

LNG Review December 2019 - Recent issues and events -

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Introduction

With a positive final investment decision on Nigeria LNG's (NLNG) Train 7 project, the cumulative capacity of LNG projects in the world with this milestone in 2019 surpassed 71 million tonnes per year, the largest ever in the history.

While the Cameron and Freeport LNG projects continue ramping up production in the Gulf of Mexico region of the United States, the Elba Island liquefaction project in Georgia shipped out its maiden cargo in December.

Japan imported 70.52 million tonnes of LNG during the first eleven months of 2019, or 6.7% less than it did in the same period of 2018, the lowest for the period of the year since 2010. China imported 53.85 million tonnes of LNG during the first eleven months of 2019, or a 13.3% increase year-on-year. The growth speed is still high but slower than the previous year. While the country's natural gas consumption also grew steadily by 9% year-on-year to 274.1 bcm during the first eleven months of 2019, the growth rate was a little moderated compared to those in the previous two years.

Assessed spot LNG prices in Northeast Asia continue being traded at the lowest levels in the history. Those for immediate next month delivery have stayed under USD 6 per million Btu since late October 2019. Those for January and February 2020 delivery concluded the year below USD 6 for the first time.

Talks between Russia's Gazprom and Ukraine's Naftogaz over transit arrangements for Russian gas through Ukraine pipeline system were concluded in late December, with disputes over past incidents resolved, setting a stage for transit deals continuing from 2020 until 2024.

[Asia Pacific]

According to Japan's customs statistics, Japan imported 6.27 million tonnes of LNG in November 2019 and 70.52 million tonnes during the first eleven months of the year, or 6.7% less than it did in the same period of 2018. Both the November and the eleven-month total were the lowest for the respective periods of the year since 2010. The average landed price for November was USD 9.47 per million Btu (calculated by the author).

* The writer belongs to Gas Group, Fossil Fuels and International Cooperation Unit. Some information pieces that some readers may consider very important may not be included due to different reasons.

The advisory committee on resource and energy issues reporting to the Minister of Economy, Trade and Industry, revealed recommendations to the government upcoming global resource strategy. Recommendations on LNG business issues include "the government should reinforce JOGMEC's financial supporting functions enabling it to offer financial assistances to those Japanese companies investing in LNG receiving terminal projects in Asian countries, in addition to liquefaction projects."

Chugoku Electric Power and Tokyo Gas signed a Memorandum of Understanding (MOU) to consider strategic partnership in LNG Procurement.

JERA's subsidiary LNG Marine Transport (LMT) entered into a time charter party (TCP) for an LNG vessel with an Angelicoussis Group company. Construction of the vessel will begin in 2020 at a shipyard in Korea. The charter period is about 12 years starting between October and December 2021. Separately, JERA also entered into an MOU with PetroChina International (PCI) concerning cooperation in the LNG business.

Mitsubishi Shipbuilding, a Group company of Mitsubishi Heavy Industries (MHI) concluded a contract with Mitsui O.S.K. Lines (MOL) to build two LNG-fueled ferries, the first such project in Japan. The vessels will be built at the Shimonoseki Shipyard & Machinery Works, with successive completion and handover scheduled for the end of 2022 to early 2023. Separately, Kyushu Electric Power engaged in long term transport agreements by deploying the world's first LNG-fueled large coal carriers with Nippon Yusen Kabushiki Kaisha (NYK) and MOL. The vessels will be operated by NYK and MOL to import coal to Kyushu Electric's coal-fired power plants. The LNG will be supplied to the vessels at the loading facility of Kitakyushu Liquefied Natural Gas, a 75% owned subsidiary of Kyushu Electric.

Kawasaki Heavy Industries (KHI) announced its official naming and launch at Kobe Works of the *SUISO FRONTIER*, the world's first liquefied hydrogen carrier. KHI plans to install a 1,250 m³ vacuum-insulated, double-shell-structure liquefied hydrogen tank, manufactured at Harima Works, on the ship and complete the vessel's construction by late 2020. Once complete, the vessel will be used for technology demonstration testing aimed to establish an international hydrogen energy supply chain from Australia to Japan.

Pavilion Energy Singapore and Total Marine Fuels Global Solutions (TMFGS) signed a 10-year agreement to jointly develop an LNG bunker supply chain in Singapore. The cooperation includes the shared long-term use of the 12,000 m³ GTT Mark III Flex membrane LNG bunker vessel (LNGBV) newbuild. In May 2019 Pavilion performed Singapore's first commercial ship-to-ship LNG bunkering operation, which comprised a reload of 2,000 m³ of LNG from a small-scale tanker to a receiving heavy-lift commercial vessel. Pavilion also chartered its first LNGBV newbuild from MOL in February 2019, with the vessel under construction at Sembcorp Marine's yard. The 12,000 m³ LNGBV shared with

Pavilion will add to the two LNBVs already chartered by Total from MOL. The first, an 18,600 m³ vessel ordered in February 2018 will be positioned in Rotterdam from 2020, and its sister ship ordered in December 2019 will be positioned in Marseilles from 2021.

The Electricity Generating Authority of Thailand (Egat) in late December 2019 received its first LNG cargo from Malaysia's Petronas at PTT's LNG receiving terminal.

Woodside revealed that the A-6 Development offshore Myanmar moved from the exploration and appraisal phase to the pre-front-end engineering design (pre-FEED) phase. The joint venture participants MPRL E&P and Total. The development would be linked to a subsea gathering system routed to a shallow-water processing platform. The gas would be exported via a 240-km pipeline to a riser platform near the existing Yadana platform complex. The riser platform would distribute gas via the existing pipeline infrastructure to Myanmar and Thailand. The A-6 Development is targeting FEED entry in the second half of 2020.

Saibu Gas agreed to purchase a 21.0% stake in PetroVietnam Low Pressure Gas Distribution JSC, a Vietnam's gas distribution company. Separately, the Vietnamese government added the Bac Lieu LNG-to-Power project to the National Power Development Plan. Singapore-based Delta Offshore Energy will build the project.

Phoenix Petroleum and CNOOC asked the Department of Energy (DOE) of the Philippines for a temporary suspension of the permit (NTP = notice to proceed) for their Tanglawan LNG project, expiring in December 2019.

Based on figures from NDRC (National Development and Reform Commission), China's natural gas production and consumption during the first eleven months of 2019 were respectively 157 bcm and 274 bcm, increasing year-on-year by 10% and 9%. According to figures of China's trade statistics, the country imported 9.455 million tonnes of natural gas in November 2019, culminating to 87.113 million tonnes in the first eleven months in the year, or a 7.4% increase year-on-year. The growth speed is still high but slower than the previous year. The country imported 6.51 million tonnes of LNG in November 2019, culminating to 53.85 million tonnes in the first eleven months in the year, or a 13.3% increase year-on-year. The growth speed is also still high but again slower than the previous year.

Xinhua news agency and the country's National Council reported the establishment of a national oil and gas pipeline company (China Oil & Gas Piping Network Corporation) as one of core measures of market reform. The new company will separate transportation, production and sales, and open the unused capacity to third-parties.

The Asian Infrastructure Investment Bank (AIIB) is investing USD 500 million to support China's efforts to transition to a lower-carbon energy future. The Beijing-Tianjin-Hebei Low Carbon Energy Transition and Air Quality Improvement Project aims to increase the availability of natural gas. The project is AIIB's first sovereign-backed financing in China.

It involves the construction of an LNG terminal in Binhai District, Tianjin Municipality. The project will be implemented by Beijing Gas Group.

INOX India commissioned India's first LNG dispensing station at Petronet LNG's Dahej terminal in Gujarat. The station will dispense fuel to buses expected to ferry staff from the terminal to Bharuch town, roughly 50 km away.

The Mundra LNG receiving terminal in Gujarat, which has been idle for a year, may finally become operational by the end of January 2020, sources said. The terminal was completed in 2018 but had not been operational. Gujarat State Petroleum Corporation and a few other state government-owned companies hold 75% stake in the project. Adani group holds the remaining 25%.

Niko Resources announced that an amendment to the production sharing contract (PSC) for the D6 Block in India has been executed, reflecting the assignment of the 10% interest previously held by Niko, to the remaining interest holders in the block, Reliance Industries Limited (RIL) and BP Exploration (Alpha) Limited.

Woodside entered into a long-term sale and purchase agreement (SPA) with Uniper for the supply of LNG from Woodside's global portfolio for a term of 13 years commencing in 2021. The quantity will initially be up to 0.5 million tonnes per year, increasing to approximately 1 million tonnes per year from 2025. Supply from 2025 is conditional upon a final investment decision (FID) on the Scarborough development. Execution of the SPA follows the signing of a heads of agreement (HOA) in September 2019.

INPEX announced that the Ichthys LNG Project achieved financial completion under its project financing framework, releasing INPEX and its partners from completion guarantee obligations to lenders corresponding to their respective participating interests.

Shell announced a significant gas and condensate discovery (Bratwurst) in the Browse Basin off the North West Coast of Western Australia. The discovery is located 160 km northeast of Shell's Prelude FLNG facility.

Santos' acquisition of the ConocoPhillips assets acquisition is expected to complete in the first quarter of 2020. At completion and expected 25% sell-down to SK E&S, Santos' interest in Bayu-Undan and Darwin LNG will be 43.4% (11.5% pre-transactions).

[North America]

According to a new study by the United States Chamber of Commerce's Global Energy Institute, a ban on fracking would be "catastrophic" for the economy, causing widespread job loss and significant increases in oil and natural gas prices. According to a separate study by the data analytics company Kayrros, a fracking ban on the federal lands would not have a substantial impact on supply." Separately, The Industrial Energy

Consumers of America (IECA) submitted comments opposing four LNG export applications at the United States Department of Energy (DOE).

The United States exported 33.25 million tonnes of LNG during the first eleven months of 2019, or 67% more than the same period in 2018, according to figures from DOE.

Dominion Energy announced that it completed the transfer of a 25% non-controlling equity interest in Cove Point to an infrastructure fund managed by Brookfield Asset Management as previously announced in October 2019.

McDermott and Chiyoda Corporation announced that Train 2 of the Cameron project begun producing LNG.

Chiyoda, McDermott, and Zachry announced commencement of LNG production and the first commissioning cargo of LNG from Train 2 of the Freeport LNG project. Train 3 initial production of LNG is scheduled for Q1 of 2020. Train 1 started commercial operation in December, too. Osaka Gas and JERA participate in the project through FLNG Liquefaction (FLIQ1). Osaka Gas and JERA will respectively lift approximately 2.32 million tonnes per year of LNG based on the liquefaction tolling agreements with FLIQ1.

Kinder Morgan sent out its first shipment from the Elba Island LNG export plant in Savannah, Georgia in the middle of December 2019.

FERC (Federal Energy Regulatory Commission) issued a Letter order granting Golden Pass LNG's request for an extension of time until November 2026 to complete the construction of the project. Separately, FERC issued a letter order granting Driftwood LNG LLC's request to commence site preparation activities.

Energy Transfer LP (ET) announced that a comprehensive commercial tender package has been issued to engineering, procurement and construction (EPC) contractors to submit final commercial bids for the proposed Lake Charles LNG liquefaction project being developed by ET and Shell. The project would modify ET's existing LNG import facility in Louisiana to add LNG liquefaction capacity of 16.45 million tonnes per year. The commercial bids are expected to be received in the second quarter of 2020.

In Port Gibson, Mississippi, Hesco Energy plans to open a plant to produce and sell LNG to power ships and plants around the nation.

Tokyo Gas has closed a transaction through Castleon Resources to acquire assets in the East Texas / Louisiana region from BG US Production (BG US), a subsidiary of Shell.

The Puget Sound Clean Air Agency completed a review of PSE's (Puget Sound Energy) Tacoma LNG application and made a preliminary determination that the proposal meets all the requirements and should be approved.

Carnival Corporation joined the Getting to Zero Coalition, an alliance of organizations across the maritime, energy, infrastructure and finance sectors committed to

accelerating the decarbonization of the international shipping industry. As part of its strategic plan for carbon footprint reduction, the company also leads the cruise industry's use of LNG to power cruise ships, with a total of 11 next-generation cruise ships joining the fleet through 2025. Carnival Corporation launched the world's first cruise ship powered by LNG, *AIDAnova*, in late 2018, followed by a second LNG ship, *Costa Smeralda*, in December 2019.

General Dynamics NASSCO delivered *Lurline*, the lead ship of the two-vessel Kanaloa Class, built for Honolulu-based shipping and logistics company, Matson. *Lurline* incorporates LNG-capable main and auxiliary engines. The second Kanaloa Class vessel for Matson is currently under construction at NASSCO's San Diego shipyard with delivery expected in the third quarter of 2020.

TC Energy entered into an agreement to sell a 65% equity interest in the Coastal GasLink Pipeline Project to KKR and Alberta Investment Management Corporation (AIMCo). Concurrent with the completion of the sale, TC Energy expects that Coastal GasLink will enter into a secured project financing construction credit facility with a syndicate of banks to fund up to 80% of the Project during construction.

The Canada Energy Regulator (CER) approved an application from Chevron Canada to export LNG for a term of 40 years. Chevron intends to export up to 28.23 billion cubic metres of natural gas per year. On the other hand, as a result of its disciplined approach to capital allocation, the company will reduce funding to various gas-related opportunities including Kitimat LNG and other international projects.

The Nova Scotia provincial regulator approved extensions to construction deadlines for sister companies planning to build an LNG plant and related pipeline in Bear Head, Richmond County, Nova Scotia. The Nova Scotia Utility and Review Board issued the orders in early December 2019. Bear Head LNG and Bear Paw Pipeline applied in October for extension to the permits, which were due to expire on 31 December, to 31 December 2022.

Tokyo Gas acquired 50% equity interests in Heolios EnTG, a joint venture company established between ENGIE and Tokyo Gas to collaboratively construct, own, and operate renewable assets in Mexico.

[Middle East]

Noble Energy announced the commencement of natural gas production from the Leviathan field. The Leviathan field was discovered in 2010, and the initial development phase was sanctioned in 2017. The first phase of development has a designed production capacity of 1.2 billion cubic feet of natural gas per day. Noble Energy holds a 39.66% working interest in the project. Other interest owners include Delek Drilling with 45.34% and Ratio Oil Exploration with 15%.

[Africa]

ExxonMobil said that it has secured more than 1.7 million acres (6,880 km²) for exploration offshore Egypt. The acquisition includes acreage in the 1.2 million North Marakia Offshore block in the Herodotus basin. The remaining 543,000 acres is in the North East El Amriya Offshore block in the Nile Delta.

Nigeria LNG (NLNG) and Vitol signed an LNG Sale and Purchase Agreement (SPA) for the supply of 0.5 million tonnes per year for a 10-year term on a Delivered Ex-ship basis commencing October 2021, from the remarketed volumes from NLNG's Trains 1, 2 and 3.

NLNG took a final investment decision (FID) for its Train 7 Project. The expansion will increase the capacity of NLNG from 22 to 30 million tonnes per year, with the award of contracts for the engineering, procurement and construction (EPC) activities to follow the closure of bank and Export Credit Agency (ECA) financing, and the finalization of some key supporting commercial agreements expected in early 2020. NLNG is an incorporated Joint-Venture owned by Nigerian National Petroleum Corporation (NNPC) (49%), Shell (25.6%), Total (15%), and Eni (10.4%). The first LNG production is expected in 2024. Prior to the investment decision, NLNG signed the first Basic 20-year term of Gas Supply Agreements (GSAs) for Train 7 with Joint Ventures (JVs) for the supply of feedgas. The Company also signed the second Basic 10-year term of GSAs for its Trains 1, 2 and 3. The JVs are Shell Petroleum Development Company of Nigeria Limited (SPDC), Total Exploration & Production Nigeria (TEPNG) and Nigerian Agip Oil Company Limited (NAOC). It followed the issuance of a Letter of Intent for the Engineering, Procurement and Construction (EPC) Contract to SCD JV Consortium in September 2019. SCD JV Consortium is made up of Saipem of Italy, Japan's Chiyoda and Daewoo of Korea.

One of BW Group's LNG carriers was attacked in late December 2019 on its way to Bonny in Nigeria by a speedboat with 10 armed men onboard. The gas carrier conducted evasive maneuvers causing the attack to fail.

Woodside, as operator of the Sangomar Field Development, revealed that the Sangomar Development and Exploitation Plan was submitted to the Government of Senegal. The Sangomar floating production storage and offloading (FPSO) facility is expected to have a capacity of around 100,000 bbl/day, with first oil targeted in early 2023.

[Europe / Russia]

Titan LNG contracted Norway's Fearnleys to run the tender process for a newbuild LNG Bunker Barge, which will be the 3rd barge that the LNG bunker supplier Titan LNG will operate. The barge will carry 8000 m³ of LNG to service LNG fuelled ships and will be

operational in 2021.

Glencore entered into an agreement to acquire the LNG business of Ørsted. Glencore will take over a number of contracts, including the right to use 3 bcm of annual regasification capacity at the Gate terminal in Rotterdam until 2031 and five LNG purchase contracts. The transaction is expected to close in the summer of 2020.

Elengy conducted an Open Subscription Period (OSP) for Montoir-de-Bretagne LNG terminal, from July to November 2019 to offer the not yet subscribed regasification capacity, i.e. more than 3.5 billion cubic meters (bcm) per year, for the period 2021 to 2035. As a result, the terminal is fully booked between 2023 and 2035. Only few capacity slots remain available in 2021 and 2022.

Total Marine Fuels Global Solutions (TMFGS) and MOL signed a long-term charter contract for a second large LNG bunker vessel, to be delivered in 2021 to be positioned in the Marseille-Fos area in France. The vessel will be built by Hudong-Zhonghua Shipbuilding in China to have a capacity of 18,600 m³ with the Mark III membrane containment system provided by GTT. Separately, Total and CMA CGM signed an agreement for the supply of approximately 270,000 tonnes per year of LNG over 10 years. This volume will cover the supply at Marseille-Fos of CMA CGM's future container ships that will operate between Asia and the Mediterranean, that are scheduled for delivery starting in 2021.

Russia's NOVATEK launched an LNG filling station to provide fuel for trucks in Rostock, Germany. This represents NOVATEK's first LNG filling station in Europe, as the company plans to build a network of stations in Germany and Poland. In early December 2019, Nauticor's *Kairos*, the world's largest bunker supply vessel (BSV) for LNG, received the first license to conduct LNG ship-to-ship bunkering operations in the port.

Spain's Enagás said that the country's natural gas consumption grew by 14% in 2019 reaching 398 TWh (26.33 million tonnes), the highest figure since 2010. The growth was mainly due to high demand for power generation and higher industrial consumption.

Costa Smeralda, the new Costa Cruises flagship, completed its first LNG refueling in the port of Barcelona. The Costa Group has ordered a total of five new ships fueled by LNG to be delivered by 2023.

The DEPA (Public Gas Corporation of Greece) board approved the company's participation in the Floating Storage Regasification Unit (FSRU) project at the port of Alexandroupolis. The project is an EU Project of Common Interest (PCI) for a connected European energy grid. DEPA will have a 20% stake in Gastrade. A final investment decision (FID) is expected in the third quarter of 2020 so that operations can begin in September 2022.

The contract for the development of LNG infrastructure in Cyprus was signed between a subsidiary of state natural gas company Defa, and the international joint venture

JV China Petroleum Pipeline Engineering, and Metron SA., with Hudong-Zhonghua Shipbuilding and Wilhelmsen Ship Management.

Cyprus, Greece and Israel signed an accord to construct the Eastern Mediterranean natural gas pipeline, that will connect gas fields in the eastern Mediterranean basin with European markets through Cyprus, Greece and Italy. The project is developed by IGI Poseidon SA, a joint venture of Greece's Depa SA and Italy's Edison.

Russia's Gazprom announced that recoverable gas reserves at its Kruzenshternskoye field increased by 360 bcm to 2 tcm. The field is located to the west of the Bovanenkovskoye field, partly onshore in the Yamal Peninsula but mostly in the waters of the Kara Sea.

Gazprom, Naftogaz of Ukraine, Gas Transmission System Operator of Ukraine and the Ministry of Justice of Ukraine signed a package of documents providing for Russian gas transit across Ukraine to continue beyond December 2019. Gazprom and Naftogaz concluded an irrevocable settlement agreement stipulating that all outstanding arbitration and judicial claims between the parties be discontinued and that in the future the parties renounce any and all possible claims under the supply and transit contracts dated in January 2009. Prior to the signing of the settlement agreement, Gazprom had paid USD 2.9 billion to Naftogaz in accordance with the ruling of the Stockholm Arbitration Court. Gazprom and Naftogaz entered into an agreement to arrange for the transmission of gas across Ukrainian territory. Gas Transmission System Operator of Ukraine signed a transport agreement with Naftogaz and an inter-operator agreement with Gazprom for a five-year period to transmit a total of 225 bcm, including 65 bcm in 2020 and 40 bcm per year in 2021-2024.

Separately, Gazprom and Gazprom Transgaz Belarus signed agreements to extend the contracts for gas supplies to and gas transportation across Belarus until 2021. The contractual supply and transit volumes in 2020 will remain at the level of 2019.

Yamal LNG announced the operational start of the fifteenth and final Arc7 ice-class tanker built specifically for the Project. The Arc7 ice-class fleet is capable of shipping all LNG produced given the increased performance of the first three LNG trains and the planned launch of Train 4. Yamal LNG is constructing a 17.4 million tonne per year liquefaction plant comprised of three LNG trains of 5.5 million tonnes per year each and one LNG train of 0.9 million tonnes per year. Separately, NOVATEK announced that Yamal LNG started using a dedicated LNG transshipment tank at the Zeebrugge LNG terminal in Belgium. The tank was built specifically for the transshipment needs of Yamal LNG with a capacity of 180,000 m³, allowing the project to transship up to 8 million tonnes of LNG per year.

Wison Offshore & Marine said it began fabrication work at the Arctic LNG-2 project in November 2019.

NOVATEK announced that the company won auctions for geological survey,

exploration and production licenses for the South-Yamburgskiy and East-Ladertoyskiy subsoil areas in the Yamal-Nenets Autonomous Region. The company also announced that Arctic LNG 1 subsidiary won the auction for geological survey, exploration and production license for the Bukharinskiy subsoil license area located on the Gydan Peninsula and partly in the shallow waters of the Ob and Taz bays in the same Autonomous Region.

NOVATEK and Transneft signed an Agreement on Cooperation in Gas Motor Fuel. Transneft is considering purchasing LNG from NOVATEK to refuel its cargo truck fleet.

Gazprom and China's CNPC announced that the Power of Siberia pipeline commenced operation.

According to a Nikkei Newspaper article, ExxonMobil, Rosneft and Japan's Sakhalin Oil and Gas Development are in talks to produce LNG from the Sakhalin 1 Project.

[South America]

Brazil's Petrobras began the process of leasing the LNG Regasification Terminal of Bahia, in the city of Salvador, and its associated pipeline, in line with the Natural Gas Market Termination Commitment Agreement with the country's antitrust regulator CADE (Conselho Administrativo de Defesa Econômica) in July 2019.

Bolivia's YPFB said that it reached a deal with Petrobras to extend natural gas exports through the Gasbol Pipeline. During the transition period from 1 January to 10 March 2020 after the existing 20-year agreement expires at the end of December 2019 YPFB will continue exporting up to 19.25 mcm per day, as well as additional volumes to gradually meet the provision of 0.04 TCF (trillion cubic feet) that were paid by Petrobras, but not yet taken.

Boskalis was awarded a contract to connect an offshore Floating Storage and Regasification Unit (FSRU) to an onshore power plant in El Salvador. The contract was awarded by Energía del Pacífico (EDP), a 378-MW LNG-to-power infrastructure project at the Port of Acajutla, El Salvador. The project is scheduled to be operational by 2021.

[Global issues]

Commodity trading houses, notably Gunvor and Trafigura, increased LNG trading volumes significantly in 2019. Not only spot LNG cargoes, but also a lot of term-contract volumes were traded by those companies lately.

Reference: Company announcements, The Nikkei Asian Review, Xinhua, Al Jazeera, Νέοι Κόσμοι, Cyprus Mail, Cedigaz News Report.

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