

LNG Review June 2017 - Recent issues and events - Hiroshi Hashimoto*

Introduction

At the beginning of June 2017, a final investment decision (FID) on a major LNG production project is made for the first time in the year in the world. The Coral Floating LNG in Mozambique will be the first major LNG production project in East Africa and underpinned by a portfolio player's commitment to offtake all production.

There were two significant policy initiatives in June - one each in the largest LNG importing country and in the largest LNG exporting country respectively in the Asia Pacific region. Japan's Fair Trade Commission released its findings in the investigation into the nation's LNG import contracts focusing on the industry's decades-long practice of restricting destinations of LNG cargoes. Australia's federal government revealed details on the proposed tentative LNG export licensing regime in response to potential shortage of gas supply in the domestic gas market. Both governmental initiatives are expected to have some important implications on the dynamic LNG market in the region at least for the next five years. While they are both unprecedented moves by the government, they both indicate they prefer commercial solutions.

In the Middle East Qatar was severed its diplomatic tie with some other regional powers. So far the impact on LNG trades has been limited but the situation should continue being paid attention to.

Northeast Asia's LNG imports continued its growth in May 2017, largely pushed by increasing LNG supply. Japan, Korea, China and Chinese Taipei in total imported 13.10 million tonnes in the month, 24.8% more than the same month a year ago, resulting in cumulative imports of 72.61 million tonnes for the first five months of the year, a nearly 14% increase compared to the same period in 2016.

Throughout the month of June, spot LNG prices in the Northeast Asian market stayed around USD 5.5 per million Btu, reflecting the softer sentiment in the market. In fact the prices have been in the range for three months.

This paper provides some of the important issues in the LNG industry in the month of June 2017 and the author's interpretation of them.

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[Asia Pacific]

Japan imported 37.05 million tonnes of LNG during the first five months of 2017, 6.7% more than the same period one year ago, according to the customs statistics. The average price for May 2017 edged higher at USD 8.58 per million Btu. The weighted average price for LNG imports for the first five months of 2017 was USD 7.89, compared to USD 6.89 in the first half of the preceding year, reflecting the higher crude oil prices in the period.

Japan's Fair Trade Commission ruled in its report of the investigation into the nation's LNG import contracts that destination clauses may violate the country's competition law. The decision is likely to lead to more trading of cargoes, by excluding such clauses in new and renewed contracts and effectively disabling ones in existing contracts.

Kyushu Electric Power and NYK agreed to partner in LNG transport. The agreement will allow Kyushu Electric Power to consider using ships in the NYK fleet for short-term demands of LNG transport. The two companies will also consider the feasibility of cooperation in LNG bunkering. In a separate decision, NYK assigned its LNG vessel Grace Barleria to a charter contract for Kyushu Electric Power from June 2017. The vessel will principally transport LNG from the Wheatstone LNG project in Australia.

S&P Global Platts is seeking feedback on its proposal to increase the specifics of both the quality and location of Platts JKM™. Platts proposes to normalize JKM™ to a gross heating value, or GHV, of 1,075 Btu/scf and to normalize JKM™ to delivery Tokyo Bay. Platts is proposing to implement both of these changes from 18 September 2017. The two items proposed are thought to be an attempt to further clarify the pricing methodology.

Korea Gas Corporation (Kogas) continues expanding LNG infrastructure and being active in LNG commercial activities. The company started the operation of three 270,000 kl LNG storage tanks in Samcheok. The Samcheok LNG terminal currently operates nine 200,000 kl tanks. Kogas is expected to receive its first LNG cargo under a long-term supply deal with Cheniere Energy around the beginning of July 2017 at the Tongyeong LNG terminal. Korea's oldest nuclear reactor, Korea Hydro & Nuclear Power's (KHNP) Kori No. 1, stopped operations on Sunday 18 June 2017, becoming the country's first nuclear plant to close permanently. This development may have some impact on the country's LNG demand in the future.

In Southeast Asia, both existing and emerging LNG importers are expanding their LNG related activities. In Singapore, Singapore LNG Corporation (SLNG) carried out its first small scale LNG reloading at its Jurong Island LNG terminal from 18 to 20 June 2017 for the newly built, 6,500m³, Cardissa, an LNG bunker vessel owned by Shell. Thailand' PTT and its exploration unit PTTEP established the PTT Global LNG Limited to support

their business throughout the LNG value chain. In the Philippines, construction of an LNG receiving terminal could be completed by 2020, Energy Secretary Alfonso Cusi said in a presentation to an industry forum in early June 2017.

According to the NDRC (National Development and Reform Commission, China), China in May 2017 produced, imported, and consumed 11.9 bcm, 7.2 bcm, and 16 bcm of natural gas, 14.7%, 49.5% and 18.5% respectively more than the same month in 2016. During the first five months of 2017, China's cumulative gas production, imports, and consumption were 62.6 bcm, 34.4 bcm, and 96.7 bcm respectively, which were 8.6%, 15.6% and 13.2% larger year on year respectively. According to the customs statistics of the country, China imported 2.91 million tonnes of LNG in May 2017. Cumulative imports of LNG during the first five months of 2017 were 12.88 million tonnes, 38% larger than the same period in 2016. On the contrary, pipeline gas imports in the same period decreased.

While existing importers are increasing LNG imports in China, more new players are also emerging. Guanghai Energy's Qidong LNG terminal in Jiangsu received its first LNG cargo in early June. Guanghai Energy and Zhejiang Energy signed a Memorandum of Understanding (MOU) on strategic cooperation in LNG, coalbed methane, gas and oil projects in Kazakhstan.

China is also developing domestic gas resources. As of 21 June 2017, gas has been produced at the South China Sea Gas hydrate trial-production platform for 42 days. The cumulative gas production surpassed 235,000 cubic meters, according to a brief from China's Ministry of Land and Resources.

In India, BP and Reliance Industries Limited (RIL) are expected to award contracts to progress development of the 'R-Series' deep water gas fields in Block KG-D6 off the east coast of India. The project is expected to produce up to 12 million cubic metres of gas a day, coming on stream in 2020. Starting from this one, development of the three projects in total is expected to bring a total 30 - 35 million cubic metres per day new domestic gas production onstream, phased over 2020 - 2022. Before making the announcement of investment plans, the two companies dropped the arbitration against the government on the gas price which their joint venture was getting from the producing fields (D1 and D3) of the block.

Pakistan is increasing imports of LNG and advancing additional infrastructure plans to support imports. But Pakistan's government has postponed shipments of LNG to its second terminal, as infrastructure building has been delayed.

Bangladesh's Petrobangla is advancing plans of LNG imports. The company is asking expressions of interest by July 2017 to supply LNG on a spot basis. Petrobangla also signed a memorandum of understanding (MOU) with AOT Energy in the middle of June to

supply LNG on a long-term basis. Bangladesh also reportedly finalised a government-to-government negotiation with Qatar's RasGas to import around 2.5 million tonnes per year of LNG for over 15 years, starting in early 2018. Bangladesh's first LNG import terminal, a floating storage and regasification unit (FSRU) provided by Exceleerate Energy, is expected to be in place by April 2018. The second FSRU is developed by Summit Group expected in 2018. Petrobangla is also planning to set up two onshore LNG terminals. Petrobangla signed an MoU with India's Petronet LNG in December 2016 to build one on Kutubdia Island, and issued an international tender in April 2017 for construction of the second one.

In Australia, the federal government released a detailed draft of Australian Domestic Gas Security Mechanism (ADGSM) in early June 2017, to be implemented in July. Under the draft a shortfall needs to be judged before November in the previous year to trigger an export licensing regime to be enforced nationwide from January. Some media reports incorrectly interpreted this as a delay (from July 2017 to January 2018), but this is on schedule just as originally planned. The draft gives the resources minister control over implementing the mechanism from 2018 to 2022. The licensing regime covers LNG projects nationwide, although the proposed restriction is likely to affect only east coast projects.

Santos CEO Kevin Gallagher said "a net contributor" measurement in the proposed ADGSM unfairly targets the GLNG project. Santos GLNG project is viewed as the only LNG project that is not a net contributor to the domestic market.

The Australian Energy Market Operator (AEMO) in its first *Energy Supply Outlook (ESO)*, released in the middle of June 2017 highlighted a low risk of electricity shortfalls for an average summer in 2017/18, however the power system remains susceptible to extreme conditions.

In early June 2017, there was a rumour that AGL Energy may decide on a location of an LNG import terminal in Eastern Australian "by the middle of the year". AGL is reportedly hoping for construction to start in 2019, with the terminal in operation in 2020 - 21. Victoria is believed to be seen as a favourable option, partly because it is located between New South Wales and South Australia, and partly because of the Iona storage facility. As of the end of June, there has been no announcement on the proposed location of the terminal.

In Western Australia, North West Shelf LNG plant suffered a partial production outage on Saturday 24 June 2017. The plant experienced an unplanned production outage on 15 April, too.

Woodside Singapore signed an LNG sale and purchase agreement (SPA) with

Indonesia's Pertamina commencing in 2019. Woodside Singapore has committed to supply initial ramp up quantities building to approximately 0.6 million tonnes per year from 2022 to 2034, and has an option to increase the supply to approximately 1.1 million tonnes per annum from 2024 to 2038. The volumes will be sourced from Woodside's global portfolio.

Korea's Samsung Heavy Industries (SHI) completed construction of Shell's Prelude floating LNG (FLNG) vessel, and it set sail for Australia.

In the Northern Territory, results from the two-well appraisal drilling campaign in the Barossa field in NT/RL5, offshore Bonaparte Basin, were positive, strengthening the field's position to supply backfill gas to Darwin LNG. The Barossa-Caldita partners are ConocoPhillips (37.5% and operator), SK E&S (37.5%), and Santos (25%).

In Malaysia, JX Nippon Oil & Gas Exploration (Malaysia) Limited, the Operator of Block SK10 offshore Sarawak, Malaysia with a participating interest of 75%, commenced commercial gas production from Layang Field on 28 May 2017. Gas produced from the field will be supplied to the MLNG Tiga liquefaction plant in Bintulu, Sarawak.

In Indonesia, Eni carried out its first shipment of LNG produced for the domestic market by the Jangkrik field in deep water. The 22,500 m³ cargo left the Bontang Liquefaction Plant in East Kalimantan for Bali as part of a long-term LNG contract signed with Pertamina in 2015. Eni started gas production at Jangkrik ahead of schedule in May 2017. Eni operates the Muara Bakau PSC in which it holds a 55% stake.

In Papua New Guinea, ExxonMobil announced positive production well test results from the Muruk 1 sidetrack 3 well in the North Highlands. The test confirms Muruk as a potentially significant new discovery close to existing PNG LNG infrastructure. Interest owners are ExxonMobil (42.5%), Oil Search (37.5%) and Santos (20%), with Oil Search as operator.

[North America]

According to data from DOE (Department of Energy), the United States exported 15 cargoes of LNG in April 2017. Cumulative exports of LNG during the first four months of the year amounted to 197,270,266,000 cubic feet, that is equivalent to 4.10 million tonnes, surpassing 183,773,189,000 cubic feet (3.82 million tonnes) for the 12 months in 2016.

There were several positive developments toward realisation of a second wave of LNG production projects in the United States, while the nation's dry gas production decreased year on year for fourteen months in a row as of April 2017.

Freeport LNG Development, L.P. announced the filing of a formal application with the Federal Energy Regulatory Commission (FERC) for authorization to site, construct and operate a fourth liquefaction train (Train 4) and commencement of the front-end

engineering and design (FEED). The Train 4 is being designed with a nominal production capacity of 5.1 million tonnes per year. Freeport LNG anticipates being ready to commence construction of Train 4 by the end of 2018, with operations commencing as early as 2022.

Energy Transfer subsidiary Lake Charles LNG Export Company entered into a Memorandum of Understanding (MOU) with Korea Gas Corporation (Kogas) to study the feasibility of joint participation in the Lake Charles LNG Liquefaction Project. Shell subsidiary BG LNG Services is also participating in the study.

Sempra Energy and Woodside Petroleum signed a memorandum of understanding (MOU) with Korea Gas Corporation (KOGAS) regarding the development of the proposed Port Arthur LNG liquefaction project in Port Arthur, Texas.

Liquefied Natural Gas Limited (LNGL) has extended the validity period of its binding engineering, procurement, and construction (EPC) contract with KSJV (KBR - SKE&C joint venture) for LNGL's subsidiary Magnolia LNG, LLC (originally signed in November 2015) through December 2017.

Delfin Midstream and Golar LNG signed a Joint Development Agreement to develop the project, which is the only permitted floating LNG export project in the United States, with up to four FLNG vessels producing up to 13 million tonnes of LNG per year. Delfin LNG received a positive record of decision from MARAD in March 2017. In early June Delfin received approval from the Department of Energy (DOE) for long-term exports of LNG to countries that do not have a Free Trade Agreement (FTA) with the United States. It is expected that FID on the Delfin project will take place in 2018 with first LNG to be delivered in 2021/22.

ExxonMobil, Eagle LNG Partners and Crowley signed a Memorandum of Understanding (MoU) to collaborate on the development of LNG as a marine fuel. The parties will initially focus their efforts in Florida before expanding to other North American markets.

The Federal Energy Regulatory Commission (FERC) stated in its *Summer 2017 Energy Market and Reliability Assessment* report that the limited availability of the Aliso Canyon natural gas storage facility in Southern California may pose a risk to gas and electric reliability in summer 2017 if hotter than normal weather conditions and unplanned gas pipeline outages materialize. California state regulators have not allowed Southern California Gas to inject gas into the facility following a leak from October 2015 to February 2016.

Alaska Gasline Development Corporation (AGDC) and Korea Gas Corporation (Kogas) signed a memorandum of understanding (MOU) that puts in place a framework to study on development of, and possibly investment in, the Alaska LNG Project. AGDC is

holding an open season from June to August 2017 for the natural gas and liquefaction tolling project.

In April 2017, for the fourteenth consecutive month, dry natural gas production decreased year-to-year from the same month a year ago. The preliminary level for dry natural gas production in April 2017 was 2,148 billion cubic feet (Bcf) (44.70 million tonnes of LNG equivalent), or 71.6 Bcf/day. This level was a 1.3 Bcf/day (1.8%) decrease from the April 2016 level of 72.9 Bcf/day.

In Canada the central government approved a 40-year natural gas export licence to Woodfibre LNG for its proposed facility in Squamish, British Columbia. The National Energy Board (NEB) approved Woodfibre's application in April 2017.

[Middle East]

The most immediate impact from the recent diplomatic dispute between Qatar and other Arab nations in the Middle East on the Qatari LNG fleet was the exclusion of Qatari vessels from Fujairah, a key bunkering location, forcing the vessels to find alternative refuelling sources. There has been no impact on the Dolphin gas pipeline which links Qatar's North Field with United Arab Emirates (UAE) and Oman.

Qatar Petroleum's (QP) Wave LNG Solutions and Shell Gas & Power Developments B.V. (Shell) signed a framework agreement to develop LNG bunkering infrastructure at strategic shipping locations across the globe.

Qatargas announced a new Sale and Purchase Agreement (SPA) with Shell. Qatargas will deliver up to 1.1 million tonnes per year of LNG from Qatargas 4 to Shell for five years from January 2019. Qatargas 4 (Qatar Liquefied Gas Company Limited (4)) is a joint venture between Qatar Petroleum (70%) and Shell (30%). It is expected that the LNG will be delivered to either the Dragon LNG Terminal in the United Kingdom or the Gate LNG Terminal in the Netherlands, according to the announcement.

Iran began exporting its natural gas to the Iraq in late June 2017, Deputy Petroleum Minister for International Affairs Amir Hossein Zamaninia said.

[Africa]

In Africa, some progresses were observed in the front of floating LNG production.

Eni announced the launch of the Coral South LNG project implementation phase, marking the first major final investment decision (FID) in the year 2017 in a major LNG production project in the world. The Floating Liquefaction (FLNG) unit will have a capacity of around 3.4 million tonnes per year. The FLNG facilities construction will be financed through Project Finance covering around 60% of its entire cost. This is the first Project

Finance ever arranged in the world for a liquefaction floater.

Equatorial Guinea has short-listed a few companies for an off-take agreement at its Fortuna floating LNG (FLNG) project, Gabriel Obiang Lima, minister of mines and hydrocarbons said. Fortuna FLNG will have production capacity of 2.2 million tonnes per year and an estimated start-up in 2020.

[Europe / Russia]

Centrica Storage Limited (CSL) concluded that CSL cannot safely return the Rough assets and facilities to injection and storage operations, after completing the wells testing programme and a review into the feasibility, as a result of the high operating pressures, and the fact that the wells and facilities are at the end of their design life. Furthermore, from a commercial perspective, an assessment of both the economics of seasonal storage today, and the costs of refurbishment or rebuilding the facility and replacing the wells, suggests that both pathways would not be economic.

The United Kingdom government-backed Oil and Gas Authority (OGA) released a 'tight gas strategy' to unlock the remaining gas within the maturing Southern North Sea (SNS). The OGA estimates that there is some 3.8 trillion cubic feet (tcf) (79.07 million tonnes of LNG equivalent) of remaining gas accessible within the SNS, inclusive of infill opportunities, undeveloped discoveries and prospects.

Global Energy Ventures (GEV), a CNG solutions company, signed an Investment Agreement with Meridian Holdings as well as a Shareholders Agreement. The Agreements provide for a 5.0% equity interest in Meridian. Meridian grants GEV Gas volume rights of up to 300 million scf/d of port capacity at Meridian's proposed Port Meridian terminal in the United Kingdom and Gas sale rights of up to 300 million scf/d.

The LNG bunkering vessel ENGIE Zeebrugge, jointly owned by ENGIE, Mitsubishi Corporation, NYK Line, and Fluxys, performed its first deliveries of LNG as a marine fuel to M/V AUTO ECO and M/V AUTO ENERGY, the two new gas-propelled pure car and truck carriers (PCTCs) of UECC, in the port of Zeebrugge, Belgium. The LNG bunkering operations were conducted at the same time that the cargo operations for PCTCs were taking place. ENGIE Zeebrugge, which is the world's first purpose-built LNG bunkering vessel, arrived in Zeebrugge at the beginning of April after delivery from Hanjin Heavy Industries & Construction in Busan, Korea.

Wood Group secured a new front end engineering design (FEED) contract with Gastrade S.A. for the Alexandroupolis floating LNG receiving, storage and regasification unit (FSRU) in Greece.

Lithuanian Lietuvos energijos' gas trading subsidiary LDT (Lietuvos dujų tiekimas)

announced in late June 2017 a deal to purchasing an LNG cargo from Cheniere to be delivered in the second half of August and storing part of the cargo in the Inčiukalnio natural gas storage facility in Latvia.

Russia's Novatek continued being active in LNG activity development. The company signed a Memorandum of Understanding (MOU) with Fluxys. The parties intend to pursue strategic cooperation in developing small-scale LNG projects in Europe. Novatek is expected to start exporting LNG from the Yamal project by the end of 2017. The company says it may also start construction of the Arctic 2 LNG project in 2019 with the first LNG targeted by 2023. Mitsui O.S.K. Lines (MOL) signed a long-term charter contract for four LNG carriers with the tank capacity of 174,000m³, which will be delivered and serve on Yamal LNG project in 2019 and 2020 onwards. The four contracted carriers will serve as a transport of LNG transshipped by the project from Europe.

Gazprom is also expanding its activities in multiple fronts. The company claimed that it exported 9.5 bcm or 13.3% more gas to Europe during the first five months of 2017 than the same period a year ago, after hitting a record of 179.3 bcm in 2016 (19.9 bcm or 12.5% more than in 2015). In late April 2017, Nord Stream 2 AG signed the financing agreements for the project with ENGIE, OMV, Shell, Uniper, and Wintershall, where those companies will provide long-term financing for 50% of the total cost of the project. In late June, Gazprom started laying the TurkStream gas pipeline in the deep-water area off the coast of Anapa with the Pioneering Spirit pipe-laying vessel. TurkStream is a project stretching across the Black Sea from Russia to Turkey and further to Turkey's border with neighbouring countries. The first string of the gas pipeline is intended for Turkish consumers, while the second string will deliver gas to southern and southeastern Europe. Each string will have the throughput capacity of 15.75 billion cubic meters per year. Gazprom may boost gas production by 7.4% in 2017 compared with 2016 to over 450 bcm, Chief Executive Officer Aleksei Miller said at the annual shareholder meeting, adding that the company produced 232.7 bcm in first six months of 2017.

In a related move, the Nord Stream 2 project company claims that there is no need for an international governmental agreement between the EU member states and the Russian Federation on Nord Stream 2, as a comprehensive legal framework governing Nord Stream 2 and other import pipelines is already in place, on the contrary to the European Commission's claims.

Gazprom and Shell signed the Heads of Agreement (HOA) to set up a joint venture, which will secure financing for and carry out the design, construction and operation of the LNG plant in the Leningrad Region. The parties also signed the Joint Study Framework Agreement on the Baltic LNG project. The Baltic LNG project envisages the construction of

the LNG plant with an annual capacity of 10 million tonnes in the port of Ust-Luga, Leningrad Region. In the meantime, LNG Gorskaya, a privately-owned Russian company, has launched a small-scale floating LNG production project off the port of Gorskaya to become an LNG exporter from Russia's European coast. The LNG will be shipped to Baltic ports using three tankers already on order from Russia's United Shipbuilding Corporation. LNG Gorskaya's initial annual LNG output will be 0.42 million tonnes, which could triple within three years.

Gazprom said as of early June 2017, 774 km of the Power of Siberia gas pipeline was completed. Before the end of the year, the plan is to complete over 1,100 km, about a half of Power of Siberia's priority section stretching from the Chayandinskoye field in Yakutia to the Russian-Chinese border. Gas supplies to China via the eastern route is expected to start in the period from May 2019 through May 2021.

[South America]

In early June 2017 in Jamaica, Desnoes & Geddes Limited, brewer of Red Stripe Jamaica beer, agreed to take long-term supply of LNG from New Fortress Energy starting in September 2017.

The Panama Canal Authority (ACP) published a proposal for modifications to its current tolls structure. The proposal modifies the tolls charged to LPG and LNG vessels. The date for implementation of the modifications to the tolls structure is planned for October 2017. For LNG vessels, the transit fees will be hiked by 15%. For a 173,000 m³ vessel, the unit cost to transit the route will be 19.5 cents per million Btu up from current 17 cents for a round trip.

BP Trinidad and Tobago (BPTT) made two significant gas discoveries with the Savannah and Macadamia exploration wells, offshore Trinidad. The results of these wells have unlocked approximately 2 trillion cubic feet (tcf) of gas in place to underpin new developments in these areas.

Reference: Company and agency announcements, customs statistics, Reuters, Bloomberg, Yonhap, AP, UPI, Argus, Korea Times, อารักษ์ 9 Thailand, Press Trust of India, Economic Times of India, The Hindu Business, Business Standard India, The News International Pakistan, Dawn, Financial Express Bangladesh, The Australian, Katherine Times, The Age Victoria, The West Australian, Alaska Journal of Commerce, CBC Canada, ArabianOilandGas.com, CPI Financial, IRNA, DELFI by The Lithuania Tribune, TASS, Your Oil and Gas News, Jamaica Gleaner, Cedigaz News Report.

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