

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

Introduction

The unprecedented expansion of the global LNG industry continues, with stable prices of the commodity amid ample supply.

Japan, Korea, and China all increased LNG imports year-on-year in July 2017. In particular, China's July LNG imports were 3.12 million tonnes, the highest volume since January and nearly doubling from July 2016. For the first seven months of the year, China's LNG imports were 45% higher than the same period a year ago at 19 million tonnes.

In July 2017 Australia's LNG exports increased significantly to 5.4 million tonnes, up from 4.9 million tonnes in June. Western Australia and Northern Territory combined shipped 3.7 million tonnes in July and Queensland projects shipped 1.7 million tonnes.

Although the United States has been stepping up LNG exports this year, at least one project under construction announced a delay.

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

[Asia Pacific]

Asian spot LNG prices rose from the high USD 5s to the low USD 6s at the beginning of August 2017 and stayed in the low USD 6 for the rest of the month.

Korea's refiner S-Oil Corporation signed a long-term LNG supply contract with Malaysia's Petronas, to buy 700,000 tonnes per year of LNG from March 2018 through March 2033. S-Oil's main shareholder is Saudi Aramco.

Singapore's Pavilion Gas and Singapore LNG Corporation (SLNG) signed an agreement for LNG Storage and Reload Services at the SLNG Terminal on Jurong Island. Pavilion Gas has rights to access tank capacity over the next 24 months.

Vietnam's Prime Minister Nguyễn Xuân Phúc was visited by Tokyo Gas President Michiaki Hirose in Ha Noi in the middle of the month. The company is working with PV Gas on the Thi Vai LNG terminal project in the southern province of Ba Ria-Vung Tau.

China's Ministry of Land and Resources, China National Petroleum Corporation (CNPC) and Guangdong province agreed to build a pilot methane hydrate project in the South China Sea.

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Chairman Chen Chin-te of CPC Corporation, Taiwan, resigned on Friday 18 August 2017, following Minister of Economic Affairs Lee Chih-kung's resignation three days earlier, after a massive electricity blackout, which was triggered during the replacement of power supply system components at the Tatan gas-fired power plant in Taoyuan.

Indian Oil Corporation (IOC) Board gave its in-principle approval for acquiring up to 50% equity in GSPL LNG Limited, which is setting up an LNG Terminal at Mundra Port in Gujarat. GSPL LNG is a joint venture of Gujarat State Petroleum Corporation (GSPC) and Adani Enterprises Limited (AEL). The terminal, to be commissioned in the fourth quarter of 2017 - 18, will be connected to Gujarat State Petronet Limited (GSPL) existing pipeline network. IOC said that Malaysia's Petronas and India's Petronet LNG were interested in stakes at the Ennore terminal in the southern state of Tamil Nadu, which IOC aims to start operating in 2018 - 19.

Swan Energy subsidiary Triumph Offshore executed ship building contract of an 180,000 m³ LNG Floating storage and regasification unit (FSRU) with Hyundai Heavy Industries (HHI) in connection with its upcoming FSRU project in Jafrabad, Gujarat.

Höegh LNG Partners Operating LLC entered into a term-sheet to acquire 23.5% of the shares of each of SRV Joint Gas and SRV Joint Gas Two, which respectively own the *FSRUs Neptune* and *GDF Suez Cape Ann*, from Mitsui O.S.K. Lines (MOL). The FSRUs operate under long-term time charters with Engie with expiration dates in 2029 and 2030, respectively, and, in each case, with options for the charterer to extend the time charters. Following the transaction, MOL will continue to hold 25% of the shares of each Joint Venture. The *FSRU GDF Suez Cape Ann* was chartered by H-Energy for 5 years from 2018 in April 2017 and will arrive at the LNG jetty at Jaigarh port by Q3 2018.

According to All Pakistan Compressed Natural Gas Association (APCNGA), in 2012 around 3,200 CNG stations were shut down following a ban the supply of natural gas due to the shortage of the commodity, but since May 2016 around 2300 stations have restarted their operations thanks to LNG imports.

In Bangladesh Summit LNG Terminal Company is expected to sign a floating storage and regasification unit (FSRU) charter deal for 15 years with Excelerate Energy to provide one of Excelerate's existing FSRUs at Moheshkhali Island in the Bay of Bengal. The cabinet committee on economic affairs approved the draft agreement for awarding the job for setting up another terminal on Kutubdia Island in Cox's Bazar to a consortium of local Hong Kong Shanghai Manjala Power Limited and Malaysia's Global LNG and Petronas.

39 firms submitted EoIs to supply spot LNG to Bangladesh, the state-owned Rupantarita Prakritik Gas (RPGCL) disclosed. 15 of the bidders are from Singapore, three from Japan, two each from the United States, the United Kingdom, Norway, Hong Kong,

and Bermuda and one each from Italy, Korea, India, Australia, Spain, Switzerland, Malaysia, and Bangladesh.

Bangladesh's cabinet gave the green light to the pricing and draft contract for the deal. The government will sign a 15-year contract with Qatar's RasGas. For the first five years of the contract, RasGas will supply 1.8 million tonnes per year, which will go up to 2.5 million tonnes in the following ten years.

In July 2017 Australia's LNG exports increased significantly to 5.4 million tonnes with volumes from Queensland projects stable at 1.7 million tonnes, while flows of gas into Queensland from other states slowed considerably.

Santos signed an agreement with ENGIE for the supply of gas to the Pelican Point Power Station in South Australia. The contract is for 15 PJ, starting in January 2018. The contract will be fulfilled with a mix of GLNG gas and Santos portfolio gas. Santos also signed a location swap agreement facilitating the delivery of at least 18 PJ of gas per year. Under the three year agreement from 2018 (with an option to extend for a further year), Santos will take delivery of gas at Wallumbilla and then provide an equivalent quantity at delivery points in the southern domestic market. In the meantime, Santos expects GLNG LNG sales to ramp up to around 6 million tonnes per year by the end of 2019 and stay at that level. That is well below the project's capacity of 7.8 million tonnes per year.

AGL announced Crib Point (Western Port) in Victoria as the preferred site for a gas import jetty and pipeline. The company expects to commence construction in 2019 and bring the terminal into operation by 2020/21.

The Australian Taxation Office (ATO) reached a settlement with Chevron over the company's treatment of inter-company loans. Chevron dropped an appeal against a Federal Court decision in April 2017 in the ATO's favour ruling that Chevron was liable for AUD 340 million in unpaid taxes related to intragroup loans between 2003 and 2008. Chevron since revealed the ATO had audited returns from 2008 to 2013 over the same issues.

Chevron apparently switched focus to compressing the gas on the seabed to keep gas flowing to the Gorgon LNG project, instead of previously favoured option of a semi-submersible compression platform.

The company's Wheatstone LNG project is moving toward first production. Final commissioning of onshore LNG Train 1 is nearing completion. Train 2 construction and the hook-up of the domestic gas train modules are both progressing to schedule.

Woodside reported a 49% jump in half-year 2017 profit, and said it was making progress on plans to stakes in the Scarborough and Browse fields off Western Australia.

Total E & P Indonésie (TEPI) conducted the first PHM drilling spud in Tunu field within the Mahakam Working Area on PT Pertamina Hulu Mahakam's (PHM) account, on

16 July 2017. PHM has been appointed by the Government to manage the Mahakam Working Area, which is effective on 1 January 2018, after the expiration of Mahakam Production Sharing Contract (PSC) contract in the management of TEPI.

Indonesia's Pertamina signed a preliminary agreement to supply state electricity utility PT Perusahaan Listrik Negara (PLN) with natural gas from the Jambaran-Tiung Biru field in East Java, which is expected begin in late 2020 or 2021. The country's Coordinating Maritime Minister said that Singapore had offered to supply LNG for power generations in several locations in Indonesia.

There has been strong market interest in the extra LNG volumes currently being marketed by ExxonMobil on behalf of the PNG LNG Project. The interest levels highlight the marketability of PNG LNG's high heating value gas. Oil Search is a partner in the PNG LNG project and P'nyang field operated by ExxonMobil, as well as a partner in the undeveloped Elk-Antelope gas assets operated by Total. The parties are in talks over how best to develop their gas fields without duplicating infrastructure, by underpinning the addition of two units at the PNG LNG plant by the mid-2020s.

[North America]

The United States exported more natural gas than it imported in February, April, and May of 2017, due to declining net pipeline imports from Canada, growing natural gas pipeline exports to Mexico, and increasing exports of LNG, according to the latest EIA's Natural Gas Monthly. The United States exported 92 cargoes of LNG in the first half of 2017. Cumulative exports of LNG during the period amounted to 310,438,145,000 cubic feet, that is equivalent to 6.46 million tonnes, easily surpassing 183,773,189,000 cubic feet (3.82 million tonnes) for the 12 months in 2016.

According to Cheniere, commissioning activities for Train 4 of the Sabine Pass Liquefaction Project began in March 2017, and first LNG was achieved in July 2017. Cheniere is setting up an office in Beijing to facilitate deals with Chinese buyers.

GAIL India has signed three time-swap deals to sell some of its LNG from the United States. Under the deals, the company will buy LNG from international companies in 2017 and sell equivalent amount of Henry Hub-indexed volumes during 2018 - 19. It is also seeking destination swaps to cut shipping costs of LNG from the United States. GAIL has a sale and purchase agreement (SPA) with Cheniere Energy for 3.5 million tonnes per year for 20 years. GAIL has also booked 2.3 million tonnes per year capacity at Dominion's Cove Point liquefaction facility.

In a July 2017 update, Dominion Energy Cove Point (DECP) states that its LNG export project at Lusby, Maryland, is 92% complete and is on track for an in-service date in

the fourth quarter of 2017.

Toshiba America, Incorporated (TAI) formed Toshiba America LNG Corporation (TAL), a new operating company that focuses on the LNG market. TAL is a tolling customer at Train 3 of the Freeport LNG project in Quintana, Texas. Toshiba has also entered into a pipeline capacity agreement with an affiliate of the Enbridge Corporation to bring natural gas to the LNG facility and with Gulf LNG for tug services.

The Cameron and Freeport LNG projects apparently negatively impacted the second quarter and year-to-date 2017 results (approximately USD 367 million and USD 391 million, respectively) of CB&I. Sempra Energy announced that it is reasonable to expect that the Cameron LNG liquefaction-export project's first liquefaction train could be delayed into 2019, with the other two trains following throughout 2019.

Liquefied Natural Gas Limited's (LNGL) projects in the United States and Canada are well placed to meet the next wave of LNG exports that will be needed in the early 2020s, the company said. LNGL has Magnolia in Louisiana and Bear Head in Nova Scotia, both of which are designed to have four 2-million tonne per year liquefaction trains.

Tellurian continued to progress development of the Driftwood LNG and Driftwood pipeline project during the second quarter of 2017. Bechtel completed the front-end engineering and design (FEED) study and submitted a lump sum turnkey (LSTK) engineering, procurement and construction (EPC) proposal for the Driftwood LNG project, intending to begin producing LNG in 2022.

Fourchon LNG LLC filed a letter in early August 2017 requesting that the Federal Energy Regulatory Commission (FERC) initiate its pre-filing environmental review process for a proposed LNG export project in Lafourche Parish, Louisiana. Fourchon LNG proposes a liquefaction facility with a peak capacity of approximately 5 million tonnes per year and a ship berth on Belle Pass, Port Fourchon. Fourchon LNG intends to commence construction in phases, with the first phase commencing in the third quarter of 2019. Commonwealth LNG announced that the Federal Energy Regulatory Commission (FERC) has accepted its application to initiate the pre-filing process for an LNG export facility near Cameron, Louisiana. The project will have the capacity of 9 million tonnes per year. Commonwealth LNG expects to begin construction in 2019 and commercial operation in 2022.

While the Panama Canal Authority (PCA) is expected to lift restrictions on daylight transits of the canal by LNG vessels starting October 2017, booking slots in advance is becoming difficult as a majority of them have been already taken, according to sources.

In June 2017, for the first time in 15 months, dry natural gas production increased from the same month a year ago to 2,188 billion cubic feet (Bcf) (45.53 million tonnes), or 72.9 Bcf/day, up 1.3 Bcf/day (1.9%) from the June 2016 level of 71.6 Bcf/day.

LNG Canada, a joint venture led by Shell, is aiming for a final investment decision (FID) in 2018, its chief executive Andy Calitz said. Indian Oil Corporation (IOC) said it is in talks with its partners to scout for an alternative, cheaper site for the Pacific Northwest LNG (PNW LNG) project. IOC has a 10% stake in the project.

Hawaii-based Pasha Hawaii announced that two new LNG fueled containerships will be joining its fleet which provides service between Hawaii and the mainland. The ships will be built at Brownsville, Texas-based Keppel AmFELS, a subsidiary of Keppel Offshore & Marine, with delivery expected in 1Q and 3Q of 2020.

Puerto Rico's electric utility PREPA filed for bankruptcy protection in July 2017. In late July, Excelerate Energy cancelled its contracts with PREPA to build the infrastructure for the Aguirre Offshore GasPort project.

[Middle East]

Qatargas delivered the first Q-Max cargo aboard Bu Samra under the long-term Sale and Purchase Agreement (SPA) signed in 2012 between Qatargas 3 and PTT to Thailand's Map Ta Phut LNG terminal in early August 2017. Qatargas and RasGas completed their first co-loaded LNG deliveries to two different destinations. The cargoes were delivered to the Zeebrugge LNG terminal in Belgium and South Hook in Britain.

Qatargas Operations Group completed two years, and 30 million man-hours, without a lost time injury (LTI) in the Company's onshore and offshore assets.

[Africa]

Egypt is planning to import 80 cargoes of LNG during the 2017 - 18 financial year that began in July, Petroleum Minister Tarek El Molla said, down from the 118 cargoes imported in the previous financial year. He said the country planned to import 154 cargoes in 2016 - 17 but only imported 118 cargoes.

Golar LNG announced that it and affiliates of Keppel Shipyard and Black and Veatch (B&V) have entered into an agreement for the sale of equity interests in Golar Hilli LLC to Golar LNG Partners L.P., which will indirectly own the Hilli Episeyo, a floating LNG vessel. The unit is contracted to Perenco Cameroon SA and SNH (Société Nationale des Hydrocarbures, Cameroon) for an eight-year term. The Hilli is scheduled to leave Singapore for Cameroon at the end of September or beginning of October. All going well, the voyage between Singapore and Cameroon is expected to take 32 to 40 days allowing Golar to tender its notice of readiness during the first half of November.

The Shell Petroleum Development Company of Nigeria (SPDC) joint venture started production at Gbaran-Ubie Phase 2 project in Nigeria's Niger Delta region,

following the first phase in June 2010. Peak production of around 175,000 barrels of oil equivalent (boe) per day is expected in 2019. SPDC is the operator of a joint venture between Nigerian National Petroleum Corporation (NNPC, 55%), SPDC (30%), Total E&P Nigeria Ltd (10%) and ENI subsidiary Nigerian Agip Oil Company Limited (5%).

Nigeria launched a scheme to transport LNG to regions not linked by pipeline, supplying power plants and industry, officials said. NNPC, the Nigerian unit of France's Total and Gas Aggregation Company Nigeria Ltd (GACN) would deliver gas to a small LNG plant run by Nigeria's Greenville LNG, officials said.

Equatorial Guinea's Ministry of Mines and Hydrocarbons (MMH), Ophir Equatorial Guinea (Block R) Ltd, OneLNG SA and La Compañía Nacional De Petroleos De Guinea Ecuatorial (GEPetrol) nominated Gunvor as its preferred buyer from the Fortuna FLNG project. Gunvor is committed to take the full capacity of 2.2 million tonnes per year on a Brent-linked FOB basis for 10 years. The contract structure allows flexibility for up to 1.1 million tonnes per year of the capacity to be marketed on an alternate basis.

Ghana's and Equatorial Guinea's Presidents signed a Heads of Agreement (HOA) for the supply of LNG from Equatorial Guinea to Ghana for 15 years, reviewable every five years. In June 2017, the ministers of Energy of the two countries signed a Memorandum of Understanding (MoU). Equatorial Guinea will supply 150 million standard cubic feet per day (1.14 million tonnes per year) to Ghana at an LNG regasification terminal in Takoradi.

In December 2016, Höegh LNG signed an FSRU contract with Quantum Power Ghana Gas Limited (Quantum Power) for the Tema LNG import terminal near Accra in Ghana. The contract is for a period of 20 years with a five year extension option for the charterer. A positive award of the final government approval will lead to a final investment decision (FID) for the infrastructure construction. Höegh LNG is expected to service the contract with the Höegh Giant which was delivered from the shipyard on 27 April 2017.

KBR was awarded pre-front end engineering design (FEED) and project support services contracts by BP for the development of the Tortue / Ahmeyim field offshore Mauritania and Senegal, covering design of the subsea, pre-treatment floating production storage and offloading (FPSO) facility, inshore hub/terminal, and interfaces for floating liquefied natural gas (FLNG). This new work will build on the concept phase work for the development of the field done by KBR's subsidiary Granherne for BP's partner, Kosmos.

Kosmos Energy completed the drill stem test (DST) of the Tortue-1 well, confirming key development parameters including well deliverability, reservoir connectivity, and fluid composition. Initial analysis of fluid samples indicate Tortue gas is well suited for liquefaction given low levels of liquids and minimal impurities. The Kosmos BP partnership remains aligned on delivering a final investment decision (FID) in 2018 and first gas in

2021. Kosmos is exploration operator of Block C-8 with a 28% participating interest. BP is named operator with a 62% participating interest, and Société Mauritanienne des Hydrocarbures et de Patrimoine Minier (SMHPM) has a 10% participating interest.

Mozambique will charge ENI USD 350 million in capital gains tax for its sale of a stake in the Coral South field to ExxonMobil, the nation's finance minister said on local television. Mozambique's government plans to set up a sovereign investment fund where taxes received on sales of the country's minerals will be used to finance development projects, state media reported in August 2017.

[Europe / Russia]

Centrica expects to produce up to 30 billion cubic feet (bcf) of gas from its Rough gas storage site by the first quarter of 2018. In June 2017, Centrica applied to the Oil and Gas Authority (OGA) for permission to withdraw remaining stocks and some cushion gas from its Rough site, which it has decided to close. The Energy & Utilities Alliance (EUA), a trade body whose members include SSE, EDF Energy and ScottishPower, is pressing for a Parliamentary inquiry into the long-term consequences of the closure of the storage site.

First gas was exported from Cygnus Bravo, the satellite wellhead platform in the Southern North Sea's Cygnus development operated by ENGIE E&P UK on 1 August 2017 to Cygnus Alpha, which itself has been at a plateau of 250 million cubic feet per day since 13 December 2016. Combined output then travels from the Alpha processing unit, 150 km off the coast of Lincolnshire, via a 55 km link to the Esmond Transmission System - which lands at the Bacton gas terminal in Norfolk. The overall Cygnus complex comprises four platforms and two subsea structures. It contributes 5% of United Kingdom gas production. Equity interests are operator ENGIE (38.75%), Centrica (48.75%) and Bayerngas (12.5%).

Total E&P UK started-up production from the Edradour and Glenlivet gas and condensate fields, located in about 300 - 435 metres of water in the West of Shetland area, close to the Laggan-Tormore fields which came on stream in February 2016. The Edradour and Glenlivet will bring additional production capacity of up to 56,000 barrels of oil equivalent a day (boe/d). Total operates Edradour and Glenlivet with a 60% interest alongside DONG E&P (UK) (20%) and SSE E&P UK (20%).

Shell Western LNG announced the arrival of the Cardissa, an LNG bunker vessel with capacity to hold around 6,500 m³ of LNG to serve customers from the Gate terminal in Rotterdam to locations throughout Europe. Shell also finalised a long-term agreement with a joint venture between Victrol NV and CFT to charter a LNG bunker barge with a capacity to carry 3,000 m³ of LNG.

The Boards of Total and A.P. Møller - Mærsk approved the acquisition of 100% of

the equity of the E&P company Maersk Oil & Gas A/S (Maersk Oil).

Wärtsilä achieved the mechanical completion of the Tornio Manga LNG terminal in Northern Finland. With the storage tank of 50,000 m³ the terminal will be the largest LNG receiving terminal in the Nordic region. By the middle of 2018, the terminal will supply natural gas to a local stainless steel mill, and LNG to local industries and other consumers in the region. The first shipment of LNG is scheduled for arrival in November 2017.

Poland's PGNiG booked an additional 35% of regasification capacity at the Świnoujście LNG terminal. As a result PGNiG will be able to import LNG equal to 5 billion cubic metres per year from 2018.

Lithuania imported an LNG cargo from the United States for the first time as a former Soviet state on 21 August 2017 aboard the Clean Ocean tanker.

According to preliminary data, from January to 15 August 2017, Russia's Gazprom Group extracted 283.8 bcm of gas which is by 47 bcm, or by 19.8% more than the same period of 2016. Exports to the far abroad countries in this period amounted to 118.3 bcm, which is 12.7 bcm, or by 12% more compared to the same period of 2016. However, Gazprom reported a 34% year-on-year drop in H1 profits at RUB 408 billion (USD 6.9 billion), mainly attributed to foreign exchange losses and a weaker local currency. The company said it used the Opal pipeline to full capacity on 9 August 2017 for the first time since a German court lifted a restriction on the company's access in July.

Russia's NOVATEK is considering the construction of a transshipment LNG terminal on the Kamchatka Peninsula, according to Lev Feodosiev, Deputy Chairman of the company's Board. The project's essence is to transship LNG from ice-class tankers capable of passing through the Northern Sea Route to more ordinary LNG tankers.

NOVATEK's subsidiaries OOO Arctic LNG-2 and OOO NOVATEK-Yurkharovneftegas respectively obtained new licenses for the subsoil area including the Shtormovoye field on the Gydan peninsula and for the subsoil area including the Verhnetiuteyskoye and the West-Seyakhinskoye fields on the Yamal peninsula in close proximity to the South-Tambeyskoye field.

The first foundation for the Amur gas processing plant (GPP) was laid in the Svobodnensky District of the Amur Region. The Amur GPP will be supplied via the Power of Siberia gas pipeline with multi-component gas from the Yakutia and Irkutsk gas production centers. The GPP will extract valuable substances, primarily ethane and helium, from gas. The processed gas will be then exported to China. The GPP will have six production lines, each with the annual capacity of 7 billion cubic meters. Two process lines will come online at the first start-up complex. To date, about 979 km of the Power of Siberia gas pipeline has been built. It is planned that more than 1,300 km of the pipeline will be built by the end of

2017. Gas supply to China is scheduled to begin on 20 December 2019, in accordance with the supplementary agreement to the contract between Gazprom and CNPC.

Russia's Gazprom plans to put its Yuzhno-Kirinskoye field into operation in 2023, head of the company's construction and investment department Vadim Petrenko said. The production drilling is planned for 2018.

[South America]

Argentina's Enarsa reportedly launched two LNG tenders seeking up to 32 cargoes for delivery over the next year. Enarsa seeks eight cargoes for delivery between September and October 2017 and 24 cargoes between March and October 2018.

BP Trinidad and Tobago (BPTT) announced first gas from the Juniper development, the fifth of BP's seven upstream major project start-ups planned for 2017. Juniper began production on schedule and under budget. The project is expected to boost BPTT's gas production capacity by an estimated 590 million standard cubic feet a day. Juniper is BP's first subsea field development in Trinidad. It produces gas from the Corallita and Lantana fields via the new Juniper platform, 80 km off the southeast coast of Trinidad in water approximately 110 metres deep. The gas then flows to the Mahogany B hub via a new ten-kilometre flowline that was installed in 2016. Another major project in Trinidad, the Trinidad Onshore Compression project, began operations in April 2017. In June BPTT announced that it had sanctioned development of the Angelin gas field, which is expected to start production in late 2019. BPTT also announced two gas discoveries which may support future developments offshore Trinidad.

The Jamaica Public Service Company (JPS) signed a power purchase agreement with New Fortress South Power Holdings Limited which will be constructing a 94-megawatt power plant at the Jamalco bauxite operations in Clarendon. The plant will use LNG and will be the third such power generating facility to be constructed in Jamaica.

Reference: Company and government announcements, Reuters, Taipei Times, Press Trust of India, The Times of India, India Today, Money Control, The News International Pakistan, Daily Star Bangladesh, Financial Express Bangladesh, The Australian, The West Australian, Bernama, The Star Malaysia, Jakarta Post, Bisnis Liputan6.com, Detikcom, Kumparan.com, SINDOnews.com, Financial Post Canada, Gulf Times, Peninsula Qatar, The National (UAE), Ghana News Agency, Financial Times, The Times, Коммерсантъ, TASS, Offshore Magazine, EnergyQuest Australia, Cedigaz News Report.

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