LNG North America

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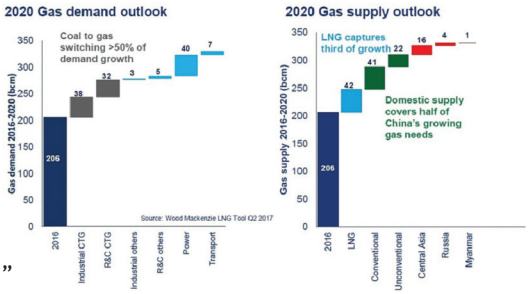
China leaps forward to embrace spot US LNG cargoes

Gravitating away from importing LNG on a take-or-pay contract basis, China's exceptional gas demand growth in winter 2017/18 not only increased incremental supply from longterm contracts by nearly 40% but also propelled up imports of spot LNG cargoes. Indirectly, this puts China into a position of soaking up excess US gas exports shipped to AsiaPacific – if the price is right.

Domestic gas and LNG are biggest sources of new supply



Though the US and China have no direct LNG offtake agreement, Chinese regasification terminals were the final destination for 8% of LNG cargoes from the United States which makes China the third largest buyer of US gas exports.

From the outside, China's swift embrace of spot LNG has been driven by policy factors such as the government's drive to reduce coal-burn for power generation in megacities in the country's northeast. But next to such political pull-factors, it's the exceptionally low price for LNG in AsiaPacific that pushes even the most conservative buyers to change tact, and embrace a revised strategy of purchasing gas on shortterm and spot markets.

Tact of two titans converges

China, set to become the world's second largest LNG consumer, is ideally placed to take on the role of balancing rampant supply of shale gas exports from the United States, the world's sixth largest supplier. By the end of 2017, China will have overtaken South Korea to become the world second largest LNG importer, behind Japan, according to shipping data.

"The US project will be quick to place volumes on the water to support upstream production, even should margins become squeezed," said S&P Global Platts senior director for global gas and LNG Madeline Jowdy.

Anticipating future US/China relations in global gas markets, she suggested: „The needs and goals of these two market behemoths are clearly on a path to convergence. Beyond that, the next generation of US supply will rely on the buy-in either directly or indirectly of Chinese consumers."

"Challenging" US economics

However, "challenging" economics limit still limits the enthusiasm of discerning Chinese buyers for US LNG. Unsurprisingly, Sino-Russian energy ties have warmed considerably under Xi Jinping and there is some synergy between Moscow's 'Pivot to Asia' and Beijing's 'Belt and Road Initiative', finds Hugo Brennan, Asia analyst, Verisk Maplecroft.

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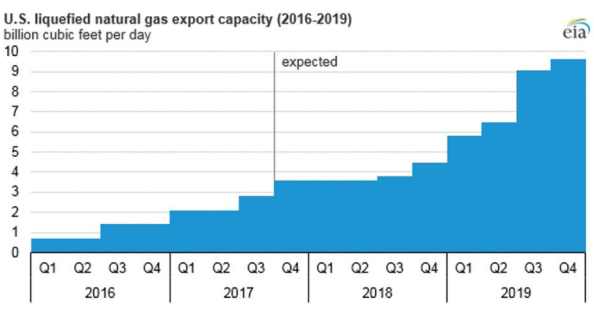
Prices rise in Asia, Europe to boost US LNG exports over the winter

Strong seasonal gas demand this winter for power generation and heating, along with high spot LNG prices in Asia and Europe, are forecast to push up US LNG export volumes. Utilization at Sabine Pass is projected to remain well above 90% in winter 2017–2018, the US Energy Information Administration (EIA) anticipates.

Overall utilization of existing LNG liquefaction facilities in 2018, however, will be slightly lower on average than this year. According to export projections in EIA's latest Short-Term Energy Outlook, the utilization of US liquefaction plants will average 80% in 2017 and 79% in 2018.



Weather, demand fluctuations, seasonality in import markets and production schedules for new LNG facilities are among the factors that can affect utilization rates, EIA said.

With the completion of Sabine Pass Train four this August, total US gas liquefaction capacity in the Lower 48 states increased to 2.8 billion cubic feet per day (Bcf/d). Located on the U.S. Gulf Coast near the Louisiana-Texas border, Sabine Pass consists of four existing natural gas liquefaction units, or trains,

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AGENDA

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President Trump's recent trade mission to China is expected to have limited success when it comes to selling US LNG. "The economics of US supplies to China may be challenging," he warned, suggesting "Chinese LNG buyers might find cheaper deals elsewhere."

"Liquefaction and shipping from the US to China involve large fixed costs, and US LNG developers also have to compete with the threat of lower cost expansions in Qatar and Australia, the current LNG export giants – and most notably, US suppliers face stiff competition from Russia."

Still, the deep and liquid nature of the US gas market allows LNG developers to offer their customers more flexibility than what is typically the norm. For example, US cargoes have been sold without destination restriction, allowing buyers to sell-on their purchases when their demand structure changes. According to Mr. Brennan, "these benefits could be attractive to Chinese players seeking to grow their global LNG position."

Transit chokepoints

When it comes to supply, energy cooperation has developed into the central plank of the bilateral relationship – not only between Washington and Beijing, but also between Moscow and Beijing. The Chinese government takes an interest in a well-diversified portfolio of gas suppliers to ensure that it does not become too dependent on any one state.

Stepping up spot LNG purchases, combined with some flexible long-term supply deals, could help reduce China's reliance on gas imports that transit strategic chokepoints, most notably the Strait of Hormuz (account for approximately 7% of Chinese gas imports) and the Strait of Malacca (16%).

Verisk Maplecroft's Government Stability – Projections Index, shows that nine of China's thirteen largest import partners are categorized as either high or medium risk. Meanwhile, the US is considered low risk and outscores China's other gas suppliers in the index, suggesting that there is less potential for political instability to impact gas production or supply.

On China's end, gas demand keeps growing and is estimated to reach 330 bcm by 2020, up from 206 bcm in 2016 (see graph).

Clean energy policy

Underpinning this uptick is the government's aim to increase the role of natural gas within the country's energy mix from 6% in 2016 to 8-10% by 2020.

According to Kerry-Anne Shanks, Head of Asia gas and LNG, Wood Mackenzie, this policy objective is driven by Beijing's attempt to shift towards a greener economy that is fuelled by a cleaner energy mix. China's rapidly growing demand will be met by a combination of domestic supply, pipeline imports and LNG.

Wood Mackenzie estimates that LNG will capture a third of China's gas demand growth out to 2025. ■

China restricts coal-burn in cities, turns to LNG to avoid winter gas shortage

China's new '2+26' cities policy – a pledge to cut emission in the country's 28 northern cities by 15% year-on-year in the winter months – is limiting the use of coal for power generation and in industries. As an alternative to coal, gas demand could rise by 23 bcm in winter 2017/18 compared to previous winters, according to Wood-Mackenzie projections. In fact, Chinese LNG imports almost doubled last month, surging 95.7% compared to October 2016, to reach 3.57 million tonnes, according to data from the General Administration of Customs.

Facing the most severe shortages is northern China, particularly Beijing, Tianjin and Hebei, where demand is highly seasonal. This region will make up half or 10 bcm of the incremental winter gas demand in 2017.

To meet this demand increase, the region has several options: It can ramp up piped-gas from other provinces, most of which being transported through the Shaan-Jing pipelines – or tap one of CNPC's four underground storage facilities in Tianjin and Hebei – or partially rely on the small indigenous production from Bohai Bay and Dagang. Or turn to LNG, particularly purchases of spot cargoes via CNPC's Caofeidian terminal and CNOOC's Tianjin terminal.

LNG North America
Publisher
Stuart Fryer
Editor
Anja Karl
Tel: +44 7733 684682
anja@lngjournal.com
Layout
Vivian Chee
Tel: +44 (0) 20 8995 5540
chee@btconnect.com
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From mid-December, however, Chinese authorities have mandated power producers in some regions to return to burning coal, responding to acute gas shortages. Coal stockpiles held by China's six major power producers for the winter season had dropped to the lowest level seen over at least four years, according to estimates from Macquarie Group.

Spot LNG preferred over contracted gas offake

At a national level, China's LNG imports will total 20 million tons this winter, up by 40% year-on-year, according to WoodMackenzie projections; but compared to last winter, there will be more reliance on spot purchases.

"The higher-than-usual demand throughout 2017 resulted in higher offtake in contracted LNG volumes in January to September. PetroChina had imported around 70% of its annual contract quantity (ACQ) by September, while it had only imported around 50% of its ACQ between January and September 2016," explained Wen Wang, China gas and LNG senior consultant, WoodMackenzie. In her view, "this means lower contracted offtake is left for the winter, and higher demand for spot."

Given the growing scale of China's winter energy demand, the country's gas import volumes will affect LNG import prices in the wider region. "Regas capacity constraints in northern China might limit LNG price upside in December and January. But a colder-than-normal end of winter could further boost local LNG demand, and global LNG price," Ms Wang said.

Reliability issues of piped-gas, domestic production

Over the past few winters, China's northern powerhouses around Beijing, Tianjin and Hebei have sought to dent their seasonal rise in energy demand over the winter by using domestic fossil fuels, or ramping up gas pipelines. However, the ramp-up schedule of Shaan-Jing IV pipeline remains uncertain," Ms Wang cautioned.

To balances supply shortfalls in Northern China, two large state-owned gas companies have build LNG regas facilities: According to Ms Wang, CNPC's Caofeidian was operating beyond working capacity from December 2016 to January 2017; but in other months, it still has room to ramp up imports. CNOOC's Tianjin terminal was largely under-utilised last winter due to relatively weak demand growth, running at 20% in most winter months and 50% in December.

"Sinopec is constructing another terminal in Tianjin, but due to construction delays, it is not possible to serve the winter demand," she added, pointing out that flexible, trucked LNG can also help address infrastructure constraints, although affordability is a factor to consider.

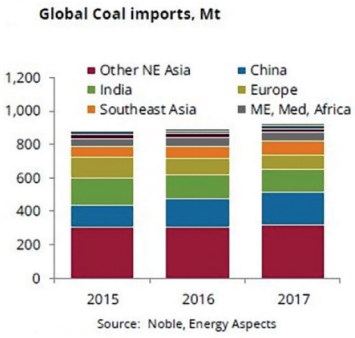
Supply-demand balance analysis, carried out by Wood Mackenzie, shows that Chinese gas importers and distributors can avoid large-scale shortages if all supply sources and infrastructure are running perfectly; however, "daily shortage will almost certainly happen if there are cold snaps." ■

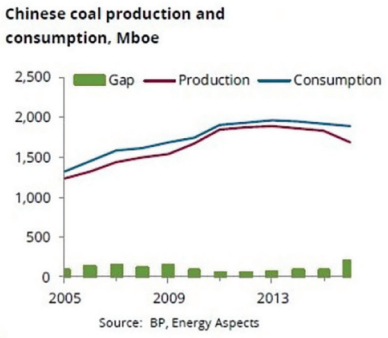
Upswing in Chinese coal mining could crush 2018 seaborne coal prices

Speedy approval of new mines in China has the potential to lower demand for seaborne coal imports by up to 50 million tons (Mt), sending down coal prices from levels above 80$/t towards to just 60$/t in 2018. EnergyAspects cautions, however, that such a dramatic fall in prices, caused by replacing higher-priced imported coal with cheap domestic production, is highly unlikely given that the government in Beijing had been content with higher prices as a driver for electric utilities to replace coal with cleaner-burning natural gas.

"If mining restrictions or additional shutdowns are indeed the new norm - and for at least 2018 we think it is - the dynamics in the rest of the world should help keep coal prices in 2018 and 2019 above 80 $/t, "EnergyAspects estimates. On the other hand, "if balances do tighten more than expected and prices start going well above 100 $/t, Chinese resolve to maintain mining restrictions could well be tested, the impact that will have on imported coal prices."

On the other hand, should Beijing decide to soften restrictions for coal mining and incentivise new mines, a swift surge in Chinese domestic coal supply would unravel the global supply/demand balance: "If the rest of the world's coal market was looking at a net 15 million tons (Mt) gain yoy in seaborne coal demand in 2018, a shift in Chinese import demand lower by 50Mt would move the market back to a point on the supply curve where it would start pricing back down towards the 60$/t level," EnergyAspects said.






China's largest open-pit coal mine at Haerwusu, Inner Mongolia

Though there is some time-lag until the permitting of new large mines translates into higher Chinese coal production numbers, analysts expect that given "given the steep are of the marginal supply curve where the market is now, a further increase in Chinese imports could lead to another move up in pricing."

Coal prices on a "precarious high" compared with LNG

In the coming 12 months, any significant downward re-pricing "looks unlikely" and analysts say this also means that fuel switch triggers for European will also "rather not change." According to Energy Aspects, most of the fuel switch in Europe is likely to be realised at gas prices around 12 €/MWh at the TTF, provided 2018 prices for Cif ARA stay in the 85-95 $/t region.

However, the coal market does "seem to be perching on a precarious high," analysts suggested, "and policy decisions in China could significantly change the outlook, particularly for further dated prices."

"With global LNG prices converging ever closely with those TTF prices, it also suggests that global [coal] prices could be pushed down towards that level." ■

INEOS to deliver first US ethane to China in 2019

Global petrochemical manufacturer INEOS has struck a long-term supply agreement with SP Chemicals which will see ethane, derived from US shale gas, being shipped to China for the first time. The deal also stipulates the construction of a 95,000cbm Very Large Ethane Carrier (VLEC) which is expected to be delivered in 2019.

The VLEC, built in China by Jaccar Group on behalf of INEOS, will be the largest ethane carrier in the world. It will ship US shale gas to SP Chemicals new gas cracker facility, currently under construction in Taixing China. Similar to the INEOS Dragon ships, the new vessel will be operated by Evergas as the first VLEC in their fleet of 23 gas ships.

Use of VLECs, deep sea going vessels specially designed to carry liquefied ethane, has increased with the rise in US shale gas production which includes ethane as a by-product. By 2019, ethane supply from the US is forecast to grow to 2.017 million barrels per day, however, take-off capability from domestic refineries in the United States are lagging behind at an anticipated 1.615 bpd.

Surplus of ethane in North America, and the subsequent drastic fall in prices, has opened up opportunities for export. To that end US-based exporter 'Enterprise Products Partners and Navigator Holding in July signed a letter of intent to develop an ethylene marine export terminal on the Houston Ship Channel.

SP Chemicals, the fourth largest ion-membrane chlor-alkali manufacturer in China, will use the US ethane supply from INEOS as a feedstock for its manufacturing of downstream petchem products. Based in Jiangsu Province, SP Chemical can produce up to 750,000 tons per annum (tpa) of caustic soda, 660,000 tpa of chlorine, 135,000 tpa of aniline, 500,000 tpa of VCM, and 320,000 tpa of styrene monomer. These products are used in Chinese state-owned enterprises and exported to international customers, including BASF and Akzo Nobel. ■


Example of an VLEC

US gas exports to Mexico reaches new all-time high

Exports of natural gas from the United States to Mexico – both by pipeline and shipments of LNG cargoes – have reached an all-time high of just under 7.8 Bcf/d this week, following record high Lower 48 gas production at around 77 Bcf/d at the start of the week. Amid healthy fundamentals, it will now by weather patterns that determine winter gas trading patterns and volumes of US gas exports.

Looking at the next 15 days, analysts at HFI Research said that fundamental factors like US gas exports or Lower 48 production " aren't as material or meaningful as what weather will be" – although fundamentals give some direction as to where US gas will trade at the end of the winter season.

"This current picture sets up badly for the bull balance argument in 2018, especially given most of the LNG demand increases won't come online until the end of 2018 and 2019," analysts commented.

"If producers do meet all the takeaway capacity that comes online in Q1-2018, then prices will have to move lower over the injection season (April to November) to accommodate for higher power-burn demand," they said.

Reverse of US-Mexico energy trade relations

Mexico is second only to Canada in energy trade with the United States. Historically, trade relations have been driven by Mexico's sales of crude oil to the United States and by U.S. net exports of refined petroleum products to Mexico.

However, rapid growth in US exports of petroleum products and natural gas propelled up the valued of US energy exports to Mexico to $20.2 billion in 2016, while energy imports fell to just $8.7 billion, according to figures from the US Energy Information Administration (EIA).

Based on data through November, U.S. natural gas exports to Mexico averaged 3.8 Bcf/d in 2016, and reports indicate that daily flows during early 2017 are already exceeding 4.2 Bcf/d.

New pipelines to double US gas export capacity

Several new gas pipelines will nearly double the US gas exporting capacity to Mexico. Much of the imported gas will be used to generate electricity, as Mexico's energy ministry expects utilities to add significant amounts of gas power generation capacity through 2029.

Four U.S. pipeline projects are currently under construction: Roadrunner (Phase II), Comanche Trail, Presidio Crossing, and Nueva Era, with a total capacity of 3.5 Bcf/d. These four pipelines will supply gas to new power plants in the states of Chihuahua, Nuevo Leon, Sonora, and Sinaloa.

By the end of 2018, two additional pipelines – KM Mier-Monterrey and Neuces-Brownsville, with 3.3 Bcf/d capacity, are scheduled to start exporting US gas to Mexico's Northeast and Central regions, mainly from the Eagle Ford play in southern Texas.

Pipeline gas displaces Mexico's imports of US LNG

The significant rise in US pipeline gas exports has been gradually displace Mexico's LNG imports.

Completion of the Los Ramones Phase I pipeline (2.1 Bcf/d capacity), which went into service in 2014, has already mostly displaced LNG imports at the Altamira terminal with natural gas from the Eagle Ford play. LNG imports at Altamira averaged 0.1 Bcf/d through October of this year, more than 50% lower than in 2015.

The completion of Phase II South (1.4 Bcf/d) of Los Ramones pipeline is expected to displace LNG imports at the Manzanillo terminal in the Central region of Mexico, including Mexico City. LNG imports to Manzanillo averaged 0.5 Bcf/d through October. The Central region has been experiencing natural gas shortages and has been required to purchase additional LNG to make up the difference. Once Los Ramones Phase II South begins operation and ramps up to full capacity, more U.S. shale gas is expected to displace LNG imports at the Manzanillo terminal. ■

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with a fifth train currently under construction. When complete, Sabine Pass will have a total liquefaction capacity of 3.5 Bcf/d.

"With increasing liquefaction capacity and utilization, US LNG exports averaged 1.9 Bcf/d, and capacity utilization averaged 80% this year, based on data through November," EIA said. "Exports from Sabine Pass began to increase in September 2017 as Train 4 ramped up to full production — reaching 2.7 Bcf/d in November — with an overall capacity utilization rate of 96% across four trains."

Five additional LNG projects, next to Sabine Pass, are currently under construction in the U.S. and will increase the country's total liquefaction capacity to 9.6 Bcf/d by the end of 2019.

Cove Point LNG (one train, 0.75 Bcf/d capacity) in Maryland is 97% complete, and Dominion Energy last week began introducing feedgas into the liquefaction facility so that it can start production. The aim is to get Train-1 in service before the end of 2017. Shell has agreed to take Cove Point's commissioning cargoes, while Gail India and ST Cove Point hold long-term contract for LNG offtake capacity.

By summer 2018, the first six trains (0.03 Bcf/d capacity each) of Elba Island are scheduled to come online, and four more trains are scheduled to come online by May 2019. Freeport LNG Train-1 is expected to come online in November 2018, with the remaining two trains following in six-month intervals.

In 2019, Cheniere's 2 Corpus Christi LNG project (two trains, 0.6 Bcf/d capacity each) in Texas is expected to come online – as well as Sempra's Cameron LNG project (three trains, 0.6 Bcf/d capacity each). ■

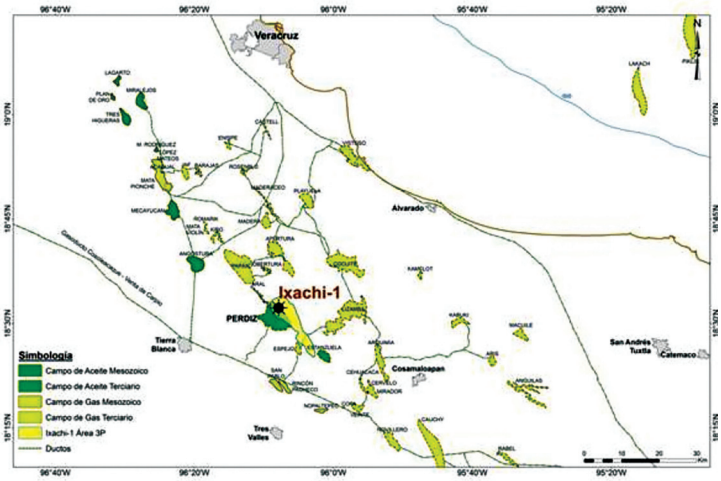
Mexico's biggest onshore oil & gas find in 15yrs will reduce import dependence

Pemex, Mexico's national oil company, has made the biggest onshore find of oil and associated natural gas in 15 years in the eastern state of Veracuz. The find near the Ixachi-1 well, believed to hold some 1.5 billion barrels of oil equivalent, will help reduce Mexico's reliance on importing LNG and pipeline gas from the United States.

The find was described by President Enrique Pena Nieto as the "most important onshore discovery" made by the company in 15 years. Pena Nieto in 2013 enacted a far-reaching energy reform that ended Pemex' decade-long monopole, and attracted foreign investment in upstream oil & gas but also in the power generation sector.

Pemex confirmed the onshore field has a volume of over 1,500 million barrels of oil equivalent and could represent total reserves of around 350 million barrels of oil equivalent. Production at the light oil field is targeted to start by the end of 2018, or in early 2019.

Despite the 2013 energy reform, the state utility Pemex still manages nearly all of Mexico's crude production; it anticipates to end 2018 with average output of 1.9 million bpd.



Location of the Discovery of Ixachi-1 well in the Veracruz Basin

Reduced import dependence on US LNG, pipeline gas

Fast development of the new find near Ixachi-1, which possibly extends further than what is known today, will reduce Mexico's need for oil and gas imports.

According to Pemex, development should be quick given that the new find is located in an area where infrastructure is already in place. Pemex has, however, not yet decided whether it will solely rely on its own resources to develop the massive new find or work with an equity partner, and CEO Jose Antonio Gonzalez Anaya said it is too soon to provide a production forecast or a spending plan for the field.

"This volume is similar to the findings reported by private companies a few months ago at the Zama-1 well," he stated, suggesting it has the potential to alter, if not reverse Mexico's energy balance and put an end to import dependency.

Currently Mexico is the largest recipient of US LNG from the Sabine Pass export plant in Louisiana, though more pipeline supplies from the US and Mexico's own rise in output will reduce the cargo flow.

More than 40 US LNG cargoes have been shipped to Mexico from Sabine Pass so far – but in the future, the bulk of LNG cargoes from the Louisiana facility and other US plants being developed may have to find a home elsewhere. ■

Chart supplies 1st LNG regas station to Mexico

Chart Industries' latest compact LNG regasification station is now fully operational in Mexico, bringing natural gas to fuel an off-grid power station. The regas project is a first for the country, Chart pointed out, and mimics a familiar fuel model that is already in use for diesel or propane.

Located close to the city of Queretaro in central Mexico, the regas station enables a local agricultural business that lacked pipeline access to use cleaner-burning natural gas for power generation, instead of more expensive and polluting LPG.

Explaining the concept behind installing an LNG regas station in a land-locked location, rather than along the coast, Chart pointed out "the station mimics the familiar fueling model of diesel, propane and other LPGs whereby an external provider delivers the liquid fuel via truck for storage on site in a horizontal tank. Chart's complete system then vaporizes the LNG to supply the end-user with natural gas at the point of use, exactly as if they were connected to the pipeline grid."

The station was supplied as a skid mounted, fully factory assembled and tested package, which meant minimal ground preparations and civil work.

Single truck transport and crane lift and installation and commissioning works onsite, some 45km away from Queretaro, were completed within two days.

For the plant operator full automation with Bluetooth monitoring and controls complete the picture for the seamless transition to natural gas. ■

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Gazprom, NIOC ink roadmap on gas monetization

Iran's deputy oil minister Ali Kardor, who also heads the National Iranian Oil Company (NIOC) has signed an energy roadmap with Gazprom chairman Alexey Miller that will see the Russian energy major conduct a proof-of-concept study on implementing integrated projects in Iran. Gazprom said it aims to work with NIOC along the entire gas value chain, from extracting gas in Iran to monetizing the product – ideally via the Iran LNG project.

The energy roadmap was signed during Miller's latest visit to Teheran this week, where he also met with, Iran's Minister of Petroleum Bijan Namdar Zangeneh. After the meeting, both parties confirmed their "interest in advancing their partnership on a large scale."

Advancing Iran LNG project

Iran LNG is meant to become the key sales outlet for NIOC and Gazprom for selling jointly produced Iranian gas to global markets. The liquefaction plan is currently under development at Tombak Port, some 15km southeast of Kangan.

Phase-1 of the Iran LNG project envisages the construction of two liquefaction trains, each with 5.25 mtpa of annual capacity. During Phase-2, the facility's output will be increased to 21 mtpa by adding two further liquefaction trains.

No timeline on the startup of the two trains was disclosed. Iran LNG Co. will operate the facility, with NIOC and the Oil Industry Pension, Saving and Staff Welfare Fund as the main shareholders.

The heads of NIOC and Gazprom signed another three Memoranda of Understanding (MoU) were following high-level talks: one on jointly developing Iranian gas fields with subsequent gas transportation and monetization; the second on collaboration during the construction of the Iran-Pakistan-India gas pipeline; and the third for developing a concept for a unified system of gas production, transmission and petrochemistry based in Iran.

IFLNG venture to start up in 2018

Keen to fast-track gas export project, NIOC has also supported Iran's first ever gas export contract, sealed by IFLNG – a joint venture between Khark Gas Refining Company and Norway's Helma.

The start-up of FLNG as well as small land-based liquefaction terminals will help Iran to diversify it natural gas exports. The 20-years contract between Helma and Khark stipulates the liquefaction and export of Iranian gas from the South Pars field starting from mid-2018.

Ali Kardor, managing director of NIOC, in late November confirmed contract had been signed, specifying the pricing formula of the products will be determined by the Iranian Oil Ministry. Under the contract between IFLNG and NIOC, gas supply from South Pars phase-7 will be converted to LNG on an FLNG vessel, chartered by IFLNG from Belgium's Exmar. The vessel, named Caribbean FLNG, has the capacity to produce 500,000 tons of LNG per year.

By summer 2018, the Caribbean FLNG is slated to dock at Pars Service port in Persian Gulf in order to receive and liquefy up to 2.3 million cubic meters per day (MMCf/d) of natural gas from South Pars Gas Refinery.

The speed of South Pars development is deemed 'crucial' not only for Iran's electrification plans (installed capacity currently 76 GW) but also for the country's future oil and gas exports. Located offshore in the Persian Gulf, South Pars holds almost 40% of Iran's proved natural gas reserves. ■

The stalled Iran LNG plant

Saudis invest in Novatek's future LNG projects

Attending the inauguration of Novatek's landmark $27-billion Yamal LNG plant on December 8, the Saudi Arabian Energy Minister Khalid Al-Falih confirmed the Middle East oil nation is considering investing in future LNG projects in the Russian Arctic. Talks are being held about setting up a $1 billion energy fund, aimed at fostering future supply of Russian LNG as part of a Saudi government plan to use more gas for power generation.

First cargo from Yamal LNG was loaded at the port of Sabetta and, according to shipping data, is heading for Western Europe where it expected to arrive at its as yet unspecified destination on December 17.

Al-Falih admired the timely completion of the challenging Yamal LNG plant and reiterated Saudi plans to have state-companies join Russia's Novatek in its Arctic gas upstream projects – in return, Russian firms are evaluating deals with Saudi Aramco on providing drilling services for the latter.

In terms of Saudi investment in Russia, the envisaged $1 billion energy fund was meant to be finalized during high-levels meeting in late October between the Saudi King Salman and the Russian Energy Minister Alexander Novak. The focus is to "strengthen cooperation in oil, gas, electricity renewable energy and other projects for oil and gas equipment," deepening political and economic ties between the world's largest oil and gas producers. ■

Gazprom snubs profitability of Canadian shale gas

Economically speaking, the North American shale industry had yet to turn a profit, Gazprom claims which added to the debt burden of shale producers. "Canada's shale-gas sector continues to develop at a very slow rate due to limited possibilities for monetizing gas and the availability of other, cheaper gas resources," the Russian gas exporter stated.

In their overview of LNG market trends, the Russians cited analysts as believing that LNG export plants in the United States would not be used to their full capacity in the coming years. On top of that, Gazprom pointed out that only one final investment decision for a new LNG project was made in the US in the period from the second half of 2015 to the present.

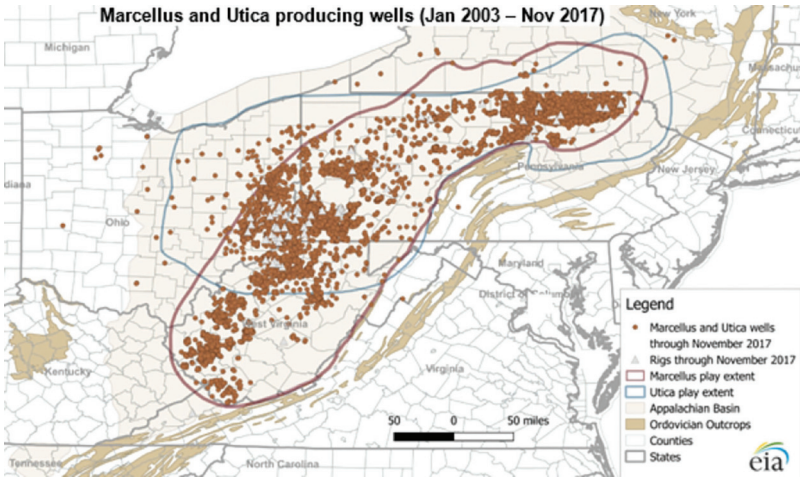
"This is indicative of the dwindling interest in US LNG on the part of buyers, especially in the countries that can import pipeline gas. For instance, US LNG accounts for less than 1% of the total amount of gas consumed by European countries in the course of this year," Gazprom said.

Commenting on prospects of Chinese shale gas production, the Russian state gas company said despite a "positive outlook", China's shale industry is lagging behind the stated objectives. "The only way to achieve robust growth would be to discover a large number of substantial deposits and to considerably reduce production costs. Most experts maintain, however, that the Chinese shale industry will not affect the country's growing dependence on gas imports in any significant manner," said Gazprom.

Keen to expand its foothold in the expanding AsiaPacific market, Gazprom underlined that internally documentation is being compiled for the third train of the LNG plant on Sakhalin Island, the so-called Sakhalin II project. The Russian gas major also recently signed a Heads of Agreement with Shell to jointly implement the Baltic LNG project in the area of Portovaya. ■

Appalachia shale drives growth in US gas production

Shale gas production in the Appalachia region has been increasing rapidly for the past five years, growing by more than 14 billion cubic feet per day (Bcf/d) since 2012, according to EIA's Drilling Productivity Report. Overall Appalachian natural gas production grew from 7.8 Bcf/d in 2012 to 22.1 Bcf/d in 2016 and was 23.8 Bcf/d in 2017, based on EIA data through October 2017.



Productivity of gas drilling in the Appalachia region kept growing and the average monthly output per rig for new wells has risen by 10.8 mm cbf/d since January 2012. Analysts attribute this rise to efficiency improvements in horizontal drilling and hydraulic fracturing in the region, which include faster drilling, longer laterals, advancements in technology, and better targeting of wells.

In West Virginia, for example, the average lateral length per well has increased from about 2,500 feet some ten years ago to currently over 7,000 feet. Some operators have recorded lateral lengths as long as 15,000 feet in the Marcellus and 19,000 feet in the Utica. Along with longer horizontal drilling, the days it takes for completion have decreased from about 30 days in 2011 to currently 7 days, or less.

Natural gas produced from U.S. shale basins now accounts for 56% of U.S. dry natural gas production, most of which originates from the Marcellus and Utica regions.

The Marcellus Shale, covering about 95,000 square miles, extends from extends from New York in the north to Kentucky and Tennessee in the south. It is the most productive natural gas-producing formation in the Appalachian Basin, with dry gas wells predominantly located in the western Marcellus while liquids-rich wells are typically found in the western portion.

The Utica Play, consisting of two stacked geological units - the Utica and Point Pleasant formations, are older and therefore located deeper in the ground than the Marcellus formation. The Utica Play spans about 60,000 square miles across Ohio, West Virginia, Pennsylvania, and New York.

Drilling in the Marcellus Shale started in 2003 and in 2010 first efforts of horizontal fracking began in the the deeper Utica and Point Pleasant formations in Ohio, and more recently in Pennsylvania and West Virginia.

As of November 2017, more than 1,800 wells have been drilled in the Utica-Point Pleasant, and more than 11,300 wells have been drilled in the Marcellus. ■

Shale gas output in the Bakken rises faster than oil

The gas-oil ratio in North Dakota's Bakken region, one of the most prolific US shale plays comprising the Bakken and Three Forks formations, has been gradually shifting towards natural gas. While oil production slowed over the past three years, gas production continues to rise and reached a record high of 1.94 Bcf/d in August 2017, or the energy equivalent of about 334,000 b/d of crude oil.

Peak of oil in the Bakken region was in December 2014, when production reached at 1.2 million barrels per day (b/d), but since then production gradually declined to 1.07 million b/d (as of August 2017), based on data in EIA's Monthly Crude Oil and Natural Gas Production Report.

Gas-oil ratio rises beyond the bubble point

Tight oil formations, like the Bakken region, have low permeability so the gas-oil ratio tends to rise only gradually over an extended period of time before reaching a certain point at which it increases significantly. During the fracking process, the pressure in the shale rock formation eventually falls below the point at which gas naturally separates from the gas-saturated crude oil - a threshold known as the bubble point.

Hence, more oil relative to gas gets produced during the initial phases, but as soon as pressure in the shale formation reaches the bubble point, the production of natural gas production tends to surge. ■

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GECF expects global gas demand to surge 53% by 2040

With world energy demand growing at 1.1% per year, the Gas Exporting Countries Forum (GECF) anticipates a 53% rise in global gas consumption between 2017 and 2040. Non-OECD Asia is seen as the main growth driver, followed by the Middle East and Africa.

Presenting GECF's Global Gas Outlook 2017 in Doha, Dr Mohammed Hussein Adeli, the outgoing chief of the Doha-based Forum, said: "Natural gas will become the fastest growing fossil fuel, with an annual growth rate of 1.8%, reaching 5,395 billion cubic metres (bcm) in 2040."

Fossil fuels are anticipated to cover 75% of the world's energy demand by 2040, but the share of gas will rise from currently 22% in 2016 to 26% at the end of the forecast period. Coal, meanwhile, will shed 7%, down from currently 27% to 20% 2040, being gradually replaced by natural gas, renewables (17%) and nuclear (6%).

Gas benefits from clean fuel policies

In non-OECD Asia and Africa, more and more national governments have been introducing policies to foster cleaner energy sources while trying to ensure security of energy supply at affordable prices, and Dr Adeli pointed out that consumer countries will reap economic and environmental benefits from stepping up their gas use.

However, "despite ambitions in many Southeast Asian countries to increase the role of natural gas due to pollution and emissions concerns, the need for cheap energy (particularly coal) to satisfy energy demand growth remains a significant obstacle to gas market penetration, "GECF's Global Gas Outlook 2017 reads. "As with China, domestic supply challenges in Malaysia and Indonesia will affect gas demand potential."

For Europe, the GECF's Outlook assumes that natural gas will be encouraged in power generation, as "the best flexible back-up" to renewables and to comply with emissions standards. "In the EU, the implementation of CO2 emissions standards (550 g/kWh) for eligible power plants participating in capacity mechanisms is expected to be supportive of clean power plants, mainly gas-fired," it says.

Gas demand in the power sector has nearly doubled from 692 Bcm in 2000 to 1,280 Bcm in the past year, rising at an average annual rate of 3.9%. Dr Adeli said the GECF expects gas consumption in the power sector will continue to increase by an average growth rate of 2.5% per annum, reaching 2,329bcm in 2040.

Global power demand to peak at 41.2 PWh

Electricity demand continues to rise worldwide and is projected to peak at 41,235 terawatt hours (TWh) in 2040, spurred by demographic and socioeconomic trends like urbanization, population growth and growing wealth of individual households.

According to GECF figures, demand for electricity increased 3% on average per annum between 2000 and 2016, and is expected to grow at an annual rate of 2.2% between 2017 and 2040.

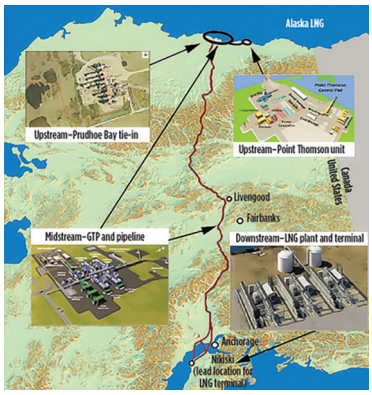
Dr Mohammed H. Adeli

"Energy accessibility will become a top priority in the long-term," Dr Adeli stressed, suggesting most of the population and income growth will come from Asia and Africa. These two regions currently have the most disadvantaged access to energy and the largest fuel substitution potential. Biomass and waste underpin 60% of energy production in the domestic sector in developing Asia and 80% in Africa, compared to under 6% in developed countries. ■

ExxonMobil's EPC plan approved for Alaska LNG

The State of Alaska has approved ExxonMobil's plan for the engineering and construction to expand the Point Thomson project on the North Slope oil and gas fields to increase future production and the prospects for the Alaska LNG project.

"The Alaska LNG Project has been endorsed by the Trump Administration and the Chinese government," said Governor Bill Walker. Interest in theproject has grown immensely in the last 45 days due to the historic Joint Development Agreement between the State of Alaska, Sinopec, the Bank of China and the Chinese Investment Corp.



"Our approval of the Point Thomson to Prudhoe Bay pipeline plan adds to the momentum of the Alaska LNG Project and demonstrates the commitment of the Point Thomson working interest owners to move gas from Point Thomson into Alaska Gasline Development Corp.'s 800-mile pipeline," Walker added, suggesting the expansion project would also "help build a stronger Alaska", because it will increase oil production out of Point Thomson by 50,000 barrels per day.

"It's clear that ExxonMobil is committed to commercializing North Slope gas, particularly from Point Thomson,' said Natural Resources Commissioner Andy Mack. "This helps align the company's work in Alaska with the State of Alaska and AGDC."

Alaska LNG in November signed a joint development agreement with Sinopec, the Bank of China and China Investment Corp. The state government of Alaska values the Chinese market for LNG exports as the North Slope resources give the state huge potential as its domestic demand is limited from a tiny population of 750,000 people.

The Alaska LNG project is an integrated gas infrastructure development. Its major components include a gas treatment plant located at Prudhoe Bay, an 800-mile pipeline to Southcentral Alaska with up to five offtake points to supply domestic customers and the liquefaction and export plant. The proposed liquefaction plant proposed for near Nikiski on the Kenai Peninsula would have initial capacity of around 20 mtpa. ■

Kinder Morgan takes FID on $1.7bn Gulf Coast Express Pipeline

Kinder Morgan, the US pipeline and energy company, has taken the final investment decision (FID) with partners to proceed with the $1.7-billion Gulf Coast Express Pipeline Project that will boost natural gas supplies from the Permian Basin for LNG export plants and domestic users after having secured sufficient firm transportation agreements with shippers.

The Permian oil and gas fields stretch over 75,000 square miles from West Texas into southeast New Mexico; they are split into two zones, the Delaware Basin in the west and the Midland Basin to the east.

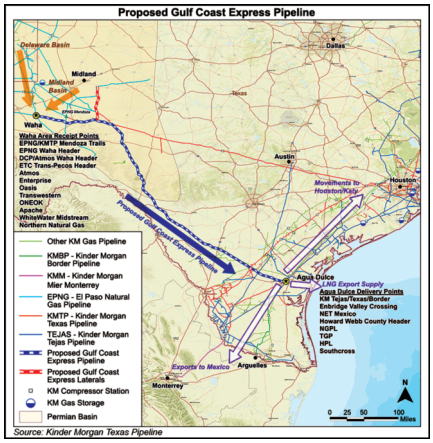
The expected in-service date of the Gulf Coast Express continues to be scheduled for the second half of 2019. Kinder will build, operate and own a 50%in the project and DCP Midstream and Targa Resources each hold a 25% equity interest.

Construction is planned to commence in the first quarter of 2018, according to Kinder Morgan Natural Gas Midstream President Duane Kokinda. "We're very pleased to have secured the commitments needed for all parties to proceed," he said, adding, "The remaining available capacity continues to be marketed to interested shippers and may be offered as part of a binding open season in January 2018."

Technically speaking, the GCX Project mainline portion consists of approximately 82 miles of 36-inch pipeline and 365 miles of 42-inch pipeline originating at the Waha Hub near Coyanosa, Texas in the Permian Basin and terminating near Agua Dulce, Texas. Additionally, the Midland Lateral portion consists of approximately 50 miles of 36-inch pipeline and associated compression, connecting with the GCX Project Mainline.

The capacity of the GCX Project is expected to be approximately 1.92 billion cubic feet per day (Bcf/d) and would include a lateral into the Midland Basin, consisting of approximately 50 miles of 36-inch pipeline and associated compression to serve gas processing facilities owned by Targa, as well as facilities owned jointly by Targa and Pioneer.

Kinder currently operates 84,000 miles of pipelines and 155 terminals in North America.Denver-Colorado-based DCP owns and operates more than 60 plants and 64,000 miles of natural gas pipelines. ■



Dominion's Cove Point LNG gets ready to export LNG

Dominion Resources' Cove Point LNG terminal in Maryland has completed its conversion from a gas import facility to an export terminal to ship Marcellus Shale gas to Asia. On December 5, Cove Point began introducing feedgas to the facility and confirmed Shell will offtake the LNG produced during the commissioning process.

Cove Point is the second LNG export terminal to come online in the U.S. in the past several years, and with five others planned, it will help the country move from being a net importer of energy to a net exporter.

FERC approved the project in 2014, and construction began in October 2014. Cabot Oil and Gas contracted with Sumitomo Corporation and Tokyo Gas, a Japanese power company, to sell 350,000 million British thermal units of Marcellus Shale gas per day for 20 years. The completed plant will have a yearly capacity of 5.25 mtpa.

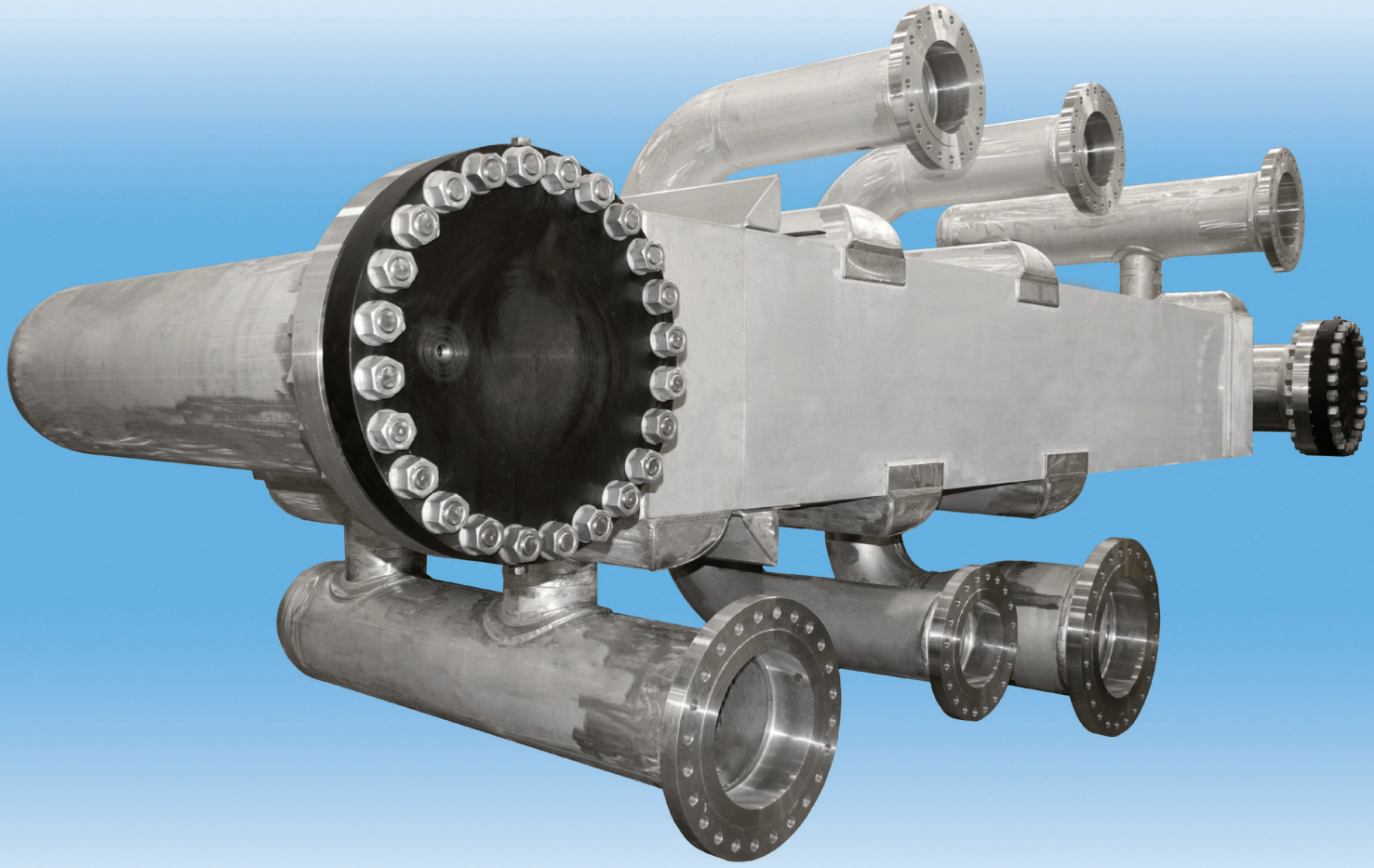
Stalled Canadian LNG projects changes name

Steelhead LNG, one of the few remaining Vancouver-based energy companies focused on liquefied natural gas project development in the province of British Columbia, has changed the name of its Sarita venture to reflect the participaton of its First Nation tribal partners.

The only other BC project moving forward is the Woodfibre venture, though it recently delayed the start of construction to early 2018.

The newly named Kispaa LNG project is planned for Sarita Bay, about 10 kilometres north of the town of Bamfield. The Sarita project is still in the preliminary engineering and conceptual design stage.

At the Core of LNG



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