

LNG Review September 2018
- Recent issues and events -
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Introduction

In early October 2018, LNG Canada announced its positive final investment decision (FID) in two LNG processing trains in British Columbia with first LNG expected before the middle of the next decade. Prime Minister of Canada said that LNG Canada represents the single largest private sector investment project in Canadian history. LNG Canada also represents the first major greenfield development to take an FID since Russia's Yamal LNG in December 2013. Each partner will be responsible to provide its own natural gas supply and will individually market its share of LNG. LNG Canada claims that the export plant has been designed to achieve the lowest carbon intensity of any large-scale LNG plant operating in the world. It also claims that LNG Canada is advantaged by access to abundant, low-cost natural gas from British Columbia's vast reserves and the relatively short shipping distance to North Asia.

Asian LNG spot prices continued being in the highest range in four years in August 2018, partly because of expected higher oil-linked contract prices and partly because of steady growth of demand in Asian countries.

According to the two countries' custom statistics, during the first eight months of 2018, China imported 57.18 million tonnes of natural gas (including pipeline gas supply and LNG), a 35% increase over the same period in 2017, surpassing 56.44 million tonnes or a 1.4% decrease by Japan as the largest importer of natural gas in the world. Japan's average import price in August 2018 was more than USD 10 for the first time since April 2015.

This paper looks at some of major events in the LNG industry in September 2018.

[Asia Pacific]

JERA, JXTG, and TEPCO Fuel & Power (TEPCO FP) signed a Memorandum of Understanding (MOU) regarding the joint development to replace the Goi Thermal Power Station.

* 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.

Electric Power Development (J-POWER) and ENGIE signed a Memorandum of Understanding (MOU) to a non-exclusive collaboration for power projects, particularly in large scale commercial offshore wind projects.

Japan's chemical group Asahi Kasei decided to replace its third coal-fired power generation plant (built in 1971 with 34 MW capacity) in the Nobeoka industrial district in Miyazaki Prefecture with a gas-fired one to be operational in 2022. Miyazaki Gas (51%), Osaka Gas (34%), Kyushu Electric Power (7%) and Nihon Gas (7%), along with Asahi Kasei (1%), plan to establish the Himuka LNG company to set up LNG receiving facilities and pipeline infrastructure.

Thailand's EGAT invites international market producers and businesses capable of LNG procurement for EGAT to submit a Request for Expression of Interest (REOI). It is expected to start importing gas by 2019.

China's natural gas imports (pipeline gas and LNG combined) were 7.769 million tonnes, the third highest monthly tally after 7.89 million tonnes in December 2017 and 7.77 million tonnes in January 2018. According to NDRC (National Development and Reform Commission), China's natural gas production and consumption in August 2018 were 12.9 bcm and 23.32 bcm, year-on-year increases by 9.7% and 21.3%, respectively.

ExxonMobil signed a preliminary deal to build a petrochemical complex and invest in an LNG terminal in the coastal city of Huizhou in China.

CNOOC (China National Offshore Oil Corporation) sold access to its Yuedong LNG terminal to state-owned Zhenhua Oil and private logistics firm Longkou Shengtong Energy through its first such auction at Shanghai Petroleum and Gas Exchange. Zhenhua Oil plans to import LNG to Yuedong in late October 2018.

At Mundra, India's Prime Minister inaugurated an LNG terminal promoted by GSPC LNG, a subsidiary of Gujarat State Petroleum Corporation (GSPC), in a joint venture with Adani group. The project is the third LNG regasification terminal in the state.

In early October 2018, ACCC (Australian Competition and Consumer Commission) started publication of LNG netback prices in order to boost transparency.

McDermott International completed the second phase (installation) of the Greater Western Flank project. The project was awarded by Woodside in January 2016. The Greater Western Flank Phase 2 fields lie approximately 40 to 60 kilometers southwest of the Goodwyn A Platform, located off the northwest coast of western Australia. The project is expected to achieve first gas by the end of 2018.

Woodside Energy Trading Singapore signed a Heads of Agreement (HOA) with Uniper Global Commodities for the supply of up to 0.6 million tonnes per year of LNG over four years from 2019. The LNG would be supplied from Woodside's portfolio sources to

markets in Europe and Asia.

The INPEX-operated Ichthys LNG project recently commenced shipment of condensate from the Floating Production, Storage and Offloading (FPSO) facility "Ichthys Venturer." The project is scheduled to commence the shipment of LNG and LPG in sequence within the quarter of October - December 2018.

ConocoPhillips entered into an agreement to sell to the government of Timor-Leste its 30% interest in the Greater Sunrise Fields.

[North America]

China announced a 10% tariff on American goods, including LNG, in retaliation for a levy imposed by the United States.

Dry natural gas production in the United States is forecast to average 81.0 Bcf/d in 2018 (615 million tonnes), up by 7.4 Bcf/d from 2017 and establishing a new record high, and continue rising in 2019 to an average of 84.7 Bcf/d (643 million tonnes), according to the Energy Information Administration's (EIA) Short Term Energy Outlook (STEO). The United States likely surpassed Russia and Saudi Arabia to become the world's largest crude oil producer earlier in 2018, based on preliminary estimates in STEO.

The Federal Energy Regulatory Commission (FERC) issued a letter order permitting the introduction of feed gas for the commissioning of Train 5 at Sabine Pass LNG's liquefaction and export facility at Cameron Parish, Louisiana.

Cheniere Marketing entered into an LNG sale and purchase agreement (SPA) with Vitol, who agreed to purchase approximately 0.7 million tonnes per year from Cheniere Marketing on a free on board basis for 15 years beginning in 2018.

Williams reported that the Atlantic Sunrise pipeline project achieved mechanical completion and 1.7 Bcf/d of capacity is ready to be placed in service pending final approval from FERC. The expansion of the existing Transco pipeline will connect Marcellus gas supplies with markets in the Mid-Atlantic, including the Cove Point LNG facility.

Freeport LNG and Sumitomo Corporation entered into a binding Heads of Agreement (HOA) for 2.2 million tonnes per year of LNG. Sumitomo agreed to negotiate for a 20-year liquefaction tolling agreement (LTA), expected to start in 2023 upon the commencement of commercial operations of the fourth train (Train 4).

Tellurian received its draft environmental impact statement (EIS) from FERC for the Driftwood LNG facility and the associated Driftwood pipeline.

NextDecade and McDermott International agreed not to sign a lump-sum turnkey (LSTK) EPC contract for the construction of Rio Grande LNG by the end of 2Q 2018. McDermott will have to secure a joint venture partner in order to execute and financially

guarantee an LNG project of RGLNG's size and scope. To maintain RGLNG's projected commercial operations date, as early as 2023, NextDecade has launched a competitive EPC bid process. This process will provide NextDecade with front-end engineering and design (FEED) verification and a final LSTK EPC contract based on the existing RGLNG FEED, which was completed in late 2017 by McDermott.

Venture Global LNG entered into a 20-year agreement (SPA) to supply Repsol with 1 million tonnes per year of LNG from the proposed Calcasieu Pass LNG export facility in Cameron Parish, Louisiana. Repsol will purchase the LNG on a free on board (FOB) basis beginning upon commercial operation of the export facility, expected in 2022.

FERC issued the Notice of Schedule for Environmental Review (SER) to Texas LNG Brownsville setting the anticipated dates for issuance of its Final Environmental Impact Statement (FEIS) and Federal Authorization Decision Deadline. Texas LNG expects to receive its Final FERC Order authorizing construction and operation of its facility in the second half of 2019.

Enable Midstream Partners announced the development of the Gulf Run Pipeline, an interstate natural gas transportation project. The Gulf Run Pipeline project is designed to connect natural gas supplies to LNG export markets on the Gulf Coast.

Philadelphia Gas Works (PGW) submitted its proposal of Public Private Partnership (P3) project with Passyunk Energy Center (PEC) to the Philadelphia Gas Commission (PGC) for review. PEC will build new liquefaction and truck loading facilities and will market and sell LNG, while PGW will operate the LNG facilities and sell related services to PEC.

ExxonMobil and Alaska Gasline Development Corporation (AGDC) agreed to certain key terms in a Gas Sales Precedent Agreement, to purchase ExxonMobil's share of gas from the Prudhoe Bay and Point Thomson units. ExxonMobil operates the Point Thomson field where the company has a 62.75% share. ExxonMobil also has a 36.4% share of the nearby Prudhoe Bay field. AGDC, Sinopec, CIC Capital, and Bank of China, signed an agreement supplementing the Joint Development Agreement that was signed in November 2017. The supplemental agreement reaffirms the parties' intent to conclude definitive agreements by December 2018.

LNG Canada announced that its joint venture participants - Shell, PETRONAS, PetroChina, Mitsubishi Corporation and KOGAS - have taken a Final Investment Decision (FID) to build the LNG Canada export facility in Kitimat, British Columbia. Each joint venture participant will be responsible to provide its own natural gas supply and will individually offtake and market its share of LNG. The FID is for two processing trains with first LNG expected before the middle of the next decade. LNG Canada claims that the export plant has been designed to achieve the lowest carbon intensity of any large-scale LNG plant

operating in the world, achieving this through a combination of using renewable hydropower from BC Hydro and highly-efficient gas turbine engines.

TransCanada announced that it will proceed with the Coastal GasLink project, a 670-km pipeline designed to transport natural gas from the Montney gas-producing region near Dawson Creek, B.C. to the LNG Canada facility, with a planned in-service date in 2023. The project is underpinned by 25-year transportation service agreements with the LNG Canada partners. TransCanada was selected in 2012 as LNG Canada's pipeline partner of choice to design, build, own and operate the pipeline system.

Pacific Oil & Gas Limited announced that its subsidiary Woodfibre LNG Export had signed a Heads of Agreement (HOA) with CNOOC Gas and Power for the potential purchase of 0.75 million tonnes per year of LNG for 13 years starting in 2023.

Mexico Pacific Limited (MPL), a joint venture between Aecom and Texas company DKRW, is authorized by the Department of Energy of the United States (DOE) to export natural gas to Mexico by pipeline for purposes of end use in Mexico, and to re-export the natural gas, after liquefaction in Mexico, to FTA countries, in a total combined volume of 621 bcf (13 million tonnes) per year of natural gas. The liquefaction project will be located in the northern state of Sonora. MPL announced that TechnipFMC had been awarded a Pre-FEED contract for its liquefaction project. MPL claimed that the project is positioned for FID in the second half of 2019, as MPL is negotiating contracts with LNG buyers.

[Middle East]

Teekay LNG's first Floating Storage Unit (FSU) was delivered to charterer Bahrain LNG. The vessel will be used to support Bahrain LNG in providing an LNG receiving and regasification terminal in Bahrain. The project is 30% owned by Teekay LNG Partners (TGP) and is expected to commence commercial operation in early 2019.

ADNOC LNG, a subsidiary of the Abu Dhabi National Oil Company (ADNOC), signed the Engineering, Procurement and Construction (EPC) contract for the second phase of the Integrated Gas Development Expansion (IGD-E) project with a consortium of Spain's Tecnicas Reunidas and Abu Dhabi's Target Engineering Construction Company. The second phase of the IGD-E project will take 54 months to complete. It will add 245 million cubic feet per day of associated gas to the 1.4 billion cubic feet per day of offshore gas sent from Das Island to ADNOC Gas Processing's Habshan gas facilities for use in power generation.

Qatargas announced a long-term Sale and Purchase Agreement (SPA) with PetroChina, to supply China with around 3.4 million tonnes per year of LNG. Under the 22-year SPA until 2040, Qatargas will supply LNG from the Qatargas 2 project, a joint venture between Qatar Petroleum (QP), ExxonMobil and Total.

Qatar Petroleum (QP) decided to increase the capacity of Qatar's LNG expansion project, by adding a fourth liquefaction train. Qatar's LNG production capacity will reach 110 million tonnes per year. The North Field Expansion Project is well underway with various activities currently ongoing, including the Front End Engineering and Design (FEED) of the onshore facilities being executed by Chiyoda Corporation.

Enagás and Reganosa signed an agreement to jointly take part in the bidding process for O&M services of the Al-Zour regasification terminal in Kuwait for seven years. The terminal is under construction and the starting of operation is foreseen by 2021.

[Africa]

Unión Fenosa Gas, 50% owned by Naturgy UFG, owner of the Egyptian Damietta plant, was rendered a favourable award by the International Centre for Settlement of Investment Disputes (ICSID), an institution within the World Bank Group, thus resolving the claim presented in 2014 against the Arab Republic of Egypt due to a lack of supply to UFG's liquefaction facilities in Damietta.

Ghana's Tema LNG terminal project, backed by private equity firm Helios Investment, signed deals with China Harbour Engineering Company to build onshore facilities and Jiangnan Shipyard for a floating storage and regasification unit (FSRU).

[Europe / Russia]

Total announces a major gas discovery on the Glendronach prospect, located offshore United Kingdom West of Shetland. Preliminary tests estimated recoverable resources at 1 tcf. The discovery can be developed quickly with the existing infrastructure around the Edradour field and the Laggan-Tormore facilities of the Shetland Gas Plant.

Danish firm Ørsted unveils the Walney Extension project, the wind farm with a total capacity of 659 MW, overtaking the London Array off England's east coast of 630 MW. Britain hosts 36% of globally installed offshore wind capacity, making it the world's largest offshore wind market.

Shell recently delivered its first ship-to-ship bunkering of LNG from its specialised LNG bunker vessel, Cardissa in the Port of Rotterdam. It fuelled the Sovcomflot vessel Gagarin Prospect, the world's first LNG-powered Aframax tanker.

RWE and German LNG Terminal GmbH, the joint venture driving forward Germany's first LNG terminal in Brunsbüttel in Northern Germany, reached an agreement (HOA) for a considerable part of the terminal's capacity on a long-term basis. The final investment decision (FID) is envisaged for late 2019 with the terminal being fully operational by the end of 2022.

The Biogas Upgrading and Liquefaction Plant was installed at the Skogn Papermill, Norway. The plant, which will upgrade up to 3,000 m³/h of raw biogas to Renewable Natural Gas, will be part of the largest biogas liquefaction plant in the Nordic Countries. The plant will convert the cleaned biogas from fishery waste and residual paper mill slurry into liquid bioLNG fuel. Puregas Solutions is a Swedish based company recently acquired by Wärtsilä.

Skangas entered an agreement with Prima Protein for onland delivery of LNG for six years to the Prima Protein factory in Egersund. The construction of the new LNG customer terminal at the protein factory is underway. Skangas produces LNG at its Tananger plant. Skangas and Metsä Tissue Corporation also entered into an agreement to supply LNG to the Mänttä tissue paper mill in Mänttä, Finland. LNG will be delivered to the Mänttä mill by road tanker from the Skangas Pori LNG terminal.

Stolt-Nielsen, Golar LNG and Höegh LNG announced a joint investment commitment in Avenir LNG. Avenir LNG was formed by Stolt-Nielsen in 2017. With this joint investment, Stolt-Nielsen will consolidate all its LNG activities into Avenir, including four LNG new buildings on order at Keppel Singmarine in Nantong, China and the joint-venture LNG terminal and distribution facility to be constructed in Oristano, Sardinia.

A ground-breaking ceremony for the new Hamina LNG terminal to be engineered, procured and constructed by Wärtsilä and to be operational in 2020 was held. The terminal will provide 30,000 m³ capacity storage, regasification, truck-loading, as well as the possibility to supply bunkering barges and small-scale carriers. Wärtsilä Development and Financial Services (WDFS) has a minority investment in Hamina LNG Oy, the main shareholders of whom are Hamina Energy Ltd and Estonian energy company Alexela.

Spain's Enagás and the Belgium's Fluxys agreed to sell jointly and in equal parts to FS Gas Transport AB, an indirectly wholly owned subsidiary of First State Investments managed European Diversified Infrastructure Fund II (First State), their total stake in the Swedish company Swedegas. Swedegas owns Sweden's entire high-pressure gas pipeline network and is operator of the Swedish Gas System. It was acquired by Enagás and Fluxys in March 2015, each with a 50% share in the company.

Spain's CNMC (National Commission of Markets and Competition) approved the public consultation document in which it proposes a new regulation of the services provided at the LNG receiving terminals. Comments will be accepted until 31 October 2018.

Russian oil output reached 11.36 million barrels per day (bpd) in September 2018, the highest after the Soviet Union era, Energy Ministry data showed. Russian natural gas production in September 2018 was 57.54 billion cubic metres (bcm), 7.2% higher than one year earlier.

A third and final gas production facility of Gazprom's Bovanenkovskoye field is

coming onstream in the Yamal Peninsula, with commissioning scheduled to take place in 2018. In addition, it was decided to start the full-scale pre-development of Kharasaveyskoye, another large field in Yamal, in 2019. Offshore pipelaying of the Nord Stream 2 gas pipeline commenced in the exclusive economic zone of Finland. A working meeting between Gazprom and Mitsui & Co. took place at the 4th Eastern Economic Forum in Vladivostok. Gazprom and Mitsui signed a Memorandum of Understanding on the Baltic LNG project.

Yamal LNG announced that the 68th cargo offloaded from the Yamal LNG project onto the Arc7 ice-class tanker "Christophe de Margerie" topped 5 million tonnes of LNG produced since the start-up of LNG train #1 in December 2017.

Japan Oil, Gas and Metals National Corporation (JOGMEC) and Russia's NOVATEK signed a Memorandum of Understanding (MOU) for the cooperation in the upstream and liquefaction business. NOVATEK, the Ministry of the Russian Federation for the Development of the Far East and the Government of the Kamchatka Territory signed an agreement of intent on implementing a project for the construction of a marine LNG transshipment complex in Kamchatka.

Gazprom said a total of 2,010 km of pipes, representing 93% of the pipeline length, are already welded and laid for the Power of Siberia gas pipeline between Yakutia and the Russian-Chinese border. Power of Siberia's two-string submerged crossing under the Amur River is 78% complete. Before the end of 2018, Gazprom also intends to launch the project for the expansion of the Sakhalin - Khabarovsk - Vladivostok gas pipeline within the section from Komsomolsk-on-Amur to Khabarovsk.

[South America]

The Panama Canal accommodated transit of four LNG ships in a single day through the Neopanamax Locks, breaking the record on 17 April 2018 of three LNG vessels transiting through the waterway on the same day.

Excelerate Energy and Transportadora de Gas del Sur S.A. (TGS) announced the execution of a Memorandum of Understanding (MOU) to jointly collaborate on the assessment of a liquefaction project in the city of Bahía Blanca, Argentina. The project aims at studying the viability of liquefying and exporting natural gas during the summer season. The study is expected to be completed by the end of 2018.

Reference: Company and agency announcements, Reuters, Cedigaz News Report.

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