

LNG Review June 2019 - Recent issues and events -

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Introduction

A positive final investment decision on Mozambique LNG, the first land-based LNG liquefaction and export project in Mozambique, was announced in on 18 June, according to the schedule announced in April, after securing multiple international joint-purchase arrangements with Asian companies.

In the month, Cheniere announced an FID on the sixth liquefaction train at its existing Sabine Pass LNG export plant in Louisiana, United States. With these two, the total LNG liquefaction capacity in the world that has reached FID milestones in 2019 has already surpassed 33 million tonnes per year, the highest since 2006.

Other LNG export development plans advanced in the month. Notably, Russia's Arctic LNG 2 project secured a 10%-equity participation each from China's CNPC and CNOOC, as well as from a consortium between Mitsui & Co. and JOGMEC, following another 10% equity participation by Total in March. With its plant EPC contract already in hand in May and equity partners in place from Europe, China and Japan, the project has come closer to an investment decision.

Although Japan's average LNG import price declined to its lowest level in recent months at USD 9.43 per million Btu in May, it is still twice as high as assessed spot LNG prices of delivery in the same month, with the gap between them largest after the great earthquake in 2011. In order to take advantage of availability of volumes in the spot and short-term LNG market, it is critical to secure better terms and conditions (on pricing and delivery) in term contracts.

[Asia Pacific]

Tokyo Gas and GS Energy of Korea signed an agreement, respectively, with Shell Eastern Trading for delivery of one cargo each of carbon neutral LNG in July 2019. Nature based carbon credits will be used to compensate the full carbon dioxide (CO₂) emissions generated - from exploring for and producing the natural gas, to use by the final consumer.

* The writers belong 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.

Tokyo Gas signed a heads of agreement (HOA) regarding supply of LNG with SUMITOMO JOINT ELECTRIC POWER. Tokyo Gas will supply approximately 170,000 tonnes of LNG per year to the latter for 5 years from FY 2021 to FY 2025.

According to Korea's customs statistics, the country imported 2.97 million tonnes of LNG in May 2019, resulting in 16.74 million tonnes of imports in the first five months of the year, decreasing year-on-year by 12%.

Malaysia's Petronas was reportedly selected to supply Thailand's Electricity Generating Authority of Thailand (EGAT) its first LNG imports.

Samsung C&T won the Thi Vai LNG Terminal construction project in Vietnam, awarded by PetroVietnam Gas. Samsung C&T formed a consortium with the local company PetroVietnam Technical Services Corporation (PTSC).

NOVATEK, Total, Siemens and Zarubezhneft signed a Memorandum of Understanding (MOU) on cooperation in Vietnam. The MOU envisages developing of an integrated energy-generating project with the use of LNG in Vietnam.

According to China's customs statistics, China imported 7.56 million tonnes of natural gas in May 2019. During the first five months, China's natural gas import grew year-on-year by 13.4% to 39.43 million tonnes, with LNG import increasing by 4 million tonnes, or 20%, to 24 million tonnes.

Based on preliminary data from China's NDRC (National Development and Reform Commission), China's natural gas production, import, and consumption during the first five months of 2019, were 73 bcm, 545 bcm, and 126 bcm, increasing year-on-year by 10%, 13%, and 12%, respectively.

China's first seagoing LNG bunker vessel will operate with a package of solutions from Wärtsilä. The ship is being built by the Dalian Shipbuilding Industry Corporation (DSIC) for an affiliate of the ENN Energy. The equipment is scheduled for delivery in early 2020.

Castle Peak Power (CAPCO) and The Hongkong Electric (HK Electric) signed a contract with Shell Eastern Trading on long-term LNG supply for the Hong Kong Offshore LNG Terminal. The Hong Kong LNG Terminal joint venture of CAPCO and HK Electric signed a time-charter agreement with Mitsui O.S.K. Lines (MOL) for a Floating Storage and Regasification Unit (FSRU) vessel.

Chinese Taipei imported 1.4 million tonnes of LNG in May and 6.77 million tonnes in the first five months of 2019, 5.5% less than it did in the same period in 2018, according to its customs statistics.

JERA Global Markets (JERAGM) announced its first carbon-Neutral LNG delivery into India. The cargo was sourced from Abu Dhabi Gas Liquefaction Company (ADNOC

LNG).

Petronet LNG expanded its Dahej import terminal capacity to 17.5 million tonnes per year from 15 million tonnes.

IndianOil LNG issued a tender for short-term commercial lease of its LNG storage tank at Ennore terminal near Chennai. The company is seeking bids for the short-term lease for LNG unloading, storage and reloading services. The contract period is for two years from the date of the agreement execution. Bids are due by 15 July 2019.

Mitsui O.S.K. Lines (MOL) signed a short-term charter agreement for an LNG carrier with GAIL (India) Limited.

Reliance Industries Limited (RIL) and BP announced the sanction of the MJ project (also known as D55) in Block KG D6, offshore the east coast of India. MJ is the third of three new projects in the Block KG D6 integrated development plan and its approval follows sanctions for the development of 'R-Series' deep-water gas field in June 2017 and for the Satellites cluster in April 2018. These projects will bring about 1 billion cubic feet a day of new domestic gas onstream, phased over 2020-2022.

Pakistan LNG has invited bids for 240 LNG cargoes to be supplied over a 10-year period.

Bangladesh Petrobangla received expressions of interest (EOIs) from twelve companies to build the country's first onshore LNG import terminal at Matarbari in the Cox's Bazar district, according to sources.

Australia exported 31 million tonnes of LNG during the first five months of 2019, an 18% increase year-on-year.

Australian Industrial Energy (AIE) awarded the key wharf facility and pipeline construction contract for the its Port Kembla Gas Terminal (PKGT) to the SCSB joint venture which comprises Spiecapag and Soletanche Bachy. The award of the contract follows the NSW State Government's decision to grant Development Consent for the project in April 2019 and AIE welcoming its first customer, EnergyAustralia, which has committed to a five-year contract of at least 15PJs (275,625 tonnes) of gas per year from 2021. Construction will commence immediately after the AIE joint venture partners complete their Final Investment Decision which is expected later in 2019.

AGL Energy announced that the company expects first gas to be delivered from the proposed AGL Gas Import Jetty at Crib Point in Victoria in the second half of FY22 (July 2021 - June 2022). AGL had previously indicated first gas could potentially be delivered during FY21. AGL selected the Höegh Esperanza as the floating storage and regasification unit (FSRU) for the Crib Point project, as opposed to the Höegh Giant as communicated in December 2018. AGL said the Esperanza better fits timing and operational requirements

arising from the Environment Effects Statement (EES) process currently being undertaken by the Victorian Government. The Höegh Esperanza has a later delivery window than the Höegh Giant.

Australia's Queensland state will raise its petroleum royalty rate to 12.5% from 10% from July 2019. APPEA (Australian Petroleum Production & Exploration Association) said the announcement threatens investment.

Shell, along with its partners INPEX, KOGAS and OPIC, announced that the first cargo of LNG sailed from Shell's Prelude Floating LNG (FLNG) facility located 475 kms North East of Broome in Western Australia.

Transborders Energy entered into a Joint Study Agreement with Kyushu Electric Power. The Parties will work together to develop a Floating LNG (FLNG) Solution and pursue the deployment on a range of stranded offshore gas resource opportunities.

Santos announced that the Barossa Joint Venture entered into exclusive negotiations with the Darwin LNG Joint Venture for the supply of backfill gas. The Barossa project entered the front-end engineering and design (FEED) phase in April 2018, and in May 2019 announced the contract to supply the Subsea Production System (SPS) and associated SPS installation support.

PTT Exploration and Production (PTTEP) made a gas discovery off the shore of Sarawak in Malaysia, marking PTTEP's biggest find ever. The company found the gas at Lang Lebah-1RDR2, the first exploratory well in the Sarawak SK410B project. The project is located in shallow waters, about 90 kilometres off the coast of Sarawak. The consortium consists of PTTEP HKO (the operator), Kuwait Foreign Petroleum Exploration (Kufpec) and Petronas Carigali, with participating interests of 42.5%, 42.5% and 15% respectively.

INPEX signed a Heads of Agreement (HOA) with Indonesian authorities on the basic principles regarding a revised Plan of Development (POD) for the Abadi LNG Project that involves developing the Abadi gas field in the Masela Block in the Arafura Sea in Indonesia. Subsequently, INPEX submitted to the authorities a revised POD based on an onshore LNG development scheme with LNG production capacity of 9.5 million tonnes per year. The revised POD incorporates the results of Pre-Front End Engineering Design (Pre-FEED) work conducted between March and October 2018. INPEX also submitted an application to extend the duration of the PSC until 2055.

[North America]

In April 2019, for the 24th consecutive month, dry natural gas production in the United States increased year to year for the month. Production during the first four months in the year increased by 13% year-on-year to 304 bcm - following a 12% increase in the year

2018 - with 12 bcm of net export, 323 bcm of consumption (a 3% increase after 10% in 2018), and 32 bcm of net withdrawals from storage. The United States has been a net exporter of natural gas on monthly basis since September 2017. The United States exported 10.14 million tonnes of LNG during the first four months of 2019, a 51% increase from the year-ago figure.

Cheniere Energy Partners made a positive FID with respect to Train 6 of the Sabine Pass Liquefaction Project in Cameron Parish, Louisiana, and issued full notice to proceed with construction to Bechtel Oil, Gas and Chemicals.

Cheniere started production of LNG from its second liquefaction train at the Corpus Christi facility in Texas. Meanwhile, FERC (Federal Energy Regulatory Commission) has issued a letter order granting Corpus Christi Liquefaction's (CCL) request for a two-year extension, to 30 December 2021, to place liquefaction Train 3, LNG Storage Tank B, and the East Jetty into service.

Cheniere Corpus Christi Liquefaction Stage III, LLC entered into a long-term gas supply agreement (GSA) with Apache Corporation, which agreed to sell 140,000 million Btu per day of natural gas to Corpus Christi Stage III for approximately 15 years. Approximately 0.85 million tonnes per year will be marketed by Cheniere. Apache will receive an LNG price, net of a fixed liquefaction fee and certain costs incurred by Cheniere. The LNG price is based on international LNG indices. The Corpus Christi Stage III project is being developed to include up to seven midscale liquefaction trains with a total expected nominal production capacity of approximately 9.5 million tonnes per year. Corpus Christi Stage III received a positive Environmental Assessment (EA) from FERC in March 2019.

Sempra PALNG has filed a request with FERC to initiate the pre-filing environmental review process for Sempra PALNG's proposal to add two liquefaction trains (Trains 3 and 4) to its Port Arthur LNG plant under development in Jefferson County, Texas. The addition would double the plant's LNG production capacity to 27 million tonnes per year.

Toshiba Corporation concluded a purchase and sales agreement with Total Gas & Power Asia Private Limited for all shares of Toshiba America LNG Corporation (TAL). Toshiba and Total also agreed that all contracts related to the sale of LNG business entered into by Toshiba Group, including contracts between Toshiba Group companies and trading agreements between Toshiba Group and its customers, will either be transferred to Total or cancelled.

The Polish Oil and Gas Company (PGNiG) signed an agreement with Venture Global LNG to purchase an additional 1.5 million tonnes per year of LNG. The volume of LNG from the Plaquemines project will increase from 1.0 to 2.5 million tonnes per year. Deliveries will commence on the commercial operation date, currently expected in 2023. The new amendment raises PGNiG's total commitment with Venture Global LNG projects to 3.5

million tonnes per year.

A state permit decision for Texas LNG's proposed export terminal at the Port of Brownsville will have to wait another five months. The Texas Commission of Environmental Quality sent the company's state permit application to the State Office of Administrative Hearings for a contested case hearing based on a request from the City of Port Isabel. Texas LNG is seeking permission from state and federal regulators to build an export plant along the Brownsville Ship Channel capable of producing 4 million tonnes of LNG per year but the project faces stiff opposition from a coalition of neighbouring communities, fishermen, shrimpers, environmentalists and Native Americans.

MPLX, WhiteWater Midstream backed by First Infrastructure Capital, and a joint venture between Stonepeak Infrastructure Partners and West Texas Gas reached a final investment decision (FID) to move forward with the design and construction of the Whistler Pipeline. The majority of available capacity has been committed by long-term transportation agreements. The pipeline is designed to transport approximately 2 billion cubic feet per day (Bcf/d) of natural gas through approximately 475 miles (764 km) of 42-inch pipeline from Waha, Texas, to the Agua Dulce area in South Texas (near Corpus Christi). Supply would be sourced from multiple upstream connections in the Permian Basin. The pipeline is expected to be in service in the third quarter of 2021.

Flaring and venting of natural gas in the Permian Basin in Texas and New Mexico reached a new all-time high in the first quarter of 2019, averaging as much as 661 million cubic feet per day (5 million tonnes per year), according to Rystad Energy.

Commonwealth LNG and Gunvor signed a heads of agreement (HOA) for 1.5 million tonnes per year of LNG for 15 years from the Commonwealth LNG export project under development in Cameron Parish, Louisiana. Commonwealth LNG expects to take a final investment decision (FID) on the project in 2020.

Delfin LNG filed a request with FERC for a three year and six month extension of time to construct, operate and maintain onshore metering, compression, and piping facilities located in Cameron Parish, Louisiana. The onshore facilities will exclusively transport natural gas to Delfin LNG's proposed deepwater port in federal waters offshore Louisiana. Delfin LNG proposes to place the onshore facilities into service no later than 28 March 2023.

The Delaware River Basin Commission (DRBC) acknowledged that an energy company plans to ship LNG and other liquids through a new export terminal on the Delaware River in South Jersey. Delaware River Partners plans to add an LNG terminal to a new port that it plans to build on a former DuPont site in Gibbstown, Gloucester County. LNG would be shipped to the Gibbstown port via truck from a new liquefaction plant being built in Bradford County, according to a Securities and Exchange filing by New Fortress Energy.

Edge Gathering Virtual Pipelines 2 LLC (EDGE) produced its first LNG in the United States. EDGE began on-well-site LNG production in the United States on 7 May 2019, accessing Marcellus gas in Pennsylvania, and making truck-delivered LNG sales to its first customers, which include Emera Energy Services. EDGE has delivered over 30,000 gallons (114 kl) of LNG to a delivery point at a New England gas utility over 300 miles (483 km) away from the Marcellus production site. The EDGE Virtual Pipeline works by deploying Galileo Global Technologies' transportable Cryobox™ LNG production and liquefaction equipment "at the source" - natural gas wells - and delivering the LNG directly to customers' doorsteps. EDGE Cryobox units fit on a standard 40 ft tractor trailer and are designed to be quickly and easily connected, and disconnected, from feedstock gas wells. Units are also self-powered using produced gas, removing the need for a grid connection. EDGE uses technology developed and proven in Argentina.

FERC published the Draft Environmental Impact Statement (DEIS) for the Alaska LNG Project proposed by the Alaska Gasline Development Corporation (AGDC). FERC staff said in its report, "some of the adverse impacts would be significant even after the implementation of mitigation measures."

Canada's federal government is putting up CAD 275 million in support for LNG Canada's development in Kitimat. The contribution will include CAD 220 million to help LNG Canada buy more energy-efficient gas turbines, and CAD 55 million to replace an aging highway bridge in Kitimat.

Pacific Oil & Gas (PO&G) announced that its wholly-owned subsidiary, Woodfibre LNG Export, signed a binding LNG Sales and Purchase Agreement (SPA) with BP from PO&G's Woodfibre LNG export facility in Squamish, British Columbia. BP will receive 0.75 million tonnes per year of LNG over 15 years on a free on board (FOB) basis, with first delivery expected in 2023. Concurrently, BP Canada and PO&G are working on an agreement for BP Canada to provide gas transportation and balancing services ensuring a reliable delivery of gas to the Woodfibre LNG export facility over the 15 year term.

Pieridae Energy signed a purchase and sale agreement with Shell Canada Energy to purchase all of Shell's midstream and upstream assets in the southern Alberta Foothills. The Acquisition is expected to occur in the third quarter of 2019 and help secure the remaining gas supply needed for the first train of the Goldboro LNG project.

[Middle East]

PTT Exploration and Production (PTTEP) acquired Partex, enabling the company to be part of oil and gas projects in 5 countries. The key investments under Partex's portfolio include the PDO (Block 6) Project, the largest onshore producing oil asset in Oman and Oman

LNG Project (OLNG). Partex holds 2% interest in the project.

[Africa]

New Fortress Energy signed a memorandum of understanding (MOU) with the Angolan Ministry of Mineral Resources and Petroleum, Ministry of Energy and Water and Ministry of Finance for the development of an LNG terminal to supply natural gas to Angola for power generation. New Fortress would fund, build, and operate an LNG import and regasification terminal and supply gas to power and industrial facilities across Angola and work with the Ministry of Mineral Resources and Petroleum to explore the development of additional indigenous natural gas resources and a domestic liquefaction facility.

ExxonMobil and its partners will further invest in Block 15 offshore Angola to increase production as part of an agreement with Angola's National Agency for Petroleum, Gas and Biofuels. As part of the agreement, Sonangol, Angola's state oil company, will receive a 10% equity interest. Changes to the production sharing agreement (PSA) extend operations through 2032. Under the agreement, Esso Angola's interest is 36%, BP's is 24%, ENI's is 18% and Equinor's is 12%.

Anadarko Petroleum and the co-venturers in Mozambique's Offshore Area 1 announced a Final Investment Decision (FID) on the Mozambique LNG project. Prior to the announcement, CCS JV, a joint venture between McDermott, Saipem and Chiyoda, reached full agreement for a contract with the project. CCS JV's project scope includes the onshore engineering, procurement and construction (EPC) for all components of the onshore LNG development, which includes two LNG trains with a total nameplate capacity of 12.88 million tonnes per year, plus the associated utilities and infrastructure. This project involves several Japanese LNG players - Mitsui & Co. as an equity partner, Tokyo Gas, JERA, and Tohoku Electric Power as LNG buyers. The phase 1 development is based on the Area 1 - Golfinho / Atum gas field of 1,600 m under water at 40 km north offshore of the country, calling for a 40 km undersea pipeline connection, two liquefaction trains.

[Europe / Russia]

Gasunie's HyStock green hydrogen plant in Veendam, near Groningen, was opened. This plant is the first step in creating the hydrogen supply chain of the future, which will see green energy converted, stored and transported to customers. The HyStock hydrogen plant converts 1 megawatt of sustainable electricity to green hydrogen. Gasunie's aim is to achieve large-scale and profitable storage of hydrogen in the company's EnergyStock underground gas storage facilities in the near future.

German LNG Terminal GmbH, the joint venture behind the LNG terminal project

in Brunsbüttel, Northern Germany, will start the EPC (Engineering, Procurement and Construction) prequalification process in June 2019. Potential EPC contractors announcing their interest to participate in the project on or before 1st July 2019 will receive a prequalification package. Binding (lump-sum) offers will have to be submitted by pre-qualified bidders between August and October 2019. The winning bidder(s) will be announced during the first quarter of 2020. German LNG Terminal is a joint venture of Dutch companies Vopak and Gasunie as well as German company Oiltanking, part of Marquard & Bahls AG.

The Tornio Manga LNG terminal was inaugurated in Northern Finland. The project was led by Manga LNG Oy, a joint venture between Outokumpu, SSAB, Gasum and EPV Energy. The terminal will supply natural gas to Outokumpu's Tornio steel mill and LNG to local customers. Wärtsilä will serve the terminal under a 10-year maintenance agreement.

Pavilion Energy agreed to purchase the portfolio of LNG assets of Iberdrola. The portfolio comprises about 4 million tonnes per year of Iberdrola's long-term sale and supply LNG contracts. It also includes long-term regasification of approximately 2 million tonnes per year at the Grain LNG terminal, regasification access in Spain and the Spanish-France border pipeline capacity, as well as the time-charter of a newbuild MEGI LNG vessel. The parties concluded a gas sales agreement for Pavilion Energy to supply natural gas in Spain to Iberdrola Generación Espana.

Cyprus concluded a production-sharing agreement for the Aphrodite gas reservoir over 18 years with Noble Energy and its partners. The investment would consist of an extraction platform and a pipeline to Egypt's shores. The first gas is expected between 2020 and 2025.

Gazprom and OMV signed a Memorandum of Understanding (MOU) for cooperation on LNG. The two companies had previously agreed that Gazprom will supply 1.2 billion cubic meters of LNG to OMV in 2020. The partners have now agreed to continue the cooperation beyond 2020.

As Yamal LNG concluded the operational and logistical tests stipulated by the terms of the project's external bank financing, the project can formally commence cash distributions to its shareholders. Meanwhile, NOVATEK announced that Yamal LNG shipped the first cargo of LNG to Japan in accordance with the long-term offtake agreement with TOTAL. The cargo was unloaded at the Tobata LNG Terminal.

NOVATEK, Sinopec and Gazprombank signed Heads of Agreement (HOA) on establishing a joint venture to market LNG and natural gas to end-customers in the People's Republic of China.

NOVATEK agreed with CNOOC and CNPC, as well as with the consortium of Mitsui

& Co and Japan Oil, Gas and Metals National Corporation (JOGMEC) (Japan Arctic LNG B.V. (JAL BV), respectively, in relation to the sale of a 10% participation interest each in the Arctic LNG 2 project. The project's share distribution will be: Novatek 60%, Total 10%, CNPC 10%, CNOOC 10%, and JAL BV 10%.

NOVATEK, China COSCO SHIPPING, Sovcomflot and Silk Road Fund signed an Agreement in respect of the Maritime Arctic Transport LLC (MArT). The parties intend to establish a long-term partnership providing for logistics arrangements for shipping hydrocarbons from the Arctic zone of the Russian Federation to the Asia-Pacific region, as well as organizing transit cargo traffic along the Northern Sea Route between Asia and Western Europe.

A gas-to-gasoline plant was completed in the town of Ovadan-Depe outside the capital Ashgabat, Turkmenistan. The plant will process 1.785 bcm per year of natural gas, producing 600,000 tonnes of gasoline, as well as diesel fuel and LPG. The contract to build the plant was awarded by Turkmengas in August 2014 to Japan's Kawasaki Heavy Industries and Turkey's Rönesans.

[South America]

EXMAR completed commissioning of the Tango FLNG. The first cargo of 25,000 m³ has been offloaded and will be exported out of Argentina. Following the contract signing in November 2018 the unit was delivered to Bahía Blanca in February 2019.

Reference: Company announcements, Reuters, Bangkok Post, Houston Chronicle, NJ Spotlight, Vancouver Sun, Cyprus Mail, Cedigaz News Report.

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