

## LNG Review May 2019 - Recent issues and events -

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### **Introduction**

As of the end of May 2019, the fourth LNG export project in the mainland of the United States - Cameron LNG in Hackberry, Louisiana - has shipped out its first commissioning cargo. Commissioning activities are underway at two other LNG export projects in the United States. In the country, four additional projects have obtained construction and operation approvals from FERC (Federal Energy Regulatory Commission) so far this year and still seven others are waiting for greenlights this year. The country exported 7.56 million tonnes of LNG during the first quarter of 2019, a 52% increase year-on-year.

Spot LNG prices in Northeast Asia were traded in the USD 4 - 5s per million Btu in April and May 2019, maintaining a significant gap against the USD 9s of long-term contract LNG prices of the same delivery period. In contrast with increasing supply availability, Northeast Asia's LNG imports have not shown notable increases, except for those in China so far in the year. Japan imported 27.82 million tonnes of LNG during the four months of the year, a 7.6% decline from a year earlier. Australia exported nearly 25 million tonnes of LNG during the first four months of 2019, a 15% increase year-on-year.

Mozambique came steps closer to sanction its second LNG export project, its first onshore facility, after securing another international joint-purchase commitment from Asian companies and settlements of corporate deals involving key players in the LNG industry.

### **[Asia Pacific]**

JERA concluded a transaction to sell its first LNG cargo to Hokkaido Electric Power in June 2019. JERA provided Hokkaido Electric Power with the flexibility to change the delivered volumes of LNG at short notice from a full cargo to a partial cargo, together with other terms and conditions that support the balancing of the buyer's LNG consumption.

In early May 2019, Pavilion Energy performed the first commercial ship-to-ship LNG bunkering in the Port of Singapore. The operation reloaded 2,000 m<sup>3</sup> of LNG onto a

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\* 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.

small-scale tanker at the newly-modified Secondary Jetty of the Singapore LNG (SLNG) Terminal, followed by a ship-to-ship transfer to the receiving heavy-lift commercial vessel.

Thailand's Energy Policy Administration Committee (Epac) sent back a plan from the Electricity Generating Authority of Thailand (Egat) to import 1.5 million tonnes of LNG.

NOVATEK and the Ninh Thuan Provincial People's Committee signed a Memorandum of Understanding (MOU) to develop an integrated energy-generating project with the use of LNG in Vietnam.

FGen LNG Corporation, a joint venture of the Philippines' First Gen Corporation and Tokyo Gas broke ground on the LNG terminal project. A final investment decision (FID) is expected in late 2019 or early 2020.

According to China's customs statistics, the country's natural gas imports amounted 7.654 million tonnes in April and 31.885 million tonnes, or 16.4% more than a-year-ago figures, during the first four months of 2019. During the four months, LNG imports stood at 19.53 million tonnes, increasing by 23.8% year-on-year.

According to NDRC (National Development and Reform Commission), China's natural gas production and consumption in April 2019 were 14.1 bcm and 24.36 bcm, increasing year-on-year by 9.4% and 12.3%, respectively. During the first four months of the year, China's natural gas production and consumption were 58.3 bcm and 101.26 bcm, increasing year-on-year by 9.69% and 11.80%, respectively.

India imported 1.84 million tonnes of LNG in April 2019, a 9.75% increase year-on-year, according to figures from the Ministry of Petroleum and Natural Gas, reversing the trend of year-on-year declines in the first quarter. The cumulative imports during the first four months of the year stood at 6.47 million tonnes, which were still 6% lower than those in the previous year. GAIL said it signed an initial agreement with ExxonMobil to explore jointly supplying natural gas to power and transportation sector in India.

The floating storage and regasification unit (FSRU) Summit LNG began operations at Summit LNG Terminal located offshore Moheshkhali Island in the Bay of Bengal, Bangladesh. The FSRU completed commissioning of the LNG terminal owned by Summit LNG Terminal, on 29 April 2019.

EnergyAustralia agreed to purchase 15 PJ (0.28 million tonnes) per year of gas from January 2021 from the Port Kembla LNG terminal in New South Wales developed by the Australian Industrial Energy (AIE) joint venture of JERA, Marubeni and Squadron Energy.

Santos signed non-binding memoranda of understanding (MOU) with Brickworks and Weston Energy for the supply of natural gas from the Narrabri Gas Project in NSW. Santos would supply Brickworks with up to 3 PJ (55,125 tonnes) per year seven years from 2025 and Weston Energy with 10 PJ (183,750 tonnes) per year for 10 years, commencing no

earlier than 2023. Santos also has a non-binding Narrabri gas supply agreement in place with Perdaman for a proposed new fertiliser plant at Narrabri.

The Australian Competition and Consumer Commission (ACCC) said it will not oppose Australia Pacific LNG's (APLNG) acquisition of Origin Energy's Ironbark CSG project. In the APLNG's legal challenge against the Queensland government over the amount of royalties it pays, the Supreme Court in Brisbane declared the royalty formula used for the project since 2015 was invalid and sent it back to the government to come up with a new way.

Chevron and partners started the Gorgon Stage Two drilling campaign off the northwest coast of Western Australia. The campaign will drill 11 additional wells in the Gorgon and Jansz-Lo gas fields to maintain long-term natural gas supply to the LNG and domestic gas plants on Barrow Island.

Wood secured a new contract with Chevron Australia to provide subsea integration and flow assurance front-end engineering design (FEED) services for the Jansz-Lo compression project offshore Western Australia. The Jansz-Lo compression project will maintain gas supply to the existing Gorgon LNG facility.

ConocoPhillips awarded the first Engineering, Procurement and Construction (EPC) contract for the Barossa offshore project. Technip Oceania (TFMC) was awarded a contract to supply the Subsea Production System (SPS) and associated SPS installation support. Barossa will provide a new source of gas to the existing Darwin LNG facility when the current offshore gas supply from Bayu-Undan is exhausted. The joint venture includes ConocoPhillips (operator, 37.5%), SK E&S (37.5%) and Santos (25.0%). ConocoPhillips announced that Darwin LNG will invest in a battery project projected to reduce the facility's carbon emissions from power generation by 20%. Darwin LNG will become the world's first LNG plant to install a battery to reduce emissions, providing a template for other LNG facilities, the company claimed.

Petronas started producing LNG at its first floating LNG facility PFLNG Satu again, this time at the Keabangan cluster field, 90 kilometres offshore Sabah. Keabangan is the second location for PFLNG Satu, after the Kanowit field offshore Sarawak.

Indonesia's regulator SKK Migas and Inpex agreed on a framework for the revised plan of development (PoD) of the Masela Block in the Arafura Sea. The Indonesian government is expected to get at least 50% share in the production from the Block.

Santos signed a binding letter of intent (LOI) to acquire a 14.3% interest (pre-government back-in) in Petroleum Retention Licence 3 (PRL 3), which contains the P'nyang natural gas field in Papua New Guinea, from the existing PRL 3 participants. The PRL 3 participants propose to undertake the development of the P'nyang field in coordination with the participants in the PNG LNG Project.

### **[North America]**

Based on data from the Department of Energy (DOE), the United States exported 7.56 million tonnes of LNG during the first quarter of 2019, a 2.56 million tonnes or 52% increase from the year-ago figure. During the period, only two cargoes were exported to China. China is set to increase the tariff on LNG from the United States from 10% to 25% in June.

At the end of May 2019, Cameron LNG announced the first commissioning cargo of LNG departed from the Hackberry, Louisiana, liquefaction-export facility. The project began pipeline feed gas flow to the first liquefaction train in April 2019 and started producing LNG in the middle of May.

Cameron LNG filed a letter with the Federal Energy Regulatory Commission (FERC) requesting a 15-month extension, to 19 September 2020, to complete the LNG plant in Hackberry, Louisiana, and place it into service. Later FERC issued a letter granting the project the extension.

McDermott reiterated the position that the project did not experience any material change in its cost position in the first quarter of 2019. The company's statement comes in response to an announcement by Chiyoda that Chiyoda had recorded an unquantified change in estimate on the Cameron project in the first quarter of 2019, along with charges on other projects.

Sempra Energy and Saudi Aramco respective subsidiaries signed a heads of agreement (HOA), which anticipates the negotiation and finalization of a definitive 20-year LNG sale-and-purchase agreement (SPA) for 5 million tonnes per year of LNG offtake from Phase 1 of the Port Arthur LNG project. It also includes the negotiation and finalization of a 25% equity investment in Phase 1 of Port Arthur LNG.

KBR was selected by Freeport LNG Development as the preferred bidder for the engineering, procurement, construction, and commissioning (EPC) contract for Train 4 at the LNG export facility near Freeport, Texas.

FERC approved the construction of the Train 4 at the Freeport LNG project. This marks the Commission's fourth approval of an LNG export project in 2019, following April's Driftwood and Port Arthur projects and February's Venture Global Calcasieu Pass project. One Commissioner issued a dissenting statement criticizing the majority's decision to approve the project while refusing to assess the significance of the impact of the project's greenhouse gas (GHG) emissions on the environment and neglecting the Commission's duty to explore possible mitigation measures to reduce any significant adverse effects.

The United States Department of Energy (DOE) approved additional exports of LNG from Freeport LNG. Freeport LNG Expansion, L.P. and FLNG Liquefaction 4, LLC

(together, FLEX4) have authority to export up to 0.72 billion cubic feet per day of natural gas as LNG from Train 4. FLEX4 is authorized to export this LNG to any country that does not have a free trade agreement (FTA) with the United States.

Freeport LNG also filed a letter with FERC requesting an 11-month extension of time to enable Freeport LNG to complete construction of the base project and place it in service by no later than 30 June 2020. FERC's 30 July 2014 order authorizing the project set a 5-year deadline, 30 July 2019, to construct the project and make it available for service. And FERC issued a letter granting Freeport LNG the extension.

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.

Golden Pass notified FERC it would start construction of the Golden Pass LNG export plant in Texas on 13 May 2019.

The United States Department of Energy (DOE) signed of two long-term orders authorizing the export of LNG from Tellurian's Driftwood LNG export facility to be built in Calcasieu Parish, Louisiana, and Sempra's Port Arthur LNG export project to be built in Port Arthur, Texas. Driftwood and Port Arthur are authorized to export up to 3.88 and 1.91 billion cubic feet per day (Bcf/d), respectively, to any countries that do not have a free trade agreement (FTA) with the United States. Driftwood and Port Arthur each received authorization to site, construct, and operate their projects from FERC in April 2019.

Tellurian, in its first-quarter 2019 earnings reporting, said it was on track to make a final investment decision (FID) on its Driftwood LNG export project in Louisiana in 2019, start construction in 2019 and begin operations in 2023. Driftwood is designed to produce 27.6 million tonnes per year of LNG. During the first quarter of 2019, Tellurian signed a Heads of Agreement (HOA) with Total for a USD 500 million equity investment in the integrated Driftwood project, for the right to purchase 1 million tonnes per year of LNG and for a 15-year sales and purchase agreement (SPA) with a right to acquire an additional 1.5 million tonnes per year of LNG at Japan Korea Marker (JKM) prices. Tellurian executed a common stock purchase agreement (CSPA) with Total for approximately 19.9 million shares of Tellurian common stock, subject to reaching an FID on the project and other closing conditions; entered into an agreement with an unrelated third-party merchant pursuant to which Tellurian has committed to purchase one cargo of LNG per quarter beginning in June 2020 through October 2022 under delivered ex-ship (DES) terms with the price being based

on the JKM price in effect at the time of purchase; further advanced the sale of LNG and Driftwood Holdings' partnership interests, completing agreements with potential partners including Total and Petronet LNG.

Kathleen Eisbrenner - the founder, chairman and former CEO of NextDecade - died at the age of 58. Eisbrenner is best known for promoting floating storage and regasification units (FSRUs). FSRUs were first commercialised by Exceleerate Energy, a company she founded and led until 2007.

NextDecade signed two contracts with Bechtel Oil, Gas and Chemicals (Bechtel) for the engineering, procurement, and construction (EPC) of the Rio Grande LNG project in Brownsville, Texas, on lump-sum turnkey (LSTK) basis.

Venture Global LNG and Stonepeak Infrastructure Partners executed agreements under which Stonepeak will exclusively provide a USD 1.3 billion equity investment in Venture Global's Calcasieu Pass LNG export facility in Cameron Parish, Louisiana.

In early May 2019, FERC issued the final Environmental Impact Statement (EIS) for Venture Global LNG's 20 million tonne per year Plaquemines LNG facility in Plaquemines Parish, Louisiana.

The Lake Charles LNG project, led by Energy Transfer and Shell, issued an Invitation to Tender (ITT) to consortia to bid for the Engineering, Procurement and Construction (EPC) contract to convert Energy Transfer's existing LNG import facility in Lake Charles, Louisiana to a proposed large-scale LNG export project.

JAX LNG facility in Jacksonville, Florida, opened as the first small-scale LNG facility in the United States with both marine and truck-loading capabilities. The facility was constructed through a joint venture between Pivotal LNG and NorthStar Midstream with the capacity to produce 120,000 gallons of LNG (192 tonnes) per day.

In late March 2019, FERC issued a Draft Environmental Impact Statement (EIS) on the Jordan Cove project. A final FERC decision was expected by January 2020. Pembina decided to limit pre-FID capital investment on non-permitting related activities. Suspending non-permitting related activities will affect the construction schedule and first gas was expected to be delayed up to one year from the previously anticipated date in 2024. However, also in early May, the Oregon Department of Environmental Quality (DEQ) issued a negative decision on Jordan Cove's application for a Water Quality Certification, although the applicant may reapply for the certification.

The New York State Department of Environmental Conservation (DEC) announced the agency's denial of the Water Quality Certification for the Northeast Supply Enhancement (NESE) pipeline project. Williams responded that its team will be evaluating the issue and resubmitting the application.

The California Public Utilities Commission (CPUC) and the Department of Conservation's Division of Oil, Gas, and Geothermal Resources (DOGGR), announced that Blade Energy Partners had completed its independent root cause analysis of the leak at Southern California Gas Company's (SoCalGas) Aliso Canyon Natural Gas Storage Facility that began in October 2015. Among Blade's findings: The leak's direct cause was a rupture of the outer 7-inch well casing due to microbial corrosion from the outside resulting from contact with groundwater.

Washington state governor withdrew support for Puget Sound Energy's proposed small-scale LNG facility at the Port of Tacoma.

BP and ExxonMobil will contribute USD 10 million each to help the Alaska LNG Project get its federal construction authorization, Alaska's Lieutenant Governor said. The Alaska Gasline Development Corporation (AGDC) estimates it will take roughly USD 30 million to complete the EIS FERC is currently drafting. FERC is scheduled to release a draft version of the Alaska LNG Project EIS in June.

Canbriam Energy and Pacific Oil and Gas (PO&G) signed definitive documents for the acquisition by PO&G of all of the issued and outstanding shares of Canbriam. Canbriam's asset base in the Montney currently produces 200 million cubic feet per day of natural gas. The Transaction includes Canbriam's natural gas processing plants and water handling infrastructure in northeast British Columbia to support natural gas export opportunities.

### **[Middle East]**

Following the invitation in April 2019 to Tender Package for Engineering Procurement and Construction (EPC) of the four LNG mega-trains and to tender for the reservation of ship construction capacity, Qatar Petroleum (QP) issued an Invitation to Tender Package for EPC to expand its common lean LNG storage, and the loading and export facilities for its North Field Expansion (NFE) Project. The tender package calls for EPC of three LNG storage tanks; compressors to recover tank and jetty boil off gas; LNG rundown lines from the LNG trains to the LNG storage area; two additional LNG berths with an option for a third LNG berth; and loading and return lines from the LNG berths to the tanks. QP awarded the FEED (Front End Engineering Design) contract for NFE's offshore pipelines and topsides facilities to McDermott Middle East Inc.

### **[Africa]**

Total reached an agreement with Occidental to acquire Anadarko's assets in Africa in the event of a completion of Occidental's bid for Anadarko. The assets to be acquired are: Algeria: 24.5% interest of blocks 404a and 208 in the Berkine basin in which Total already

owns 12.25%; Ghana: 27% interest in the Jubilee field and 19% interest in the TEN fields; Mozambique: 26.5% participating interest and operatorship in Area 1 where a 12.8 million tonne per year LNG project is close to sanction; and South Africa: exploration licences, close to Total's recent Brulpadda discovery. Anadarko's board of directors unanimously determined that the revised acquisition proposal from Occidental is a "Superior Proposal". Anadarko terminated the Chevron Merger Agreement.

The government of Mozambique and Anadarko announced plans for Mozambique LNG to make an announcement of a Final Investment Decision (FID) on 18 June 2019 in Maputo. JERA and CPC Corporation, Taiwan jointly signed a Sale and Purchase Agreement (SPA) with Mozambique LNG1 Company. JERA and CPC will jointly purchase 1.6 million tonnes of LNG per year for the base term of 17 years from the commercial start date. The destination clause in this SPA is in line with the Survey on LNG Trades report released by the Japan Fair Trade Commission in June 2017.

This project involves several Japanese 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 (12.88 million tonne per year capacity in total). The Area is estimated to have 75 Tcf (or equivalent to 1600 million tonnes) of recoverable resources of natural gas. The project obtained the government approval of its phase 1 Plan of Development in February 2018. A joint venture led by Chiyoda Corporation with CB&I (which was merged into McDermott in 2018) and Saipem was selected as the EPC contractor for the development in 2015.

The government of Mozambique approved the development plan for the Rovuma LNG project based on three reservoirs in the Area 4 block offshore Mozambique, two of which straddle the boundary with neighbouring Area 1. Sales and purchase agreements for 100% of the LNG capacity for trains 1 and 2 have been submitted to the government of Mozambique for approval, which together will produce 15.2 million tonnes per year of LNG. The Rovuma LNG project expects to provide up to 17,000 tonnes per year of LPG in Mozambique.

**(Table) LNG Projects in Mozambique**

Project	Project Operator	Capacity	FID	Operation
Coral South FLNG	Eni / ExxonMobil	3.40	2017	2022*
Mozambique LNG	Anadarko	12.88	2019*	2023-2024*
Rovuma LNG	ExxonMobil / Eni	15.20	2019*	2024*

\* = Scheduled



### **[Europe / Russia]**

Grain LNG terminal announced that up to 350 GWh/d (8.3 million tonnes per year) of redelivery capacity, 390,000 m<sup>3</sup> of associated storage and over 100 berthing slots could be made available at the Grain LNG terminal in 2025. The capacity on offer is a combination of new build and existing capacity which comes out of contract in 2025. The expansion will increase the size of the Grain terminal to approximately 1.2 million cubic metres.

The Dutch State Supervision of Mines (SodM) recommended that the production cap at the Groningen natural gas field in the Netherlands be cut to 12 Bcm for Gas Year 2019/20. Production at the field has been capped since the beginning of 2014. The production cap for the current gas year stands at 19.4 Bcm and was due to be reduced to 15.9 Bcm for Gas Year 2019/20, before being phased out completely before 2030.

A consortium of 11 European stakeholders including ArcelorMittal, Axens, IFP Energies nouvelles (IFPEN) and Total, is launching a project to demonstrate an innovative process for capturing CO<sub>2</sub> from industrial activities - the DMX™ project.

Axpo and German LNG Terminal signed a Heads of Agreement (HOA) for a long-term capacity contract for the LNG terminal in Brunsbüttel in northern Germany. German LNG Terminal plans the investment decision by the end of 2019 with initial operations expected by the end of 2022. LNG Terminal Wilhelmshaven GmbH (LTW) investigates market participants' interest in the terminal project in Wilhelmshaven in an Open Season process. Within the next three years, LTW plans to construct an LNG terminal at Germany's only deepwater port location. The nominal send-out capacity will be up to 10 bcm per year.

Uniper sold its stake (48.24%) in the OLT LNG terminal in Italy to Australian fund First State Investments. OLT operates the floating storage and regasification unit FSRU Toscana with a capacity of 3.75 bcm per year.

Gibraltar opened a new LNG regasification terminal that was recently completed by Shell and Gasnor (a 100% Shell-owned subsidiary). Gibraltar is switching from diesel-fuelled power generation to natural gas.

NOVATEK's joint venture Arctic LNG 2 and TechnipFMC signed a contract on engineering, procurement, supply, construction and commissioning of the Arctic LNG 2 facility with annual liquefaction capacity of 19.8 million tonnes per year. The contract terms provide for the launch of the first train of the project in 2023.

Novatek plans a third LNG project in the Yamal region. The Ob LNG will be based on the resources of the Verkhnetiuteyskoye and Zapadno-Seyakhinskoye fields in the central part of the Yamal Peninsula. The new plant will produce up to 4.8 million tonnes per year of LNG and is to come in operation in year 2023. It will be built in Sabetta, near the installations serving the Yamal LNG, exclusively with Russian-made technology.

**[South America]**

Argentina is about to export its first LNG cargo from a new floating facility. YPF is believed to be offering a partial LNG cargo from FLNG Tango off Bahía Blanca, sources said.

BPTT will not have enough natural gas to supply Atlantic LNG's Train One and the plant may have to close down for two years.

**[Global issues]**

Global natural gas demand increased by 4.7% to 3,850 bcm in 2018, the highest growth of gas demand since the post-crisis rebound of 2010, driven by the United States and China. The United States accounted for more than 45% of the global increase in both the consumption and supply of natural gas, according to Cedigaz.

Reference: Company announcements, Bangkok Post, Manila Standard, Bernama, Katadata, Bisnis, Alaska Journal of Commerce, «"КОММЕРСАНТЪ"», Buenos Aires Times, Guardian Trinidad, LNG Industry, Cedigaz News Report.

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