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LNG North America

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India negotiates low price of US LNG cargoes

Petronet, the operator of India's Dahei and Kochi LNG import terminals, has managed to push down the price for LNG cargoes from North America. Houston-based Tellurian Inc agreed to deliver cargoes to India at a price of $6 per unit – much less than the price cap for output from India's Malampaya gas field.

Gas prices in India currently hover around $3.23 per million British thermal units but the ceiling for gas from difficult fields is $8.43/MMBtu. This particularly refers to production from the depleting Malampaya gas and condensate field, operated by Royal Dutch Shell.

"We can produce gas in Haynesville (Louisiana) at $2/MMBtu and it will land in India at around $6 per unit or less," Tarek Souki, Tellurian's senior vice president for LNG told Indian media. Tellurian recently signed a Memorandum of Understanding (MoU) with Petronet LNG for sale of 5 million tonnes a year of LNG. The companies aim to finalise the contract by March after due diligence.

Petronet is expected to take an 18% stake in the Driftwood project for $2.5 billion. Investors are asked to invest a minimum $500 million and underwrite a portion of Driftwood project debt to get the right to lift 1 mtpa of LNG throughout the plant's lifetime.

"Optimistic" about a deal with Saudi Aramco

Despite bowing to price pressure

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Spanish PVB provides best netback in Europe

Atlantic basin LNG producers, notably at the US Gulf Coast, can achieve a better netback value at the Spanish Virtual Balancing Point (PVB) than elsewhere in Europe. However, offtake obligations for Algerian pipeline gas will limit how much extra LNG the Iberian market can absorb in 2020.

Enagas, the Spanish system operator, has several long-term offtake gas contracts with the Algerian state-owned supplier Sonagas, based on contractual take-or-pay clauses.

These offtake obligations have already been reduced, analyst at Energy Aspects observed, as Spanish buyers provide competitively priced spot LNG cargoes. Still, "the contractual downside limit on Algerian imports will constrain the flexibility of Spanish gas buyers and limit their ability to snap up spot LNG cargoes.

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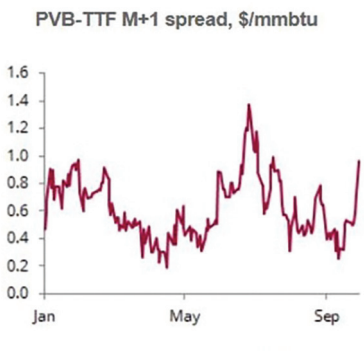
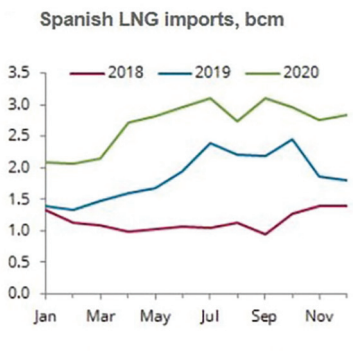


Source: Argus Media Group, Energy Aspects



Source: Enagas, Energy Aspects

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from Petronet, Tellurian insist it is "optimistic" about getting Saudi Aramco to take an equity stake in the $30 billion Driftwood LNG export plant. Similar investor-buyer deals have already been arranged with Petronet and Total.

Tellurian CFO Antoine Lafargue told analysts there we "ongoing discussions" with the Saudis. "We're in a good position them," he said, indicating "they have plenty of need for LNG rather than just one large contract with one company. Importing attractively-priced US LNG could displace Saudi crude oil currently used for power generation. Demand for natural gas in Saudia Arabia is expected to rise about 4% a year and reaching 500 million metric tons a year by 2035.

Tapping into the U.S. shale gas boom, Aramco in May already bought a 25% stake in Sempra Energy's Texas LNG terminal in return for firm offtake of 5 million tons of gas annually from the plant. CEO Amin Nasser said at the time: "We continue to pursue strategic partnerships which enable us to meet rising demand for LNG," indicating similar deals will be forthcoming.

If and when a deal with Aramco can be reached, most of the US LNG cargoes will be shipped to western Saudi Arabia to underpin planned conversions of power plants from heavy fuel oil to natural gas. The Saudis have refineries and chemical plants on the country's western Red Sea coast while most of its oil and gas production is in the east.

LNG demand from Saudia Arabia is expected to rise about 4% a year and reaching 500 million metric tons a year by 2035. Though sitting on substantial hydrocarbon reserves, Aramco has been focusing on crude oil and failed to build its natural gas business fast enough to keep up with domestic demand from the petrochemical and power sector. ■

LNG cargoes ex-Sabine Pass priced as cheap as $4.37/MMBtu

Shipments of LNG from Cheniere's Sabine Pass liquefaction and export facility in Louisiana were sold at prices as low as $4.27 per million British thermal units (MMBtu) this year, notching up to $4.61/MMBtu – but remained cheaper than the $6.55/MMBtu for cargoes ex-Cove Point.

The price comparison comes from US Department of Energy latest LNG export analysis, illustrating the price differences and proportion of spot cargoes as well as other details of shipments from the five liquefaction plants in operation.

Sabine Pass Phase-1, built by Bechtel

Low-cost prices were also obtainable for LNG cargoes from Cheniere's Corpus Christi facility, averaging $4.33/MMBtu in August compared with year-to-date figures around $4.21/MMBtu

Cargoes from Sempra Energy's Cameron LNG plant, meanwhile, cost an average price of $6.03/MMBtu compared with $6.27/MMBtu for the first four months of operations through August 2019.

Cargoes to Barbados, the Bahamas and Haiti were all sold for the same price of $10/MMBtu. The Bahamas received 11 containers from the small-scale Haileah liquefaction plant in Florida, and Barbados received five shipments from the facility and Haiti on container.

In total, 44 conventional cargoes were delivered last month compared with 51 in July 2019, with 24 departing from Cheniere Energy's Sabine Pass in Louisiana, 10 from Cheniere's Corpus Christi facility in Texas, six from Dominion Energy's Cove Point and four from Sempra Energy's Cameron LNG at Hackberry in Louisiana. No cargoes had been shipped from the newest plant, Freeport LNG, by the end of August. ■

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In 2020, Engas expects gas demand in Spain will reach its highest since 2010, when demand collapsed when the country went into recession following a banking crisis. Looking ahead, Enagas pegs next year's demand at 389.6 TWh, equalling 37 Bcm, in its base case and at 417.7 TWh, or 39.7 Bcm, in its high demand scenario.

LNG North America

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Spain's GDP growth spurs gas demand

Spain's GDP grew by 2.1% in the first half of this year, and industrial gas demand is forecast to rise to 21.3 Bcm in 2020, up from 20.6 Bcm this year. Gas-burn in the power sector, meanwhile, could retreat slightly from very high levels after there has been a lot of coal-to-gas displacement by means of power plant retrofits.

"There is some scope for further displacement of coal by gas in the power sector early in 2020 but little remaining scope later in the year," analysts said. The planned closure of eight of Spain's remaining 13 coal-fired plants by mid-2020 is expected to provide "only modest upside" to power sector gas demand

Limited scope to absorb US LNG

The Iberian limit on LNG import growth puts pressure on LNG suppliers to deliver incremental LNG into other markets in Europe next summer. "We already see Europe struggling to absorb the incremental supply being brought online," analysts said, implying US exporters might well have to cut liquefaction next summer.

The limited scope to absorb additional LNG has depressed the PVB front-summer market relative to the Dutch Title Transfer Facility (TTF), analysts noted. The PVB 2020 contract was last seen trading at a 0.54 $/MMBtu premium to the TTF. Prices for the front-month at PVB averaged 0.63 $/MMBtu premium to the TTF in the period from 2 January to 30 September. ■

Shut-ins of US production would help LNG sellers fetch better prices

Rampant US gas supply has been outpacing demand growth for the past year, slashing prices in Europe and Asia. Some US exporters are considering shutting in production as record low gas prices at the Dutch TTF hub challenge the profitability of liquefying and shipping gas to Europe.

Once deemed a 'market of last resort' for LNG, Europe has "theoretically" reached levels low enough to undermine the operating costs of US exporters "several times this year," said Sam White, director of commercial structuring at Cheniere.

Gas for November delivery on the Dutch TTF was last seen trading around €15.90/MWh, down almost 40% relative to this time last year - while day-ahead prices plunged to just abover €8/MWh. By comparison, US Henry Hub gas prices are hovering around €7/MWh, leaving LNG exporters little room to make money after cooling, liquefying and shipping their product.

Yet, shut-ins of US gas production is still unlikely at this point - given the political clout surrounding American gas exports as well as the importance and competitiveness of Henry Hub-indexed supply for global markets. US supply is gearing up to make up 46% of Atlantic Basin trade by 2022.

Cheniere, which exports nearly 40% of US LNG, expects another 135 million tonnes of new global supply will be required by 2030 to meet global demand growth, given that China and India alone will already account for 90 million tonnes of incremental demand.

Chinese state-companies are heavily investing in new gas import infrastructure and are planning to utilize new regasification facilities at 80-90% - not at 25% as some European regas plants are running. ■

Henry Hub spot gas price falls in Q4 amid surge in dry gas production

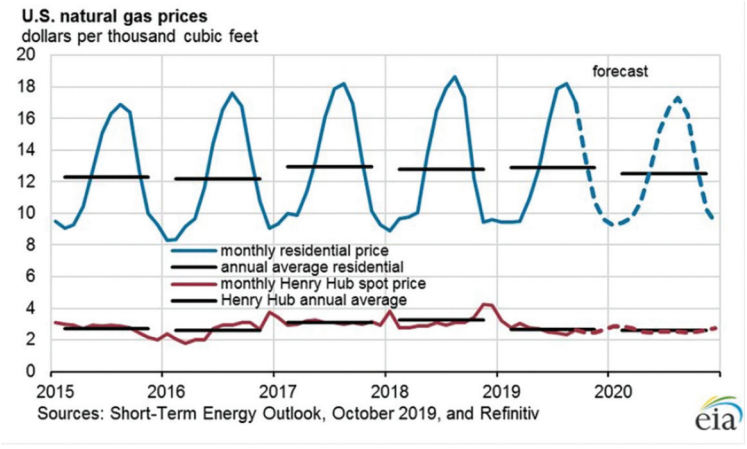
U.S. dry gas production will rise to an all-time high of 91.63 billion cubic feet per day (bcfd) this year, the U.S. Energy Information Administration (EIA) said, forecasting a fall in Henry Hub gas prices by more than $1 per million British thermal units (MMBtu) to average $2.43/MMBtu in Q4-2019.

In 2020, Henry Hub prices are expected to recover to around $2.52/MMBtu as gas production is likely to grow much less. "The delayed effect of low prices in the second half of 2019 will reduce gas-directed drilling in 2020," analysts said, forecasting production in 2020 will average 93.5 Bcf/d.

U.S. gas prices have fallen throughout most of this year because strong supply growth enabled gas inventories to build more than average during the April through October injection season. The EIA forecasts that gas storage levels will total 3,792 Bcf by the end of October, which is 2% above the five-year average and 17% above October 2018 levels.

Abundant supply of cheap, domestic gas continues to prompt electric power generations to convert their coal-fired units to run on natural gas. The EIA expects the share of US gas-fired generation to rise from 34% in 2018 to 37% this year and in 2020.

The share of coal generation, meanwhile, is forecast to fall to 22% in 2020, down from 28% last year. Coal mining is also in decline in the United States and the EIA expects total coal production will decrease to 159 million short tons (MMst) in the fourth quarter of 2019, a 17% drop year-on-year. ■



U.S. net gas exports double in H1-2019 and keep growing

Start-up of two liquefaction trains – Cameron LNG Train 1 and Corpus Christi LNG Train 2 –have pushed total U.S. net gas exports to 4.1 billion cubic feet per day (Bcf/d) in the first half of this year, more than double pre-year levels. Apart from LNG, pipeline gas is exported to Canada and Mexico.

As of June, total U.S. LNG export capacity reached 5.4 Bcf/d across four facilities and nine liquefaction trains - a significant rise compared with 2.0 Bcf/d net exports in 2018.

Net natural gas exports is forecast to continue rising through the end of 2019 as additional LNG export capacity comes online and pipeline infrastructure in Mexico is placed into service. In its Short-Term Energy Outlook (STEO), the U.S. Energy Information Administration (EIA) foresees net gas exports averaging 4.6 Bcf/d in 2019 and 7.2 Bcf/d in 2020.

Cameron Train, the fourth U.S. LNG placed into service since February 2016, was followed by Freeport LNG Train 1 and the small-scale Elba Island LNG venture. Together, these three project are seen to nearly double U.S. LNG export capacity to 8.9 Bcf/d by the end of 2020.

Although U.S. LNG exports have grown substantially, most U.S. natural gas trade is transported via pipeline across shared borders with Canada and Mexico. In the first half of 2019, net exports of natural gas by pipeline to Mexico grew by 5%, and net exports of natural gas by pipeline to Canada remained relatively flat.

Exports to Canada surged when the second phase of both the Rover pipeline and the new NEXUS pipeline entered service, allowing gas flows from the Appalachian Basin to the St. Clair point of exit northeast of Detroit. Deliveries to Mexico grew following the start-up of the Texas-Tuxpan pipeline, transporting gas from the U.S. Permian Basin. ■

Digitizing Workforce Management

Solutions to enable a safe, secure and productive industrial workforce

For industrial plants, the need to optimize safety, productivity and compliance has a direct impact on profitability. But, there is one factor that plays a greater role than any other—the human factor.

Growing scale of operations; meeting changing safety, security and regulatory requirements; and ensuring worker readiness and compliance management while maintaining operational efficiency remains a key challenge.

Introduction

Companies in the Liquefied Natural Gas (LNG) industry have unique workforce requirements They must make intelligent operational decisions in order to improve the safety of plant and personnel, to boost their productivity, ensure compliance, increase resource utilization, and at same time be able to control labor costs.

The specific requirements for LNG companies include:

- Train and certify plant staff to do their jobs the right and safe way
- Equip workers with inspected and compliant Personal Protective Equipment (PPE)
- Ensure personnel have appropriate access authorization
- Capture accurate clock in/out data
- Make sure contractors are duly managed and accountable
- Determine if employees are fit for work
- Implement effective fatigue management
- Maintain reliable mustering control

Workforce operational challenge

LNG sites face a host of workforce-related challenges, and frequently rely on manual efforts and processes, which can lead to an increase in safety incidents and non-compliance —resulting in penalties, reduced work hours and financial losses.

Typical issues range from worker data contained in multiple, non-integrated systems or isolated in disparate silos, to duplication of manual data entry using paper-based tools, difficulty in performing validation checks, and lost time in approval processes.

LNG businesses often lack real-time enforcement of company policies and compliance status, and don't receive immediate notification of non- compliance. They also suffer from a loss of on-site productivity by employees, not to mention excess work hours billing by contractors.

Access to some LNG sites is inadequately controlled, while plant managers can only do basic mustering with limited functionality. Their efforts rely on non- integrated point solutions. Customized software for these applications is costly and tedious to maintain, with limited functionality.

Leveraging digitization solutions

LNG companies are now collaborating with leading automation suppliers like Honeywell to leverage the power of digitization to better manage their industrial workforce. Honeywell's advanced, integrated Digitized Workforce Management (DWM) solution is designed to improve safety, compliance and productivity of employees, contractors and visitors.

Honeywell's end-to-end workforce management offering features seamless integration with the Honeywell EIS access control system, as well as Enterprise Resource Planning (ERP) and Human Resource Management Systems (HRMS). Users can deploy a secure, web-based system enabling easy access to multiple stakeholders and driving visibility and measurability to a single pane of glass (SPG).

Honeywell's comprehensive approach encompasses:

- Contractor Management
  - Contractor on-boarding and off-boarding
  - Group mobilizations and inductions for shutdowns/turnarounds
  - Rationalize contract workforce
- Access Management
  - Visitor management
  - Approval workflow process for access to site/area
  - Lost card/temporary card issue process
  - Certification confirmation prior to site access
- Time and Attendance
  - Integrate HRMS, payroll and contractor systems with access control for time on-site reporting
  - Reconcile contractor work hours for shutdowns and service orders
- Compliance Management
  - Training, certifications, licenses, and purchase orders automatically checked for each worker
  - Fitness for work checks (drug and alcohol)
- Fatigue Management
  - Time on site management
  - Exposure management
  - Minimum rest rules
  - Fitness for work checks
- Mustering
  - Real-time count of people mustered at each location
  - Quick reconciliation of people on site and mustered
  - Gas monitoring integration for GPS location and man down events
  - Last known location of people not accounted
- Key Performance Indicators (KPIs) /Reporting
  - Standard configured reports
  - Sensitive information protected through robust security restrictions
  - KPI metrics tracking
  - Reporting distributed across departments

Value Proposition for LNG companies

By employing Honeywell's innovative solution to digitize workforce management, LNG operators can address a wide range of workforce-related needs. They're able to:

- Reduce site-mustering time from hours to minutes
- Implement real-time compliance status monitoring and enforcement
- Improve compliance through fatigue monitoring and random substance testing
- Increase productivity with time-on-site monitoring
- Reduce overbilling of contract work hours
- Ensure efficient visitor management
- Enact smart on-boarding for employees and contractors

Honeywell's integrated solution enables high-risk LNG operations to improve compliance visibility anywhere, anytime—even in field. Site operators can reduce the risk of penalties and reputational damage through increased compliance and a lower probability of safety incidents. They can also achieve an 80 percent reduction in mustering time.

LNG firms with a large workforce can reduce the time and effort for Health, Safety and Environment (HSE) administration by up to 40 percent compared to offline systems. This includes a 30 percent reduction in inspection time for PPE and other safety devices.

For companies with a distributed workforce, Honeywell's digitized solutions can save time in compliance management, and minimize lost work hours and penalties due to non-compliant workers.

Conclusion

Leverage the power of digitization with DWM. An advanced, integrated end-to-end workforce management solution to manage Safety, Security, Compliance & productivity of workforce. Honeywell DWM automates business processes and operational efficiency with real time data visibility and alerts reducing the administrative load of the HSE, security & operations team. With intelligent software and configurable business rules, you can gain new insights on personnel & asset movements throughout the facility.

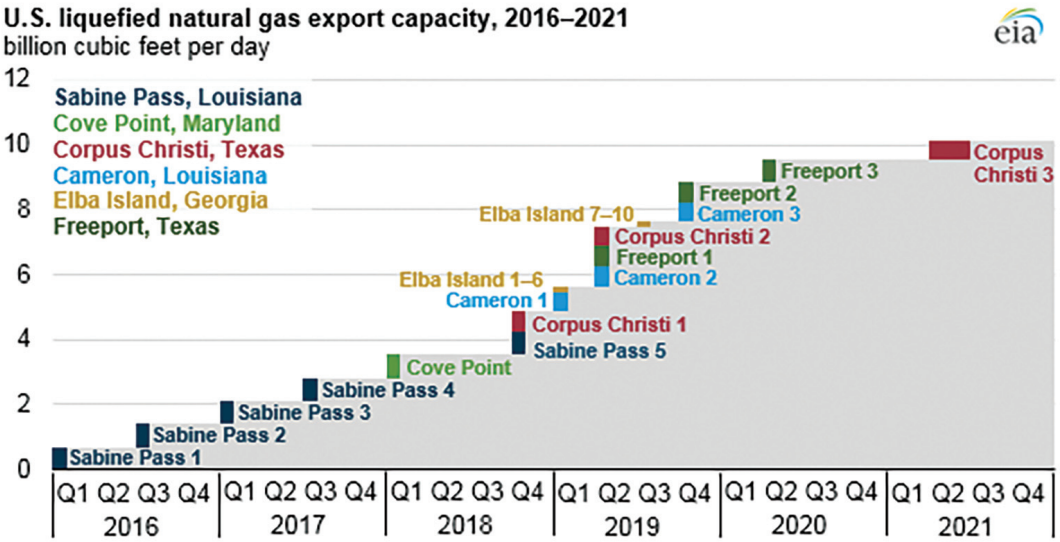
Visit us at https://hwll.co/DWM

Five US LNG projects seen take FID in 2020

The Center for Liquefied Natural Gas, a US industry group, expects five export projects along the U.S. Gulf Coast will take a final investment decisions in the next 12 months, after just two were sanctioned so far in 2019. Most of the cargoes could be directed to Europe in particular.

The two LNG export ventures that have been given the go-ahead this year are the Golden Pass project in Texas, backed by Qatar Petroleum and ExxonMobil, and the Calcasieu Pass plant in Louisiana proposed by the Arlington, Virginia-based firm Venture Global.

"Our best guess as to what Lower 48 projects could reach FID in 2020 are all on the Texas and Louisiana coast," said Charlie Riedl, executive director of the Center for LNG. He named the five projects as the Delfin venture for floating LNG offshore Louisiana with future capacity of 13 million tonnes per annum (mtpa), NextDecade's Rio Grande project in Brownsville, Texas, with 27 mtpa of output; the Lake Charles project owned by Energy Transfer and Royal Dutch Shell with production of up to 16.45 mtpa, Tellurian Inc's Driftwood plant with 27.6 mtpa, and the small-scale Magnolia facility near Lake Charles with 8.8 mtpa planned.



The US, in Riedl's view, must export and keep moving its gas to foreign markets where there is high demand. "Domestic gas consumption today is estimated at about 27 trillion cubic feet per year, while gas production is approaching 60 billion cubic feet per day in the Permian Basin and Marcellus and Utica shales alone," he explained.

"There's more gas than we possibly know what to do with," he stressed, noting that to date the US had already exported gas to about 35 countries and there were others seeking shipments. ■

Sempra gets permit to commission Cameron Train-2

Sempra Energy's Cameron LNG export plant in Louisiana has received regulatory permission to start commissioning the second processing Train at the facility on the Calcasieu Ship Channel and commercial operations are on track to start in early 2020.

The 177,000 cubic metres capacity carrier "Marvel Crane" lifted the first cargo from Train 1 at Cameron on the 31st of May 2019 and it was delivered to France.

The Cameron project contract includes building the first three liquefaction Trains that will enable the export of around 14.7 mtpa of LNG, or at least 1.7 Bcf/d of natural gas.

The other shareholders in the Cameron plant in addition to Sempra are Total, Mitsui & Co. and Japan LNG Investment, a company jointly owned by Mitsubishi Corp. and shipping company NYK Line.

Accord to supply US LNG to China

Sempra Energy's LNG unit has entered a Memorandum of Understanding (MoU) with China Three Gorges Corp. (CTG), China Yangtze's parent, regarding potential cooperation in supplying LNG to support demand growth in China.

"This initial agreement with China Three Gorges represents an opportunity to support strong growth in natural gas demand in Asia, with future expansions of our LNG projects right here in North America," the Sempra CEO commented.

Cameron Train-2 during construction

CYP is a subsidiary of China Yangtze Power Co., the largest publicly listed power company in China with a market capitalization of approximately $58 billion. China Yangtze Power engages in electric power production, technological consultation for plant operators and selected distribution services. ■

Golar advances with LNG-to-Power project in Brazil

Golar Power is moving ahead with an integrated LNG-to-Power project in Brazil's northern state of Para, after securing a 25-year power purchase agreement (PPA) from the Brazilian authorities. The 605 MW power unit is scheduled to start operations in January 2025.

The power purchase agreement had been awarded to Golar Power in an energy auction held by the Brazilian National Electric Energy Agency (ANEEL). For Golar Power, a 50:50 joint venture with Stonepeak Infrastructure Partners, the PPA is expected to generate fixed annual revenues of 711.7 million Brazilian Real ($174 million) over a period of 25 years starting on January 1, 2025. Payments under the PPA are inflation indexed and allow for pass-through of fuel costs.

The LNG-to-power Project is being developed by CELBA (Centrais Eletricas Barcarena SA), a special purpose company 50% controlled by Golar Power. Situated in the city of Barcarena, Para state, the 605 MW power unit will utilize imported LNG to generate electricity in H-class gas turbines, which will then be fed into the Brazilian national electricity grid.

Total investment of the Para LNG-to-Power project is estimated at $430 million, of which Golar LNG's share is $107 million, LNG Journal understands. Capex will be funded through debt and equity between 2022 and 2025, with the equity portion expected to come from proceeds of Golar LNG's first wave of small-scale distribution.

FRSU developed "in advance" of power plant

Following the PPA award, Golar Power is accelerating investment in a new LNG import terminal at the Port of Vila do Conde, also located in Barcarena. The plan is to use a floating storage and regasification unit (FSRU), chartered for 25 years to supply fuel the power project.

The regas unit is due to start operations by mid-2021 - "well in advance" of the power plant, Golar said. Hence, the FSRU selection and detailing of the terminal are under way with an anticipated FID in the first half of 2020. ■

Golar Spirit

Magnolia LNG seeks to ship first cargo to Vietnam in May

Australian-listed LNG Ltd, developer of the Magnolia LNG project in Louisiana, is striving to sign a full sales and purchase agreement (SPA) with Delta Offshore Energy. The first LNG cargo could set sail to the Mekong Delta in May, or early June 2020, for use in an integrated 3.2 GW combined-cycle power plant.

The two companies in September signed a non-binding accord to supply the Bac Lieu floating LNG storage and regasification unit (FSRU) and now agreed to extend the validity date of this accord until July 1, 2020. Magnolia LNG and Delta now said they would use "reasonable efforts" to agree the terms of a binding sale and purchase agreement (SPA) by May 31.

Once a full Magnolia-Delta SPA is signed, the Louisiana shipments to Vietnam will be on a free-on-board (FOB) basis for a 20-year term with options to extend the term.

Singapore-based Delta is working with the Bac Lieu Province People's Committee to develop and operate of a 2 mtpa floating regas unit and an integrated 3.2 GW onshore power station.

Render of Magnolia LNG terminal

FID on Magnolia LNG envisaged in August

LNG Ltd for its part is striving to take a financial investment decision (FID) to build the Magnolia liquefaction project by August 31, 2020. Commercial start-up is meant to take place in June 1, 2024, which could be adjusted by up to seven months.

"We feel that the extensions will provide LNGL and Delta Offshore with more than adequate time to finalize terms for what will be the first long-term sale and purchase agreement for LNG to Vietnam," said Greg Vesey, managing director of LNG Ltd.

Delta Offshore Energy's director of engineering, Bobby Quintos, pointed out the company's alliance with LNG Ltd will give Vietnamese buyers access to Henry Hub-index gas supply.

Novatek develops rival regas terminal

Though the Bac Lieu project will help Vietnam source LNG as a feedstock for power, the Asian nation is not solely counting on US gas supply. The government also supports an alternative LNG regas terminal, proposed by Russia's independent gas company Novatek.

A second LNG import terminal and adjacent gas power station is under development in Ninh Thuan province, just south of Cam Ranh Bay. That venture is backed by Novatek, the owner and developer of two Russian Arctic region LNG export plants, the existing Yamal LNG plant in northern Siberia and the Arctic LNG II project. ■

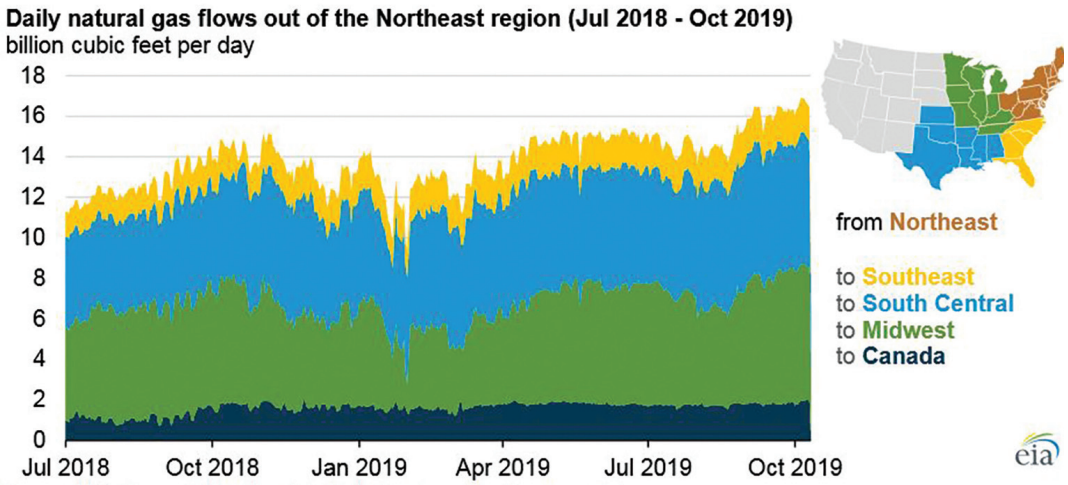
Appalachian gas outflows grows to 16 Bcf/d as spot prices fall in Northeast

Flows of natural gas from the Appalachian Shale Basin to the rest of the U.S. keeps growing as production averaged over 16 billion cubic feet per day last month, pushing down prices in the Northeast. Meanwhile, gas demand rises in other states – both from the power sector and for liquefaction and export.

Latest production increases in the Appalachian have boosted shale gas output nearly 2 bcf/d month-on-month, according to data from Genscape.

Prices at the nearby gas trading hubs fell amid constraints to swiftly transport the excess gas to regions with higher demand. During the past three weeks, natural gas prices at Appalachian supply hubs, Dominion South and Tennessee Zone 4 Marcellus, fell from about $2 per million British thermal units (MMBtu) in mid-September to lows of 76 cents MMBtu and 65¢/MMBtu, respectively, on October 4.

"The resulting average price difference of $1.59/ MMBtu lower than the Henry Hub national benchmark was the widest price gap since October 5, 2018," analysts at the U.S. Energy Information Administration (EIA) noted. In both instances, Northeastern pipelines had declared 'force majeure' - a declaration used when unforeseeable events prevent companies from fulfilling their contractual obligations.



Source: U.S. Energy Information Administration, based on Genscape data
Note: All volumes to South Central, and most to Canada, are transported via the Midwest. Flows into the Midwest exclude these volumes. Volumes to Canada assume all deliveries on Vector pipeline are exported.

Playing the arbitrage

Lower prices in recent weeks have resulted in more favorable economics for transporting natural gas volumes from the Northeast to other regional demand markets. Several players have been keen to take the arbitrage between different gas trading hubs, notably those in the South Central and Midwest regions.

Spot gas prices in southwestern Pennsylvania, at Dominion South, and in northeastern Pennsylvania, at Tennessee Zone 4 Marcellus, typically averaged 20 cents per MMBtu to 50¢/MMBtu lower than Henry Hub prices in the spring and summer seasons and this discount began to widen in August.

In September, the average natural gas spot price at these hubs was 83¢/MMBtu lower than the Henry Hub average, and the difference to Henry Hub widened to an average of $1.59 MMBtu lower on October 4, the EIA noted. Similarly, the price gap between Appalachian Basin natural gas spot prices and those at the Chicago Citygate widened from 20¢/MMBtu earlier in 2019 to 94¢/MMBtu on October 4.

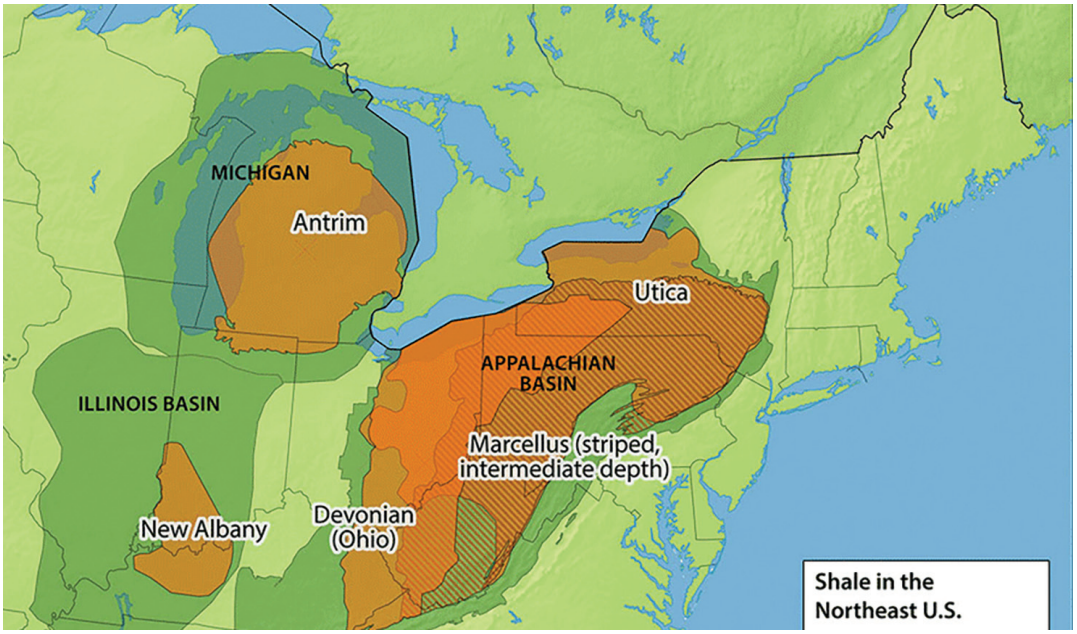
Maximizing pipeline through-put

Striving to get cheap Appalachian gas from the Northeast into the Midwest demand markets, shippers have substantially increased the use and through-put of the Rover and Rockies Express pipelines.

Increased flows on these pipelines coincided with an explosion on the Texas Eastern Transmission (TETCO) pipeline (1.7 Bcf/d capacity) on August 1, which forced rerouting of southbound TETCO flows of natural gas out of the Northeast onto other pipelines.

"However, volumes delivered to the Midwest have continued to rise despite TETCO returning to partial service in late August," analysts commented.

"The explosion on the TETCO system limited southbound capacity out of the Northeast, but flows from the Northeast through the Midwest region to South Central demand markets have increased," they said, adding "Southbound flows on the Tennessee Gas Pipeline and Columbia Gulf Pipeline were flowing at or near full capacity for most of September." ■



Map of the Appalachian Shale Basin + graph: US gas flows

At the Core of LNG

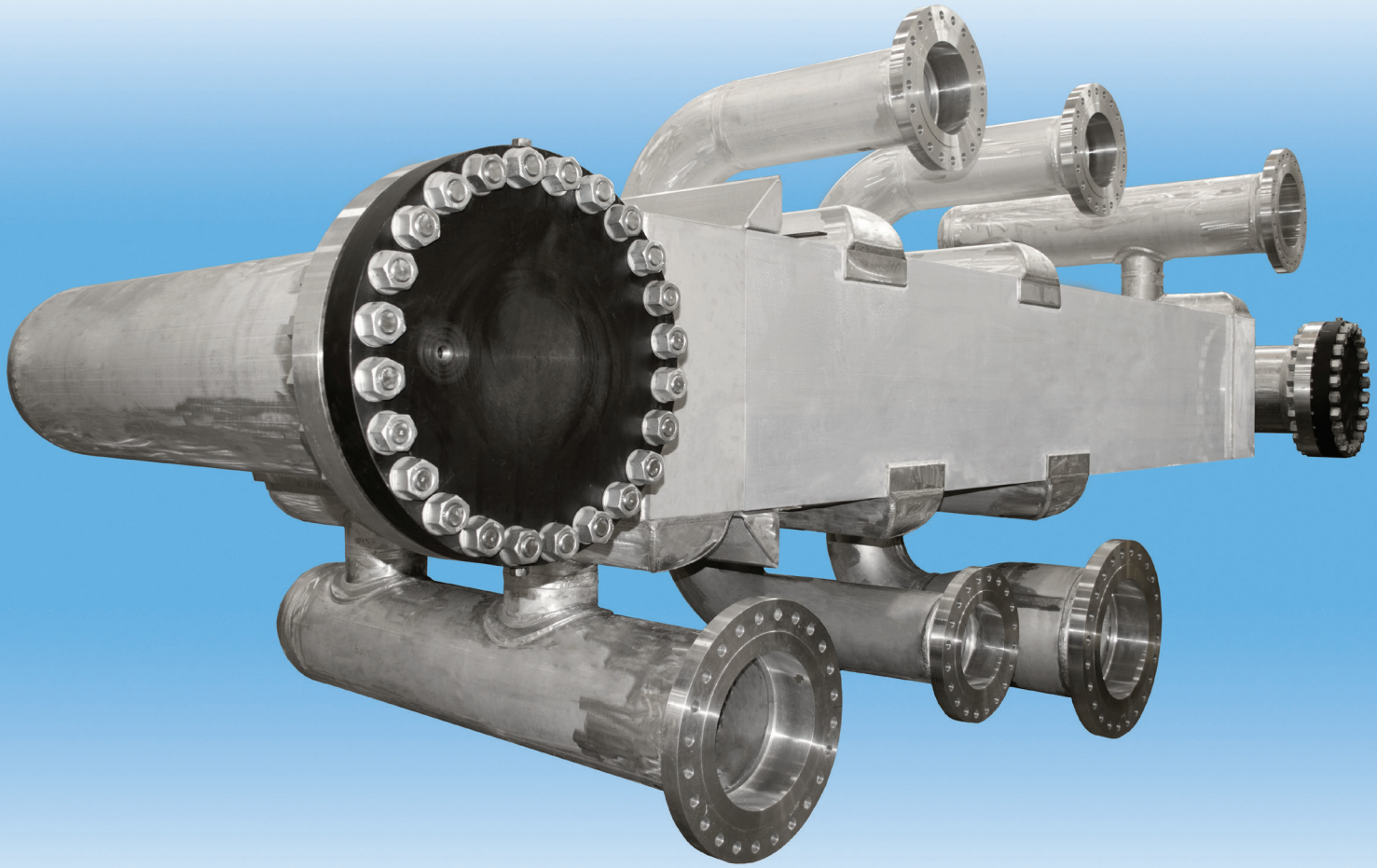


Chart brazed aluminum plate fin heat exchangers (BAHX) are highly efficient, custom engineered, compact units that have been at the heart of LNG liquefaction processes since the 1970's and are facilitating the export of North American shale gas today.

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Japan to lose top position as world's largest LNG importer to China by 2022

As Japan's gas-burn in the power sector falls amid competition from coal, nuclear and renewables, the country is expected to lose its position as the world's No.1 LNG importer to China by 2022. Despite sustained low LNG spot prices, it is cheaper for Japanese utilities to burn coal than natural gas.

Japanese energy companies are "well-contracted in LNG" to the early 2020s as U.S. and Australian supplies ramp-up. As a result, the average cost of gas for Japanese utilities remains "well above spot price," Wood Mackenzie finds, so "coal is still the cheapest form of electricity generation after nuclear and renewables on a short-run marginal cost basis."

With burning coal cheaper than natural gas, Japanese utilities are looking to build new coal-fired generating capacity and utilities will not renew some LNG import contracts after expiry. As coal and nuclear gains market share, Japan's demand for regasified LNG is seen falling 12% to 72.8 million tonnes per annum (mmtpa) compared to 2018. In contrast, China's import volume is seen surging 37.5% to 74.1 mmtpa.

"Odd one out" on coal new-builds

The Japanese government is watering down its green energy goals, bowing to cost pressure in the face of slower macroeconomic growth. Ambitious targets to decrease gas and coal generation (down to 27% and 26% shares, respectively) and offset with nuclear and renewable generation, are no longer being pursued.

On the contrary, analysts now call Japan "an outlier" as a developed power market that still prioritizes construction of new coal capacity." However, these pro-coal policy targets seem to be clearly misaligned with public sentiment and leading policies of global banks.

"The tide appears to be turning with increasing restrictions on financing and building coal. As such, we expect this policy target and such a robust share of coal in the generation mix will be increasingly difficult to sustain. This would improve the outlook for LNG," said senior analyst Lucy Cullen.

According to Wood Mackenzie projections, Japan's LNG will remain above 70 mmtpa through much of the 2020s, and are likely to exceed 60 mmtpa until at least 2040. Set to remain the world's No.2 LNG importer, "Japan still provides ample opportunities for LNG sellers, particularly as existing contracts expire," Cullen said.

At risk of missing renewable targets

Aggressive investments into new wind and solar power capacities are meant to boost Japan's renewable energy share to 22-24% of its 2030, but Wood Mackenzie finds the government is likely to miss this target as too little effort is being made to grid-integrate the influx of intermittent green energy sources.

On the nuclear front, Japan restarted five plants last year alone. With next restarts scheduled for the mid-2020 and 2021, this will put downward pressure on LNG import requirements in the early 2020s.

"We assume 15 reactors will be back online by 2030, accounting for 12% of power generation, much lower than the official target of 20-22%," Cullen said. "While nuclear restarts generally dampen gas generation, our lower nuclear number implies a more optimistic view of LNG demand compared to the government." ■

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Optimizing the Fire & Gas System Lifecycle

Integrated approach helps LNG companies improve safety and protect investments

Throughout industrial operations, there is a focus on the performance of Fire & Gas (F&G) systems. These systems continuously monitor for abnormal situations such as a fire or toxic gas release, and provide early warning and mitigation actions to prevent escalation of the incident and protect the plant, personnel, assets, and the environment.

Today, it is more important than ever for LNG companies to leverage their investments in F&G technology to achieve their most critical objectives: improve overall safety, eliminate unplanned downtime, mitigate the consequences of incidents, ensure regulatory compliance, and increase profits.

Background

The LNG industry is challenging—and is becoming more so every day. Global gas demand is surging, meaning operating companies must develop new resources with utmost efficiency and safety.

The specific challenges faced by LNG companies include:

- Startup operations on schedule and within the budget
- Increase uptime by maximizing asset availability
- Reduce operating and maintenance costs while improving productivity
- Minimize risks and avoid financial losses due to incidents
- Sustain high levels of operational performance
- Maintain benefits throughout the asset lifecycle
- Quick Return Of Investment (ROI)

LNG operations are under pressure to minimize the impact of potential hazards and deal with complex fire & gas codes and local regulations. They may also heed the IEC 61511 standard (ANSI/ISA S84.00.07 in the U.S.), which is intended to protect industrial plant operations.

Role of F&G systems

An Integrated Control and Safety System (ICSS), used to control LNG facilities, is a combination of the Basic Process Control System (BPCS) and Safety Instrumented System (SIS) under a single architecture.

The SIS is primarily applied to prevent hazardous events from occurring (Prevention layer) and, if necessary, mitigate the consequences of such an event (Mitigation layer). The motive for this distinction is due to the fact that a BPCS does not necessarily contribute the risk reduction and sometimes might even pose a potential risk itself.

Experience has shown that LNG operators can improve plant safety and mitigate risk by employing the latest fire & gas technology as part of their ICSS. Industrial F&G systems continuously monitor conditions within process plants and provide warnings of an abnormal situation before it becomes a significant threat.

Need for a holistic strategy

The safety of facilities, personnel, production processes, and the environment is a crucial concern for the LNG industry. Faced with this reality, operating companies are seeking to ensure the lowest risk and highest value protection from their F&G systems by integrating these assets into the overall control system.

With a non-integrated approach to fire & gas, each technology supplier has a different view of operating processes. There are multiple solution providers focused on their own sub-systems. This forces plant staff to assume the role of a system integrator—an approach that can be expensive and difficult to implement and manage.

Conversely, a holistic strategy for F&G is based on a unified technology solution providing a single view of operations. Systems are based on a common design philosophy and are integrated "out of the box" to enhance the safety of the plant. This strategy is cost-effective and easy to deploy and maintain.

Taking an integrated approach

A growing number of LNG companies are partnering with automation suppliers like Honeywell who take an integrated approach to fire & gas. Honeywell's F&G solution allows plants to run with the greatest possible operating efficiency, safety and security. Other benefits include, but are not limited to:

- Proven and advanced technology that improves employee productivity and reduces exposure to potential industrial hazards
- Maximum security at the plant level and protection at the personnel level
- Robust single point of contact to optimize plant operations and process management
- Proven reliability for continuous operations
- Increased safety and security

Honeywell's approach to F&G projects employs expert services starting with consultancy during Front End Engineering Design (FEED) and continuing through execution to long-term lifecycle support. During the FEED stage, for example, Honeywell provides services

assisting with Hazard and Operability Studies (HAZOP), risk assessments, Safety Integrity Level (SIL) verification and validation, and F&G detector coverage mapping and system availability. Other services address design engineering and implementation and commissioning based on a proven understanding of industrial safety, fire & gas, and global and local regulatory requirements.

As an automation industry leader, Honeywell delivers F&G solutions through its local organizations using global project management practices and recognized international engineering standards.

Honeywell helps to sustain the optimal performance of F&G systems through a comprehensive managed services program. With its outcome-based Assurance 360 services, the company takes responsibility for the total lifecycle of installed assets and utilizes a secure remote connection to add value through proactive/predictive maintenance of the customer's ICSS platform.

Benefits to LNG operators

Experience has shown that a holistic strategy for fire & gas enables LNG companies to avert safety incidents, minimize intervention and shutdowns, and recover more easily from incidents.

The specific benefits of integrated F&G solutions include:

- Standardized network design and selection of components; consistency in hardware and software requirements; and seamless integration of control, safety, F&G, and security assets
- Lower engineering costs using out-of-the-box solutions with common interfaces, standard engineering applications and tools, and effective project execution methodologies
- Streamlined pre-testing and site work with an integrated Factory Acceptance Test (FAT) and training of EPC contractors and plant personnel on deployed solutions
- Expedited system calibration, testing, commissioning, and installation with a single qualified technology partner and collaborative project team.

To find out more visit us at https://hwll.co/FireandGasSolution.

China's dash for gas – US LNG could help meet the challenge

China's switch from coal to gas – both to decarbonize its energy mix and tackle pollution under its Blue Sky policy – requires importing considerably more gas imports and investment in related infrastructure, DNV GL said in a report. Gas currently accounts for only 7% of China's energy mix, compared to a global average of 22% – but the Chinese government aims to boost that share to 10% by 2020, and as much as 15% by 2030.

US LNG is poised to cover a substantial share of China's growing gas demand, competing with pipeline gas from Russia through the soon to be opened 'Power of Siberia' interconnector. However, boosting gas imports and use in China requires substantial investment in LNG import terminals, gas storage as well as more and upgraded pipelines to handle and distribute the gas, DNV GL finds.

Moreover, as Chinese gas imports grow, the safety challenge for pipeline operators will also rise. Mr. Zhou, a manager from a major Chinese pipeline operator, said: "While China is enhancing pipeline interconnection, we need to pay high attention to safety management with zero tolerance for major incidents."

While policy makers in Beijing seek to boost domestic production of gas, the country also needs more LNG and piped gas imports. Forecasts of how much vary widely, though the consensus is that import dependency will grow significantly. DNV GL's Energy Transition Outlook model sees imports meeting more than 70% of gas consumption in Greater China in 2040 (see graph).

With government driving the pace, prospects for gas in China look positive if the infrastructure materializes. DNV GL's Industry Outlook 2019 research showed almost two thirds (61%) of senior industry professionals in China say more investment is needed in LNG and pipeline infrastructure.

Gulf Publishing's Energy Web Atlas counted 18 LNG import terminals in operation in China in 2018, with a total installed domestic capacity of nearly 60 mill tonnes per annum (Mtpa). Seven were being expanded. The same publication also reported that another seven terminals will add nearly 19 Mtpa capacity by the early-2020s, with more expected by mid-decade. In addition, China is adding gas storage and contracting LNG carriers to becomes less exposed to seasonal shifts in LNG prices.

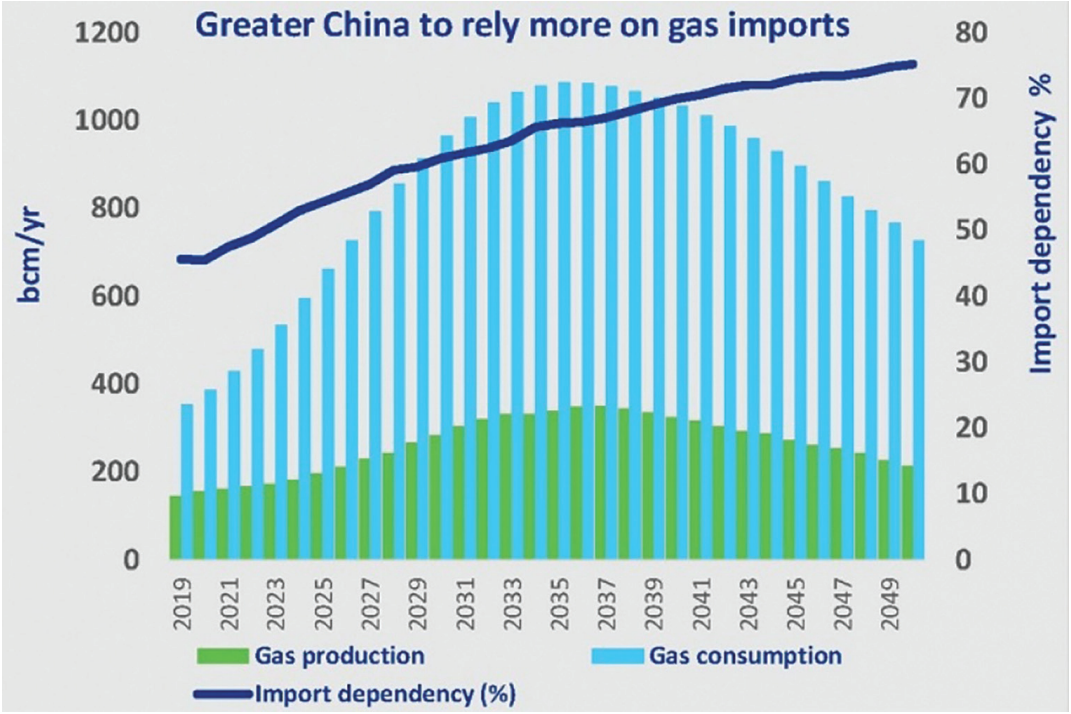
The country is also looking to piped imports. BP's Energy Outlook commented that around half of the additional gas imports that China will require will need to be met by additional pipeline capacity from Russia and other Commonwealth of Independent States countries, and the rest from LNG. This year, there are plans to create a state-owned national pipeline company to operate all oil and gas pipeline networks. The goals for this organization will include overhauling and expanding China's national gas pipeline network to extend its reach and reliability.

"China's plans for LNG facilities and gas pipelines are an opportunity to become leading edge in areas such as asset integrity and safety by applying learning from expansion projects worldwide," said Arthur Stoddart, regional manager, China, South Korea and Japan, DNV GL - Oil & Gas. "It is therefore encouraging that China is open to international co-operation to assist it on this journey."

As Chinese gas imports grow, and as the government pursues its plan to ensure regional interconnection of oil and gas pipelines, the safety and reliability challenges will multiply. "The pressure on securing natural gas supply is high, while the requirements on the reliability of facilities and equipment is even higher," said Zhou.

"We still have challenges in intrinsic safety management, and integrity management of facilities and equipment," he added. "Gaps need to be closed in the establishment and implementation of our management system, and strong execution and sufficient tools need to be in place to facilitate the implementation, and to achieve management improvement. Moreover, we need to further transfer our people's mindset, enhancing their capability to fully meet the needs of safety management."

Over the past decade, DNV GL's International Sustainability Rating System (ISRS) has directly contributed to the continuous improvement of the quality and execution of major Chinese pipeline operators' management systems. Zhou said: "It has enabled our company to achieve safe production in those years that we have implemented ISRS. We believe it is a meaningful thing to do." ■

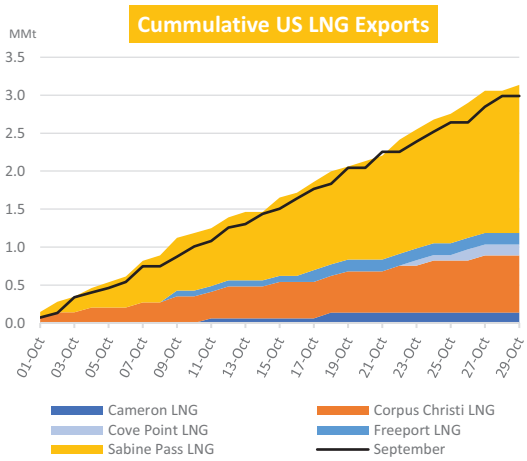


DNV GL's Energy Transition Outlook model sees gas imports meeting an rising share of China's gas consumption in 2040.

US LNG in October

LNG Unlimited Data

- October exports at 3.27mmt on 29 October
- Total shipments up by 7% m/m
- Average US capacity utilisation at 62%



Source: LNG Unlimited Data

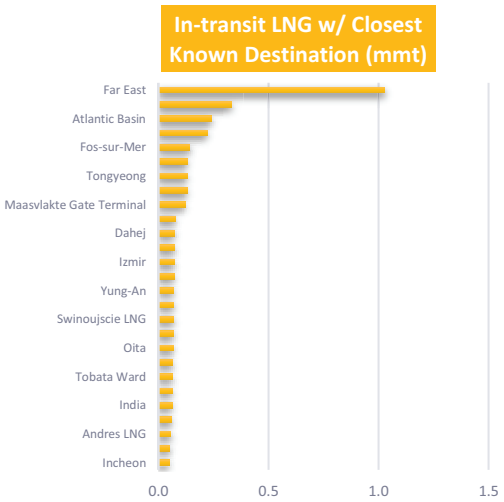
US LNG exports stood at 3.27mmt as of 29 October, suggesting roughly 153bcf will be delivered with a delivery horizon of 3 December. US LNG's exporting performance is thus likely to see a 0.22mmt (7%0 increase in month-on-month exports.

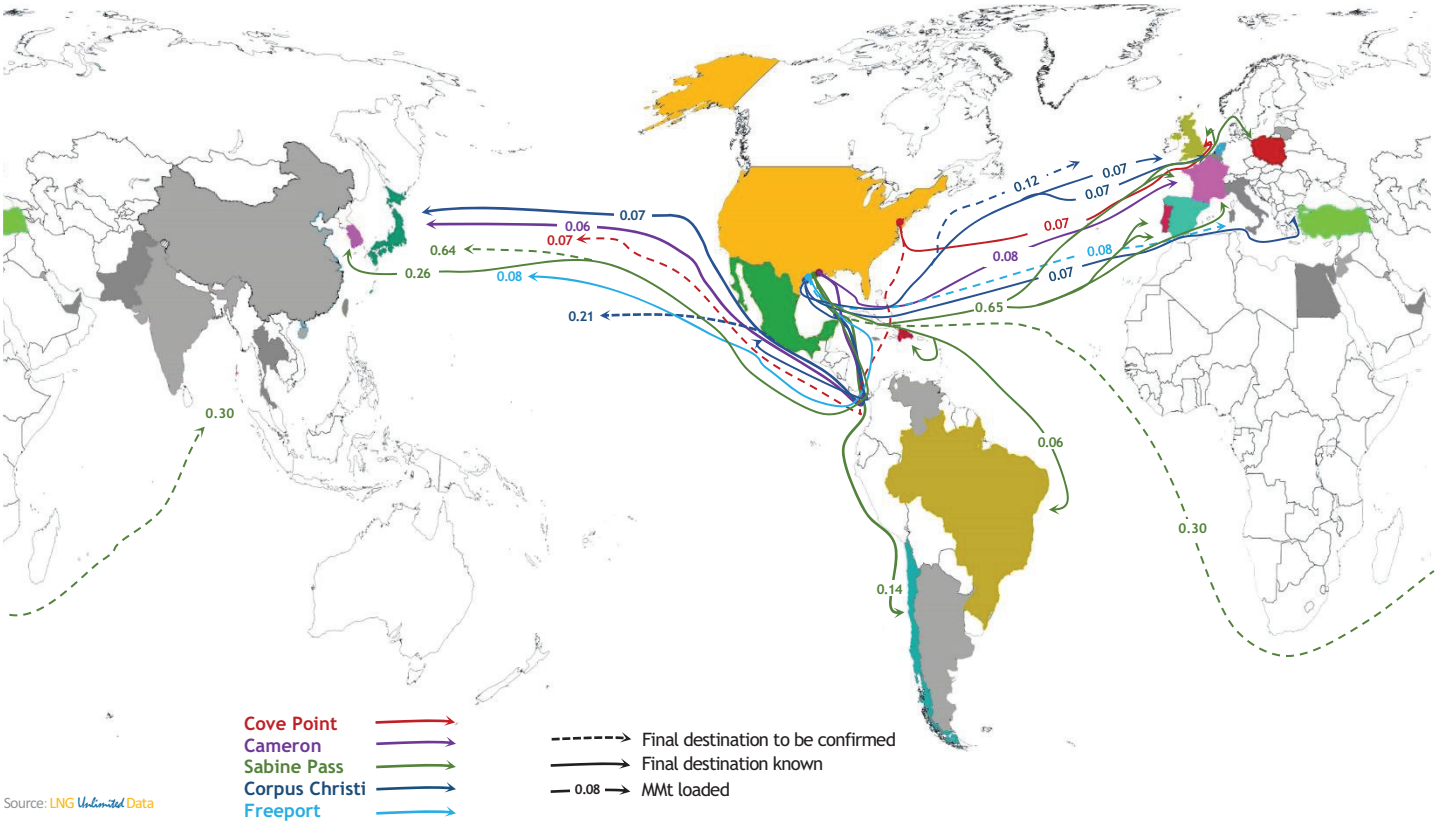
Overall October capacity utilisation stood at 62% to date, due to the recent start-up of Freeport LNG as well as maintenance at Cove Point LNG for the first half of the month which both increased nominal capacity and reduced output. As these two terminals ramp up production in November, we anticipate overall utilisation to rise again accordingly.

Meanwhile, flat out production at Corpus Christi and Sabine Pass as well as the ongoing production ramp up at Freeport were responsible for the mon-on-month export growth. Cove Point and Cameron LNG, however, shipped three cargoes less overall than in September.

In contrast to last month, our data indicates the majority of US LNG trading has shifted from the Atlantic Basin back towards the Pacific, which is in line with its historical performance. Whereas almost 40% of shipped US LNG was en route to Europe and the wider Atlantic Basin at the end of September, 53% of US LNG cargoes left port en route to the Pacific in October led by destinations in South Korea and Japan. Notably, no cargoes are currently destined for the Middle East.

Since October has not yet run its course, we highlight that US plants may load up to 6 more cargoes before the end of the month, potentially pushing total October exports to around 3.6mmt. However, we believe two more cargoes is the far likelier scenario, with the *Cool Runner* and the *Maran Gas Apollonia* currently berthed at Corpus Christi and Sabine Pass LNG. Concurrently, the *Methane Rita Andrea* remains within Freeport's waiting area whilst the *Hoegh Galleon* and *Hyundai Princepia* - expected at Sabine Pass LNG tomorrow - and the *BW Lilac* - due at Cove Point - are unlikely to receive their cargoes before the end of October.





Source: LNG Unlimited Data

LNG Unlimited Data

US LNG Still in Transit

Notably, 39 of the 47 cargoes shipped so far in October remain in transit, with 23 (1.6mmt) still lacking confirmed destinations within the Pacific and Atlantic Basins, including 13 (0.89mmt) broadly headed for the Far East. Concurrently, 10 shipments (0.66mmt) that left Cove Point, Corpus Christi and Sabine Pass LNG last month are also still in transit, owed in part to the long routes taken by US LNG exports into the Far East as well as the *Hoegh Giant*, the *Maran Gas Hector* and the *Marvel Crane*, which have been waiting off the coast of Spain since the first week of October. Notably, the latter is now due to arrive at Bahia de Bizkaia LNG on Monday next week.

Previous Export Port	Vessel Name	IMO	Destination	Arrival	MMt*
Cameron LNG	Flex Ranger	9709025	Fos-sur-Mer	05/11/2019	0.08
	Bushu Maru	9796793	Futtsu	11/11/2019	0.06
Cove Point LNG	Energy Innovator	9758832	Pacific Basin	25/11/2019	0.07
	Meridian Spirit	9369904	Isle of Grain	03/11/2019	0.07
	LNG Sakura	9774135	Sagunto	05/11/2019	0.06
	Maran Gas Sparta	9650042	India	30/10/2019	0.06
Freeport LNG	Pan Africa	9750256	Atlantic Basin	04/11/2019	0.08
	Pan Americas	9750232	Far East	07/11/2019	0.07
Corpus Christi LNG	Clean Ocean	9637492	Maasvlakte Gate Terminal	29/10/2019	0.06
	Oak Spirit	9681699	Oita	04/11/2019	0.07
	Kinisis	9785158	Far East	18/11/2019	0.07
	Marvel Kite	9760782	Far East	28/11/2019	0.08
	Seri Balqis	9331672	Europe	09/11/2019	0.06
	BW Pavilion Leeara	9640645	Maasvlakte Gate Trmnl.	03/11/2019	0.06
	Creole Spirit	9681687	Far East	05/11/2019	0.06
	GasLog Warsaw	9816763	Europe	02/11/2019	0.06
Sabine Pass LNG	Gaslog Hong Kong	9748904	Far East	06/11/2019	0.07
	GasLog Shanghai	9600528	Map Ta Phut LNG	29/10/2019	0.05
	Hoegh Giant	9762962	Spain	30/10/2019	0.07
	Maran Gas Chios	9753014	Hazira	29/10/2019	0.07
	Maran Gas Hector	9682605	Europe	05/11/2019	0.07
	Marvel Crane	9770438	Europe	30/10/2019	0.07
	Cool Explorer	9640023	Atlantic Basin	08/11/2019	0.07
	Gaslog Salem	9638915	Far East	21/11/2019	0.07
	Hyundai Peacepia	9761853	Fos-sur-Mer	02/11/2019	0.07
	Magellan Spirit	9342487	Bahia de Todos FSRU	31/10/2019	0.00
	Maran Gas Ulysses	9709491	Pacific Basin	20/11/2019	0.08
	Neo Energy	9324277	Far East	23/11/2019	0.06
	Patris	9766889	Swinoujscie LNG	18/11/2019	0.07
	Al Kharsaah	9360881	Atlantic Basin	13/11/2019	0.10
	Castillo de Caldelas	9742819	Sakai	03/12/2019	0.08
	Fuji LNG	9275359	Far East	10/11/2019	0.06
	GasLog Savannah	9352860	Spain	04/11/2019	0.06
	GasLog Seattle	9634086	Far East	23/11/2019	0.07
	GasLog Skagen	9626285	Europe	12/11/2019	0.06
	Golar Ice	9637325	Far East	07/11/2019	0.07
	Golar Seal	9624914	Quintero	01/11/2019	0.07
	Iberica Knutsen	9326603	Andres LNG	08/11/2019	0.06
	K. Mugungwha	9373010	Tongyeong	19/11/2019	0.06
	Macoma	9705653	Incheon	02/11/2019	0.05
	Magdala	9770921	Far East	27/11/2019	0.08
	Maran Gas Olympias	9732371	Pacific Basin	07/11/2019	0.07
	Maran Gas Pericles	9709489	Far East	15/11/2019	0.07
	Marib Spirit	9336749	Mejillones LNG	04/11/2019	0.07
	Marvel Falcon	9760768	Far East	14/11/2019	0.07
	Megara	9770945	Far East	02/11/2019	0.06
	Singapore Energy	9238040	Isle of Grain	30/10/2019	0.00
	SK Resolute	9693173	Montoir-de-Bretagne	05/11/2019	0.07
	SM Eagle	9761827	Tongyeong	20/11/2019	0.07
Grand Total	**49**				**3.32**

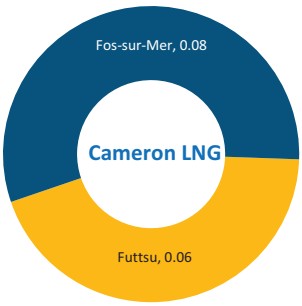
*Values are based on journey time to date in accordance with draught at departure and in-transit BOR. Eventual journey times will thus affect the amounts delivered.

LNG Unlimited Data

Monthly US LNG Exports as of 29 October

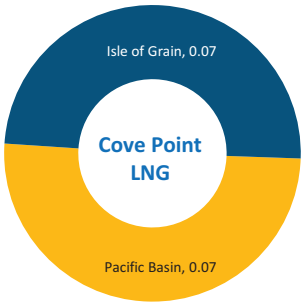
Cameron LNG

October production at Cameron LNG is likely to fall slightly month-on-month as the terminal has so far shipped 2 cargoes (0.14mmt) compared to 3 (0.17mmt) in September. Market visibility also indicates there are no further cargo liftings scheduled before the end of the month. Capacity utilisation for October therefore is likely to settle at 33%, a 9pp reduction over September.



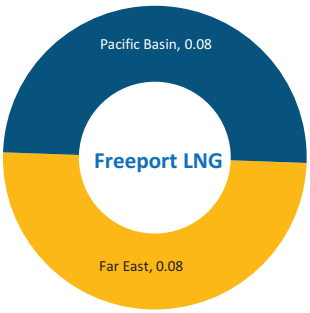
Cove Point LNG

Cove Point LNG had also shipped 0.14mmt at the time of writing in October, which represents a monthly fall in output by roughly two cargoes (0.12mmt) and pegs capacity utilisation at 30%. Whilst this represents a month-on-month fall in output by almost 24pp, the terminal's output is consistent with that of October last year. Notably, the *BW Lilac* may potentially load a cargo before the end of the month if vessel turnaround is quick enough, though our LNG Market Tracker suggests the early evening of 1 November to be a likelier departure.



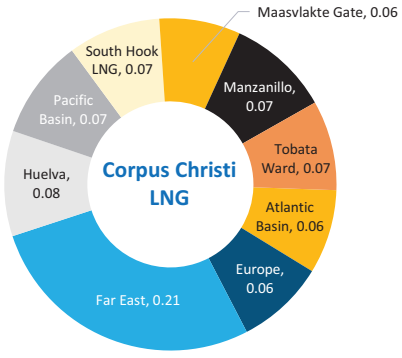
Freeport LNG

Since its maiden cargo on 3 September and some delay before that the terminal has continued to grow its exports. Accordingly, 0.15mmt have left Freeport in October, pegging utilisation of currently installed capacity at 37%. Notably, at the time of writing our Market Tracker indicated the *Galea* was loading a cargo so that Freeport is likely to raise its performance to monthly growth by one cargo. Concurrently, the *Methane Rita Andrea* was circling in the terminal's waiting area though we do not expect another cargo lifting before 31 October.



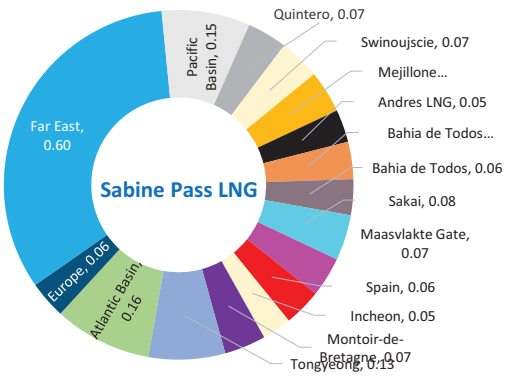
Corpus Christi LNG

As market visibility at the time of writing indicates the plant was loading a cargo aboard the *Cool Runner*, we are expecting exports from Corpus Christi LNG to have grown by 0.13mmt month-on-month. The plant has so far shipped 0.75mmt in October, implying nearly full capacity utilisation. The plant shipped its first cargoes in December last year and has since pushed to grow output every month. Compared to December 2018, Corpus Christi grew exports by 0.05mmt each month, on average.



Sabine Pass LNG

Sabine Pass LNG's exports stood at 2.08mmt on 29 October, thus representing significantly higher monthly output by 0.27mmt compared to the 1.81mmt seen in September and by 0.26mmt year-on-year. Concurrently, export capacity utilisation rose considerably by 14pp to 111%. Two of the terminal's three delivered October cargoes already arrived in Europe at Sines in Portugal on 16 October and Rotterdam in the Netherlands on 27 October whilst Incheon in South Korea received the third on 27 October, too.



LNG Unlimited Data

US LNG Exports Year-on-Year (MMt)

To Country	2018			2019										Grand Total
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	
Argentina	-	-	-	-	-	-	0.09	0.23	0.22	0.32	-	-	-	0.86
Belgium	-	-	-	-	-	0.07	-	-	-	-	-	0.07	-	0.14
Brazil	-	-	-	-	0.12	0.06	0.08	0.10	0.23	0.12	0.22	0.15	0.06	1.15
Chile	-	0.08	0.07	-	0.05	0.20	0.23	0.14	0.37	0.18	0.12	0.19	0.14	1.77
China	0.23	0.07	0.07	0.06	0.07	-	-	-	-	-	-	-	-	0.50
Colombia	-	-	-	0.06	-	0.06	-	-	-	-	0.06	-	-	0.18
Dominican Republic	-	-	-	-	0.06	-	-	-	0.06	-	-	0.08	0.06	0.25
France	0.14	0.22	0.15	-	0.07	0.43	0.32	0.15	-	-	0.07	0.06	0.21	1.82
Greece	0.02	0.06	0.08	-	0.07	-	-	0.07	-	-	-	-	-	0.30
India	0.15	-	0.14	0.14	0.14	0.16	0.14	0.29	0.07	0.07	0.15	0.28	-	1.72
Italy	0.07	-	0.13	0.21	0.07	0.14	-	0.14	0.07	0.19	0.11	0.07	-	1.18
Jamaica	-	-	-	-	-	0.04	-	0.04	-	0.01	0.12	-	-	0.21
Japan	0.07	0.52	0.27	0.35	0.19	0.15	0.34	0.14	0.29	0.41	0.35	0.39	0.20	3.68
Jordan	0.08	0.15	-	-	0.07	-	0.08	0.13	0.14	0.08	0.07	0.07	-	0.87
Kuwait	-	-	-	-	-	-	-	0.06	-	0.07	0.07	-	-	0.20
Mexico	0.15	0.07	0.22	0.30	0.14	0.15	0.22	0.43	0.34	0.49	0.25	0.20	0.07	3.03
Netherlands	0.06	0.06	-	-	0.06	0.21	0.28	0.21	0.06	0.07	-	0.07	0.13	1.22
Pakistan	-	-	-	-	0.08	0.08	-	-	-	0.08	-	0.12	-	0.36
Panama	-	-	0.06	-	0.07	0.06	-	-	0.07	-	-	-	-	0.26
Poland	-	0.07	-	0.19	-	0.07	0.07	-	-	0.07	0.07	-	0.07	0.62
Portugal	-	0.08	0.07	0.22	0.07	-	0.07	-	0.14	0.13	0.14	0.05	0.08	1.04
Singapore	-	-	0.07	-	0.15	0.13	0.03	0.06	0.06	0.07	-	-	-	0.58
South Korea	0.63	0.36	0.60	0.36	0.34	0.35	0.18	0.30	0.38	0.64	0.32	0.14	0.26	4.87
Spain	0.07	0.07	-	0.07	0.14	0.20	0.22	0.32	0.28	0.08	0.34	0.64	0.14	2.58
Taiwan	0.10	-	0.07	-	-	-	0.13	0.07	-	-	0.15	-	-	0.51
Thailand	-	-	-	-	-	-	-	0.06	-	-	-	0.05	-	0.12
Turkey	0.05	-	0.19	0.20	0.12	-	0.07	-	-	-	-	-	0.07	0.70
UAE	-	-	-	-	-	-	0.15	-	0.07	0.07	0.06	0.07	-	0.42
United Kingdom	0.15	0.43	0.30	0.19	0.08	0.08	-	-	-	-	0.01	0.07	0.20	1.51
Pacific Basin	-	-	-	-	-	-	-	-	-	-	0.07	0.13	1.13	1.34
Atlantic Basin	-	-	-	-	-	-	-	-	-	-	-	0.15	0.43	0.58
Grand Total	**1.96**	**2.26**	**2.50**	**2.36**	**2.15**	**2.64**	**2.72**	**2.92**	**2.88**	**3.12**	**2.75**	**3.05**	**3.27**	**34.57**

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