter will reduce output. Even though many OPEC members need oil prices to be around \$85/barrel to balance their book, dominant members such as Saudi Arabia, Kuwait, and U.A.E have deep pockets and plan

to keep prices low for around one year to maintain market share and put the U.S.'s burgeoning shale oil and gas industry under pressure.

It is a price war but also a waiting game. Just one thing seems certain: The present plunge in oil prices is not sustainable in the long-term and may well have been reversed when the U.S. start exporting in large volumes of super-chilled gas several years from now.

Author



Priyank Srivastava works as an analyst specializing in oil & gas for MarketsandMarkets, a full-service market research

and consulting firm tracking more than 10 industries. He assists clients by providing an insider's perspective on events and technologies impacting the global petroleum industry. He has written on strategic issues impacting the oil and gas industry and presented papers in several national and international conferences.

Always change a losing game

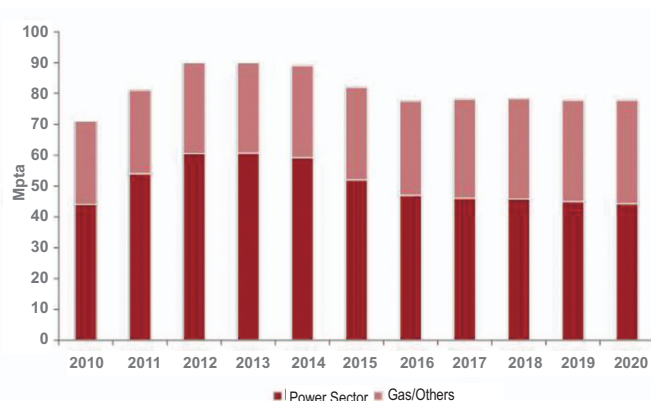
Japan's public debt has skyrocketed as it was forced to import expensive LNG for gas-fired backup power following the shutdown of all 48 reactors in the wake of Fukushima. Its consumption peaked at 37% of global LNG supplies, but a nuclear renaissance will soon put a lid on demand.

It is still unclear how much nuclear capacity will resume operations, but 4 to 6 reactors are expected to be running by the end of 2015. Though stringent safety standards and a lengthy review process will mean slow nuclear restart, it also heralds a steady reduction of LNG use in power generation.

A Japanese government official, speaking at an event in Houston, said Japan is set to restart a third of its reactors - 17 units in the next two years. Each restart displaces approxi-

mately 1 million tons of Japanese LNG demand, although some will substitute oil rather than gas fired plants, and saves a \$750 - 800 million annual LNG costs.

Spot prices for Japanese LNG have halved as anticipation of a nuclear revival exerts downward pressure on prices, which is also a threat for US gas exports. Weak crude oil prices, coupled with faltering gas demand is expected to force Japanese gas importers to stick to oil-indexed supply and cancel, or re-export, commitments for U.S. LNG cargoes.



LNG Demand in Japan, 2020 - 2020

Note: Forecast based on nuclear plants restarts and renewable energy growth assumptions

Source: BP Statistical Review 2014, and MarketsandMarkets Analysis

Mind Australia's LNG boom

Project partners in North America rush to bring LNG to market before the Pacific Basin will be awash with Australian cargoes. Scope for a second wave of projects is limited Down Under once the ongoing dozen projects are completed, the Economist Intelligence Units' lead energy analyst, Peter Kiernan, told *LNG North America*.

"Asian buyers will welcome diversity of supplies, and North American LNG will be the source for the wave of supply after 2020, following the wave of Australian supply up until then," he said in an interview.

Kiernan doubts there will be much room for additional LNG to come from Australia after current projects are completed, as this will be taken up by LNG supply from the US and Canada to some extent.

No flood of US LNG on the cards

Much enthusiasm has been touted about exporting the North American shale gas boom to global markets, but Kiernan is more of a realist:

"There won't be a flood of US LNG, as some expect," he stressed, however "it will be enough to make operators cast doubt on the viability of additional Australian LNG projects that have not yet been given the final go ahead."

"Mooted Australian LNG projects will find it more difficult to

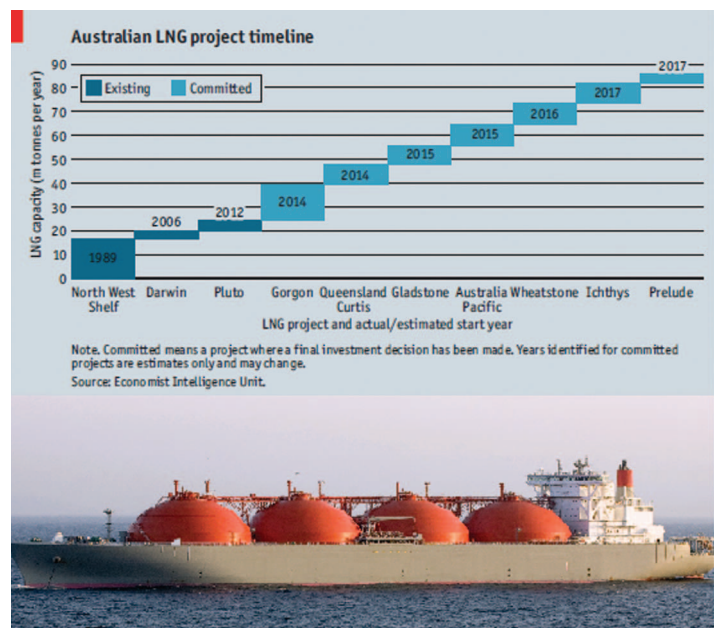
get approval because of the expected entry of US LNG into the market," he forecast, but was quick to add that projects already under construction are not at risk.

Most of the dozen of liquefaction projects under construction have long term supply agreements sewn up, many with Japanese utilities. These supply agreements are, in the main part, oil-indexed in pricing.

"With such large investment required, commercial viability is more likely to be guaranteed with long term supply agreements linked to oil prices. In some cases, buyers of the LNG have purchased equity in the projects as well," Kiernan pointed out.

Spiralling costs causes delays down-under

Asked if there are any major delays to any of the Australian projects, possibly due to cost overruns, Kiernan pointed at the Gorgon LNG project, which particularly has suffered cost overruns, as well as a few of the CSG to LNG



projects in Queensland.

"Gorgon will now cost US\$54 billion, up from US\$37 billion when the project was first sanctioned," he said. High labour costs, the strong Australian dollar, infrastructure issues and the cost of materials have all contributed to ballooning costs and, in some

cases, delays to start ups.

"For the CSG to LNG projects, operators have had to sink more dollars into drilling more wells to get the supplies than they thought they needed to," Kiernan pointed out, suggesting that has also added to costs, as have tighter environmental regulation. ■

Japan to source 70% of its LNG from Australia, U.S. by 2020

As Japan continues to rely on LNG for the bulk of its power generation due to delays in nuclear restarts, the Ministry of Economy, Trade and Industry forecasts gas importers will rely less on Middle Eastern supplies but source up to 70% of their LNG imports from Australia and the U.S. by 2020.

Australia already is the top source for Japan's LNG-to-power supplies and the Land of the Oz will stay in pool position and even expand delivered volumes, while the U.S. is set to overtake Qatar as number two supplier.

U.S. shale gas to cover 20% of Japan's LNG imports

Assuming the total volume of Japan's 2020 LNG imports stays at current levels of around 87 million tons, Australia will supply 40% of Japan's LNG, up from 20% last year. This large reliance on Australia is due to Inpex' involvement in the Ichthys liquefaction project in Western Australia.

According to the Ministry of Economy, Japan will start importing shale gas from the U.S. in 2016, which is hoped to be sourced at substantially lower prices. In the mid-term, U.S. supply is meant to account for 20% of Japan's LNG imports.

Asian gas buyers, most notably in Japan's Tepco and Chubu Electric, have joined forces to strengthen their bargaining power in contract negotiations as they eye combined purchases of 35 to 40 mtpa. The joint aim is to reduce the 'Asia premium' of \$5-10/MMBtu owing to oil-linked gas price formulas by agreeing flexible, hub-indexed prices for future LNG imports.

"We hope that North American projects will offer some innovative, hybrid price formulas - either cost-based or linked to gas trading hubs," agreed Mitsuru Sato, Director General, Oil and Gas Finance at JBIC. He stressed Japanese buyers seek to secure stable gas supplies through becoming "foundation offtakers" of selective liquefaction and export projects with stable feed-gas supply, tight cost and schedule management.

Curbing Japan's record trade deficit

The shutdown of Japan's entire nuclear capacity post-Fukushima has forced power producers to

import record volumes of coal and LNG at high prices, as fossil power generation has to make up for the lost nuclear capacity. In the three years since Fukushima, Japan's utilities subsequently accumulated an estimated \$34 billion in losses.

Sources at the Japan Bank for International Cooperation (JBIC) told LNG Journal that up to six nuclear power plants are likely to be up and running by the middle of 2015 - two of them already before the end of this year. Restarted nuclear capacity will curb expensive oil-fired generation while coal and gas will still stay in demand. First in line is the two-reactor Sendai plant (2x890MW). ■



Chart LNG... Building Her Energy Future

Standard liquefaction plants for the
transportation and energy industries

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- C250IMR – 250,000 gpd IPSMR®
- C450IMR – 450,000 gpd IPSMR®

- Optimum liquefaction solutions for monetizing small and mid-scale gas reserves
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- Brazed aluminum heat exchanger technology for superior performance and improved plant flexibility

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GDF Suez buys LNG from Quebec by truck

The US subsidiary of French LNG player GDF-Suez has signed a purchase agreement with Gaz Metro, the largest natural gas supplier in the Canadian province of Quebec, to receive LNG by truck to meet peak winter demand in New England.

Under the contract Gaz Metro, based in Montreal, will sell 475,000 Mcf (thousand cubic feet) of regasified LNG over a five-month period until the end of 2014, with the potential to purchase an additional 500,000 Mcf over the same period.

"The LNG will be transported by tanker truck to New England utilities to help meet gas inventory refill requirements," GDF-Suez said.

One large LNG road tanker can carry 9,500 LNG gallons, the equivalent of 785 Mcf of natural gas.

"This second annual arrangement with Gaz Metro represents an important step in the further diversification of our supply portfolio, as well as an opportunity for us to take advantage of gas purchases on this continent to increase our supply assets, and to continue to ensure reliability to New England when resources can be tight in the winter heating season," said Frank Katulak, President and Chief Executive of the GDF-Suez US unit.

"Additional and reliable supplies such as these will also allow us to cost-effectively provide more services to the marketplace by optimizing existing natural gas infrastructure in the region," Katulak added.

North American natural gas utilities in common with others worldwide purchase LNG during the summer and in months later in the year to fill above-ground storage tanks. That LNG is then drawn down during cold winter days to meet peak demand needs. ■

FERC gives the green light for Corpus Christi LNG

The US Federal Energy Regulatory Commission (FERC) has authorized the construction and operation of the Corpus Christi LNG export project in Texas, suggesting it would result in 'minimal environmental impacts' if Cheniere adopts some mitigation measures.

The regulator also approved the pipeline linked to the export plant put forward by Houston-based Cheniere Energy, also developer of the Sabine Pass project in Louisiana.

"The final Environmental Impact Statement concludes that if the project is constructed and operated in accordance with applicable laws and regulations, the project will result in some adverse environmental impacts. However, the impacts described in the final EIS will be reduced to less-than-significant levels with the implementation of Corpus Christi Liquefaction's and Cheniere Pipeline's proposed mitigation and commission staff's recommendations, which this order adopts as conditions," the FERC explained.

Cheniere already has a growing book of customers for the Corpus Christi plant. It most recently signed an LNG supply agreement with Portugal's main power utility Energias de Portugal SA (EDP) for



if the project is constructed and operated in accordance with applicable laws and regulations, the project will result in some adverse environmental impacts.



FERC

770,000 tonnes per annum from the venture's Train 3.

20-year deals for a total of 7.65 mtpa from the Corpus Christi plant have already been signed with six other buyers with a wide customer base in Europe and the Asia-Pacific region. Customers include the three Spanish utilities Iberdrola, Endesa and Gas Natural Fenosa, French utility and energy company EDF, as well as two Asia-Pacific LNG producers, Indonesia's state-run Pertamina and Australia's Woodside Petroleum.

The Texas liquefaction plant will be built on the northern shore of Corpus Christi Bay, at the north end of the La Quinta Channel. The plant will export around 15 mtpa of LNG from

three processing Trains.

The FERC noted that the facility would also attract traffic from LNG carriers amounting to between 200 and 300 per annum through Corpus Christi Bay. Four tugs will also be made available to manoeuvre the LNG carriers. Two parallel LNG transfer lines will deliver the fuel between the carriers and the onshore storage tanks at a rate not to exceed 12,000 cubic meters per hour.

"The construction footprint of the whole plant is around 990 acres, of which 350 acres will be affected by operations and 120 acres will be part of an exclusion zone created to protect the public in the event of accidents at the site," the FERC stressed. ■



Magnolia LNG partners bring KBR on board

US partners in the Magnolia LNG export project in Louisiana have brought on board the experienced liquefaction plant engineering company KBR to form a joint venture with the current South Korean contractors.

Project developer LNG Ltd. of Australia has signed an initial technical services agreement with KBR to undertake cost verification and provide support services for the venture. Magnolia LNG has SK E&C lined up for a lump-sum, turn-key engineering, procurement and construction contract and KBR will now lend its added experience to the project. The Magnolia liquefaction plant, to be located next to the Calcasieu Shipping Channel at Lake Charles, will comprise of four mid-scale Trains and a total of 8 mtpa of output.

"It is proposed that KBR and SK E&C will form an integrated EPC joint venture which will execute a bankable EPC contract," LNG Ltd said. "In addition both parties will work collaboratively going forward

to complete the scopes of services provided under their respective TSA agreements."

Magnolia LNG and SK E&C have also updated the EPC contract, incorporating all requirements stipulated by French bank BNP Paribas, Magnolia's project finance adviser, Merlin Advisors, the lenders' technical consultant, legal advisors White and Case and equity fund Stonepeak Partners, the proposed MLNG project's second shareholder.

"KBR will further review and advise on this updated contract consistent with their joining the project as a contractor joint-venture partner, LNG Ltd stated, adding SK E&C's participation as a member of the integrated EPC contractor joint-venture will be finalized through establishment of



the EPC contractor memorandum of understanding to be executed

in January among the parties MLNG, SK E&C and KBR."

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NEWS NUDGES

Shale activity increases in the US

The Baker Hughes US onshore well count for the fourth quarter of 2014, a measure of shale production activity, was 9,544 wells, an increase of 461 wells, or 5 percent, compared with the fourth quarter of 2013. Compared with the third quarter 2014, the well count increased most notably in the Utica Shale, up 12 wells or 12 percent, and the Marcellus Shale, up 11 wells or 2 percent basins. Shale-gas production will underpin the US LNG export industry from 2016.

Industry sales boost Tokyo Gas

Japanese gas utility Tokyo Gas Co., the nation's third-largest LNG buyer, said sales volumes in the domestic market jumped 7.5 percent to 1.37 billion cubic metres of natural gas, the equivalent of 1.1 million tonnes of LNG. Industrial sector volumes were 617 million cubic metres, up 17 percent from the year-ago period, and offsetting residential sales, down 1.8 percent compared with the same month the previous year, and sales to shops and offices which were 5.7 percent lower. Volumes for wholesale supply to other city-gas companies were 228 million cubic metres, up 11 percent from December 2013

US gas demand up on cold

The first cold snap of 2015 in the United States has driven up short-term natural gas demand across all sectors. The day-ahead Henry Hub benchmark price that makes LNG exports so attractive was last at \$3.30 per million British thermal units. During the past week average US natural gas consumption rose 23 percent. "The high demand was met by continued strong production, increased storage withdrawals, and more imported natural gas," said the Energy Information Administration. Total US consumption averaged more than 122 billion cubic feet per day (Bcf/d) through the first four days of the cold spell, peaking at more than 130 Bcf/d. Consumption levels for several days were the third-highest recorded since 2005, the EIA added. ■

Aurora LNG changes location of liquefaction site

In a rare move, partners in the Aurora LNG joint-venture in British Columbia have applied to change the project's location to an island site. The CNOOC-led venture told the BC government it would move forward with site evaluation work for a potential LNG project at Digby Island instead of the originally named Grassy Point. Both sites are near the Pacific coast port of Prince Rupert.

China National Offshore Oil Corp (CNOOC) in 2012 acquired shale-gas holdings in northeast BC as part of its \$15 billion takeover of Nexen, one of Canada's largest oil producers. The Canadian subsidiary of CNOOC now has 60% of Aurora LNG and plans with Japanese partners, Inpex Corp. and JGC Corp., to build a liquefaction plant to export 24 mtpa of LNG.

"At Aurora LNG's request, the Province has agreed to transfer the sole proponent agreement (SPA) from the northern portion of Grassy Point to Digby Island, which the company has identified as a more suitable site for an export facility," a BC government statement said. "Under the pre-existing agreement with Aurora, the Province has collected two non-refundable payments totalling \$18 million," it added with reference to payments for land acquisition.

Aurora has already been granted a permit by the Canadian National Energy Board to export up to 24 mtpa of cargoes over a 25-year period.

FIDs still outstanding for projects near Prince Rupert

The liquefaction plant when constructed would still be located just north of Prince Rupert port where both BG Group of the UK and Malaysia's Petronas

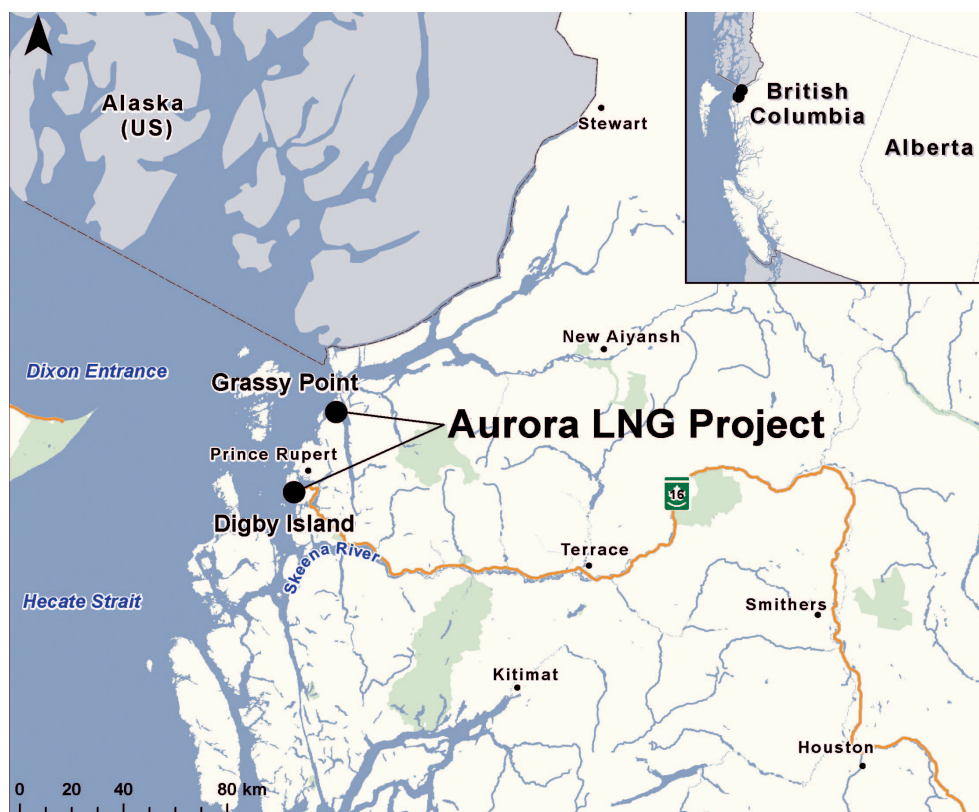
are also developing separate LNG projects.

Neither Aurora LNG nor the BG or Petronas ventures have yet to take a final investment decision (FID) for projects that would cost at least \$25 billion to complete. BG said recently that it would not be pressing ahead immediately with its Canadian export project.

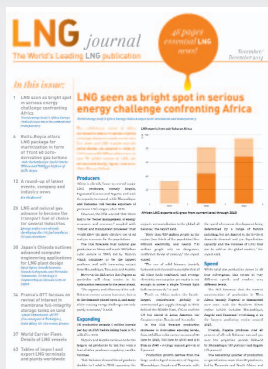
That's as CNOOC and BG said in April 2014 that they had signed a preliminary agreement to be possible partners in a Canadian LNG venture. CNOOC said at the time it had signed an accord with BG to help take the project forward.

The Chinese would then join Spectra Energy Corp., one of North America's largest natural gas pipeline companies, in the affiliated project comprising BG and Spectra to bring the feed-gas from inland to the coast. The proposed Westcoast Connector being built by Spectra is a transmission system that will bring Canadian shale gas from the Cypress area of northeast BC to BG's proposed Prince Rupert LNG export facility on Ridley Island.

The Chinese energy company is already a partner of BG in the Queensland Curtis coal-seam-gas-to-LNG project in Australia, heading for completion in December 2014. The Canadian LNG agreement was related only to a joint feasibility study on the Canadian project. ■



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