

LNG Review April 2019 - Recent issues and events -

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Introduction

As described in the previous issue of this LNG Review, a number of LNG sales deals were signed in early April 2019. At the same time in the United States where multiple LNG production projects under construction are coming closer to operation, a "second wave" of numerous LNG projects have advanced to next stages in federal regulatory review processes since April. FERC (Federal Energy Regulatory Commission) approved the Driftwood and Port Arthur LNG projects in the month, followed by its approval of the Freeport LNG Train 4 in the middle of May. Final Environmental Impact Statements (EISs) were issued to the Rio Grande LNG, Annova LNG, Gulf LNG Pascagoula, and Eagle LNG Jacksonville projects in April and Venture Global Plaquemines LNG project in May.

The fourth LNG export project in the Gulf of Mexico and East Coast regions in the United States - Cameron LNG - began producing LNG in the middle of May.

Total agreed with Occidental Petroleum to take over Anadarko's African assets, including its LNG project stake in Mozambique after Oxy acquires Anadarko. Anadarko's project in Mozambique is coming closer to an investment decision.

[Asia Pacific]

In early April 2019, JERA and EDF Trading (EDFT) completed the transaction to merge their LNG optimisation and trading activities into JERA Global Markets (JERAGM) (JERA: 66.67%; EDFT: 33.33%). JERA also completed integration into JERA of the existing thermal power generation businesses of its shareholders.

In early May, 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 Hokkaido Electric Power's LNG consumption.

* 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.

In early April, Tokyo Gas executed a heads of agreement (HOA) with Shell Eastern Trading for supply of LNG. A pricing formula based on coal indexation is included.

Keppel Gas completed its first LNG cargo import under Singapore's Spot Import Policy, which allows up to 10% of Singapore's total long term contracted gas supplies to be imported on a spot cargo basis. Pavilion Energy performed the first commercial ship-to-ship LNG bunkering in the Port of Singapore. The operation reloaded 2,000 m³ of LNG onto a 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.

Electricity Generating Authority of Thailand (Egat) is conducting a purchase tender for LNG supply of 0.8 - 1.5 million tonnes per year for eight years.

During the first three months of 2019, China's LNG import amounted to 15 million tonnes, or 20.6% larger than that of one year ago. According to preliminary figures from the customs statistics, the country's natural gas imports amounted to 31.885 million tonnes, or 16.4% more than a-year-ago figures, during the first four months of 2019.

According to preliminary figures from NDRC (China's National Development and Reform Commission), the country's natural gas production and consumption in March 2019 were 15.1 bcm (+9.8% year on year) and 24.37 bcm (+11.5% yoy), respectively. Based on those figures, production and consumption in the first quarter 2019 were 43.8 bcm (+9% yoy) and 78.8 bcm (+14% yoy), respectively.

In early April, Total and Guanghai signed a long-term Sale and Purchase Agreement (SPA) for the supply of 0.7 million tonnes per year of LNG for a period of 10 years. Also in the month, ExxonMobil signed a sales and purchase agreement with Zhejiang Provincial Energy Group. Zhejiang Energy is expected to receive 1 million tonnes per year of LNG over 20 years. ExxonMobil plans to support Zhejiang Energy during the construction and operation of its Wenzhou LNG receiving terminal.

According to India's Ministry of Petroleum and Natural Gas, the country's import of LNG during the first quarter of 2019 was 4.8 million tonnes, decreasing by more than 11% from a year ago. Its natural gas consumption as a whole also decreased by more than 4% during the period.

In late April, the floating storage and regasification unit (FSRU) *Summit LNG* began operations offshore Moheshkhali Island in the Bay of Bengal, Bangladesh. Summit LNG has time chartered the vessel from Excerelate Energy for 15 years and the vessel carried LNG from Qatar. Summit LNG Terminal a company of of Summit Power International (SPI) and Mitsubishi Corporation consortium.

Australia exported 25 million tonnes of LNG during the first four months of 2019, increasing by 15% year on year.

In late April, the NSW (New South Wales, Australia) Government awarded Development Consent to AIE's (Australian Industrial Energy) Port Kembla Gas Terminal (PKGT). The PKGT is on track to deliver first gas to customers in late 2020. In late May, EnergyAustralia agreed to purchase 15 PJ (0.28 million tonnes) per year of gas at an oil-linked price for five years from January 2021 from PKGT.

In early April, the Woodside-operated Pluto LNG Project opened its new LNG Truck Loading Facility. The facility's initial focus is on supplying trucked LNG to mining operations and communities in the Pilbara, Kimberley and elsewhere in WA for power generation. Trucked LNG will also be used to supply coastal marine vessels. Woodside signed a Heads of Agreement (HOA) with ENN Group for the sale of 1 million tonnes per year of LNG from Woodside's portfolio for a period of 10 years, commencing in 2025. The HOA remains conditional upon a final investment decision (FID) on Scarborough.

In early May, 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. The Barossa joint venture participants are ConocoPhillips (operator, 37.5%), SK E&S (37.5%) and Santos (25.0%). The offshore development area encompasses petroleum retention lease NT/RL5 and potential future phased development in the smaller Caldita Field to the south in retention lease NT/RL6.

ConocoPhillips and Shell completed the previously announced transactions to sell their respective 30% and 26.56% stakes in the Greater Sunrise fields to Timor-Leste.

In early April, the PNG LNG Project entered into a mid-term LNG sale and purchase agreement (SPA) with Unipet Singapore, a wholly-owned subsidiary of Sinopec, for 0.45 million tonnes per year over a four-year period, starting in April 2019.

Total, ExxonMobil and Oil Search signed the Gas Agreement with the government of Papua New Guinea defining the fiscal framework for the Papua LNG Project. The gas production will be operated by Total and the LNG plant will be developed in synergy with ExxonMobil-operated PNG LNG project. Total operates the Elk and Antelope onshore fields and is the largest shareholder of the PRL-15 permit with a 31.1% interest, alongside ExxonMobil (28.3%) and Oil Search (17.7%), post the State back-in right of 22.5%. In the middle of May, 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]

According to data from the Department of Energy (DOE), the United States exported 7.56 million tonnes of LNG during the first quarter of 2019, increasing year-on-year by 2.56 million tonnes or 52%. China is set to increase the tariff on LNG from the United States from 10% to 25% starting on 1 June 2019.

According to Spain's CORES (Corporación de Reservas Estratégicas de Productos Petrolíferos), LNG imports into Spain from the United States increased to an all-time high in March 2019, making the United States Spain's top supplier of LNG. Spain received 4.895 TWh (0.3 million tonnes) of LNG from the United States. LNG imports from the United States during the first quarter were 7.096 TWh (0.5 million tonnes), yet smaller than those from those from Nigeria and Trinidad but larger than Qatar.

The Panama Canal welcomed its 6,000th Neopanamax vessel through the Expanded Canal since the inauguration of the Expanded Canal less than three years ago.

Cameron LNG began producing LNG from its first train in May 2019 in Hackberry, Louisiana. FERC (Federal Energy Regulatory Commission) authorized the project to export by vessels the volumes of LNG produced related to commissioning activities. According to McDermott, initial production of LNG from Trains 2 and 3 is scheduled for Q1 of 2020 and Q2 of 2020, respectively. Cameron LNG filed a letter with FERC requesting a 15-month extension, to 19 September 2020, to complete the LNG plant in Hackberry, Louisiana, and place it into service. McDermott reiterated that the project did not experience any material change in its cost position in the first quarter of 2019. On the other hand, Chiyoda Corporation announced downward revisions to its consolidated financial forecast for the fiscal year of March 2019.

McDermott reported that the Freeport LNG project was 93% complete as of the end of the first quarter 2019 and received FERC approval on 18 April to bring in fuel gas for pre-commissioning of the pre-treatment facility. Initial production of LNG from Freeport trains 1, 2 and 3 is expected in Q3 2019, Q4 2019 and Q1 2020, respectively.

Toshiba resolved to terminate the purchase and sales agreement with China's ENN Ecological Holdings for the transfer to ENN of Toshiba America LNG Corporation. Toshiba also reconfirmed its decision to withdraw from all business related to the purchase and sale of LNG in the United States.

In the middle of May, KBR was selected by Freeport LNG Development as the preferred bidder for the engineering, procurement, construction, and commissioning (EPC) contract for Train 4. Then, FERC approved the construction of the Train 4, representing 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.

Kinder Morgan's Elba Liquefaction has not announced initial LNG production yet.

Golden Pass notified FERC it would start construction of the Golden Pass LNG export plant in Texas on 13 May 2019. FERC issued a notice to proceed permitting Golden Pass Products to begin initial site preparation in Jefferson County, Texas.

In April FERC approved the Driftwood LNG and the Port Arthur LNG projects. Driftwood LNG's estimated 27.6 million tonnes of LNG per year capacity would be located in Calcasieu Parish, Louisiana. Port Arthur Liquefaction capacity of an estimated 13.5 million tonnes per year would be located at the site of a previously approved but unbuilt import terminal in Texas. In early May, DOE signed two long-term orders authorizing the export of LNG from Driftwood LNG and Port Arthur LNG. They 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.

Tellurian, in its first-quarter 2019 earnings reporting, said it was on track to make a final investment decision (FID) on its Driftwood LNG project in 2019, start construction in 2019 and begin operations in 2023. During the first quarter of 2019, Tellurian signed a Heads of Agreement (HOA) with Total for a USD 500 million equity investment in the 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.

In early April, NextDecade signed a 20-year sales and purchase agreement (SPA) with Shell for the supply of 2 million tonnes per year of LNG from the Rio Grande LNG project with full destination flexibility with three-quarters of volumes indexed to Brent oil prices. Shell will buy LNG on a free-on-board (FOB) basis starting from commercial operation of the project expected in 2023. NextDecade received bid packages from each of Bechtel and Fluor for lump-sum turnkey (LSTK) EPC contracts for the project. FERC issued the Final Environmental Impact Statement (EIS) for the project, as well as for the associated Rio Bravo

Pipeline. NextDecade anticipates a positive FID on up to three trains (Phase I) of the project by the end of the third quarter of 2019.

In early May, FERC issued the final EIS for Venture Global LNG's 20 million tonne per year Plaquemines LNG facility in Plaquemines Parish, Louisiana. The project remains on track for a final investment decision (FID) and commencement of construction in late 2019 with commercial operations expected in 2023.

Venture Global Delta LNG and Venture Global Delta Express Pipeline (subsidiaries of Venture Global LNG), requested and granted approval from FERC Staff to initiate the National Environmental Policy Act (NEPA) Pre-filing review process for the Delta LNG project, to be located in Plaquemines Parish, Louisiana, and the Delta Express Pipeline. Delta LNG proposes to build, own, and operate a liquefaction facility with a nameplate capacity of 20 million tonnes per year, and peak capacity of up to 24 million tonnes. The liquefaction facility will include eighteen LNG blocks, each with a nameplate capacity of 1.1 million tonnes. Delta LNG will construct the Project in two phases with phase 1 to include nine LNG blocks. Delta LNG plans to begin construction in late 2021, to initiate operation of its LNG blocks sequentially to make its first deliveries of LNG in the fourth quarter of 2023, and to achieve full commercial operations in the fourth quarter of 2024.

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.

In April, Annova LNG received its final Environmental Impact Statement (EIS) from FERC. Annova LNG is a 6 million tonne per year LNG export facility under development at the Port of Brownsville, Texas. Equity owners include Exelon, Black & Veatch and Kiewit Corporation. FERC also released final EIS for the proposed Gulf LNG Liquefaction Project at the existing LNG import terminal in Jackson County, Mississippi and for the Jacksonville Project proposed by Eagle LNG Partners Jacksonville, LLC (Eagle LNG).

In late March 2019 the Federal Energy Regulatory Commission (FERC) issued a Draft Environmental Impact Statement on the Jordan Cove project. A final FERC decision is expected by January 2020. As Pembina decided to limit pre-FID capital investment on non-permitting related activities, first gas is expected to be delayed up to one year from the previously anticipated date in 2024. The company says it has executed non-binding offtake agreements in excess of the planned design capacity of 7.5 million tonnes per year. However in early May, the Oregon Department of Environmental Quality (DEQ) issued a decision on Jordan Cove's application for a Water Quality Certification to deny the requested certification at this time. The applicant may reapply for the certification and submit additional

information that could result in a different decision.

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

Table: Selected LNG project advancing regulatory process in the United States

Sponsor	Project	Capacity	Operation	FERC Decision	EIS (EA)
Freeport	Freeport (T4)	5	2022	2019/5/16	2018/11/2
Tellurian	Driftwood	27.6	2023	2019/4/18	2019/1/18
Sempra Energy	Port Arthur	13.5	2023	2019/4/18	2019/1/31
Venture Global	Calcasieu Pass	10	2022	2019/2/22	2018/10/22
Venture Global	Plaquemines	20	2023	2019/8/1	2019/5/3
Cheniere	Corpus Christi (Stage 3)	11.45	2022	2019/6/27	2019/3/29
Texas LNG	Brownsville	4	2023	2019/6/13	2019/3/15
Kinder Morgan	Gulf LNG Pascagoula	11.5	2024	2019/7/16	2019/4/17
Exelon	Annova LNG	6	2024	2019/7/18	2019/4/19
NextDecade	Rio Grande	27	2023	2019/7/25	2019/4/26
Eagle LNG	Jacksonville	1	2021	2019/7/11	2019/4/15

(Note) Capacity = million tonnes per year. Shaded dates indicate schedules.

(Source) Compiled by the authors based on information from FERC.

In early April, JERA entered into a Heads of Agreement (HOA) with Diamond Gas International for the sale and purchase of LNG from LNG Canada Project for the purchase of up to 16 cargoes of LNG a year on a delivered ex-ship condition for approximately 15 years beginning in fiscal 2024.

Also in early April, Chevron and Woodside applied for a new license from Canada's National Energy Board (NEB) for their Kitimat LNG plant in northern British Columbia with capacity nearly doubling to 18 million tonnes per year from up to three LNG trains.

[Middle East]

Qatar Petroleum (QP) issued the Invitation to Tender Package for Engineering Procurement and Construction (EPC) of the four LNG mega-trains of its North Field Expansion (NFE) project. The package has been issued to three EPC Joint Ventures: Chiyoda and Technip; JGC and Hyundai Engineering and Construction; and Saipem, McDermott and CTCI. QP also issued an invitation to tender for the reservation of ship construction capacity required for the LNG carrier fleet for NFE. In addition to NFE, the tender covers shipping requirements for the LNG volumes that will be offtaken by Ocean LNG (a 70%/30% joint venture between QP and ExxonMobil) from the Golden Pass LNG export project in the United States. The tender also includes options for replacement requirements for Qatar's existing LNG fleet. In early May, QP issued an Invitation to Tender Package for EPC to expand its common lean LNG storage, and the loading and export facilities for NFE Project.

Total and the Ministry of Oil and Gas of Oman signed a Heads of Agreement (HoA) for the award to Total of an exploration license on Block 12 in Central Oman.

[Africa]

Algeria's SONATRACH and Italy's Eni signed a Memorandum of Understanding (MoU) to confirm their willingness to come soon to the renewal of the gas supply contract and the transportation arrangements through the pipeline crossing the Mediterranean Sea for the forthcoming years.

Noble Energy approved the Alen natural gas development offshore Equatorial Guinea. Natural gas from the Alen field will be processed through the existing Alba Plant LLC liquefied petroleum gas processing plant (Alba Plant) and EG LNG production facility located at Punta Europa, Bioko Island. Noble Energy and partners will maintain ownership of the hydrocarbons through the processing facilities, and the Company will be progressing negotiations for offtake agreements to sell the LNG in global markets.

In early May, 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 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 planned; and South Africa: exploration licences, close to Total's Brulpadda discovery. Anadarko's board of directors determined that the revised acquisition proposal from Occidental constitutes a "Superior Proposal" as defined in Anadarko's merger agreement with Chevron. Anadarko announced plans for Mozambique LNG to make an announcement of a final investment decision (FID) on 18 June.

JERA and CPC jointly signed a Sale and Purchase Agreement (SPA) with Mozambique LNG1 Company to jointly purchase 1.6 million tonnes per year of LNG for 17 years from the commercial start date.

The government of Mozambique approved the development plan for the Rovuma LNG project, which will produce LNG from three reservoirs located in the Area 4 block offshore Mozambique, two of which straddle the boundary with 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. The trains will produce more than 15 million tonnes per year of LNG. The project expects to provide up to 17,000 tonnes of LPG per year from Area 4 resources. The partners also plan to distribute up to 5,000 LPG burners and cooking stoves in the Afungi area to replace the burning of wood.

[Europe / Russia]

In early May, the Grain LNG terminal in the United Kingdom announced that up to

350 GWh/d (8.3 million tonnes per year) of redelivery capacity, 390,000 m³ of associated storage and over 100 berthing slots could be made available at the terminal in 2025. The capacity on offer is a combination of new build and existing capacity which comes out of contract in 2025.

On 7 March 2019, the Gate terminal in the Netherlands announced the details of an open season regarding the 1 BCM per year of available capacity and the 2 BCM per year of additional capacity. Gate terminal signed several confidentiality agreements and received several expressions of interest from market parties. However, no contracts were signed by the deadline of 19 April. As a result, none of the above capacity has been allocated yet. Gate terminal will, however, continue offering the capacity to the market but now on a first-come-first-served basis both for the 1 BCM per year of available capacity and the 2 BCM per year of additional capacity (subject to FID). The procedure also remains open to parties not yet having signed a confidentiality agreement and/or an expression of interest.

In early May, 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. In spring, German LNG Terminal will apply for the required permit for the terminal. The investment decision is scheduled for the end of 2019 with initial operations expected by the end of 2022. Also in the middle of May, LNG Terminal Wilhelmshaven GmbH (LTW) investigates market participants' interest in the LNG terminal project in Wilhelmshaven in an Open Season process. The conclusion of binding contracts is currently planned for the middle of October 2019.

In early May, 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.

Shell stopped its involvement in the Baltic LNG project in the area of Ust-Luga seaport in Russia on the Baltic Sea.

Russia's NOVATEK signed Heads of Agreements (HOAs) for the supply of LNG with Repsol and Vitol, respectively. NOVATEK also signed a binding agreement each with CNOOC and China National Oil and Gas Exploration and Development Company (CNODC), a wholly owned subsidiary of China National Petroleum Corporation (CNPC), on the acquisition by the two Chinese companies of a 10% participation interest each in the Arctic LNG 2 project. In the middle of May TechnipFMC signed a contract on EPC of the facility. The contract terms provide for the launch of the first train of the project in 2023. NOVATEK's joint venture with Gazprombank Cryogas-Vysotsk commenced full-scale production of LNG.

Gazprom said it plans to construct seven production wells at Kovyktinskoye before the end of 2019. Natural gas from the field will start flowing into the Power of Siberia gas

pipeline in late 2022. Gazprom is considering an option to build a small-scale LNG production facility at the field.

[South America]

In April 2019, an ENGIE's consortium with la Caisse de dépôt et placement du Québec (CDPQ) won the bidding process conducted by Petrobras for the sale of a 90% shareholding in Transportadora Asociada de Gás S.A. (TAG), the largest natural gas transmission network owner in Brazil.

In May, Argentina is about to export its first LNG cargo from a new floating facility, FLNG Tango off Bahía Blanca.

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