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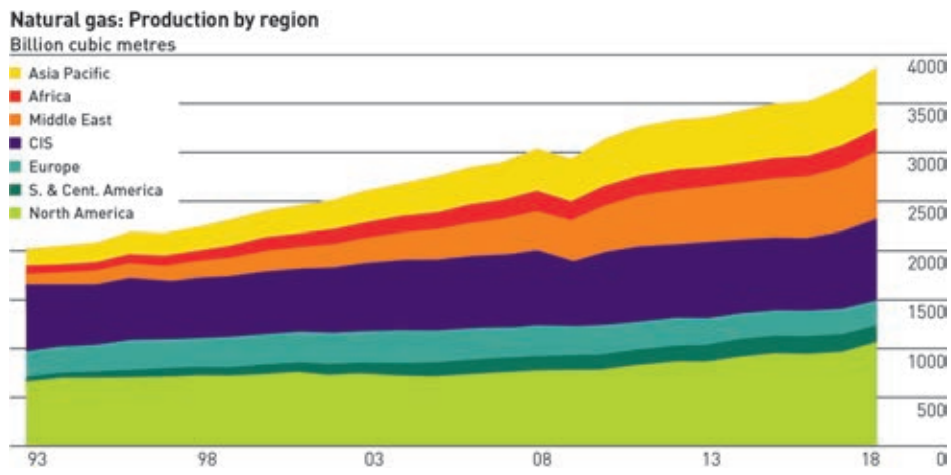
Global energy statistics show that US shale revolution still unfolding

Annual BP Statistical Review gives more insights into future natural gas and LNG market

The natural gas industry experienced a bonanza year with both global consumption and production increasing by more than 5 percent, one of the strongest growth rates in either gas demand or output for more than 30 years, according to the 68th annual BP Statistical Review of World Energy.

Global natural gas consumption rose by 195 billion cubic metres, one of the fastest rates of growth since 1984.



Natural gas production increases around the world led by US shale

Doubled

The expansion of inter-regional natural gas trade amounted to 39 Bcm, or 4.3 percent, more than double the 10-year average, driven largely by continuing rapid expansion in liquefied natural gas.

LNG supply growth came mainly from Australia (15 Bcm), the US (11 Bcm) and Russia (9 Bcm). China accounted for around half of the increase in imports (21 Bcm).

LNG supplies continued their rapid expansion, increasing by almost 10 percent (37 Bcm) as a number of new liquefaction plants in Australia, US and Russia were either started or ramped up.

"For much of the year, the strength of Asian gas demand, led by China, was sufficient to absorb these increasing supplies," stated the Statistical Review.

"But a waning in the strength of Asian demand towards the end of the year, combined with a mini-surge in LNG exports, caused prices to fall back and the differential between Asian and European spot prices to narrow significantly," explained the Review.

Asian LNG prices have fallen further in the first part of this year, towards the bottom of the price band defined by the full-cycle and operating costs of US exporters.

"The prospect of further rapid increases in LNG supplies this year means there is a possibility of a first meaningful curtailment of some supply capacity," BP noted.

Last resort

"The extent of any eventual shut-in will depend importantly on the European market, which acts as the de facto 'market of last resort' for LNG supplies," added the report.

BP Group Chief Executive Bob Dudley said the Statistical Review provides a timely and objective insight into energy developments and how change can begin to be achieved when required.

"The strength in energy consumption was reflected across all the fuels, many of which grew more strongly than their recent historical averages," he added.

"This acceleration was particularly pronounced for natural gas. On the supply side, the data for 2018 reinforced the central importance of the US shale revolution," said Dudley.

"Remarkably, the US recorded the largest ever annual increases by any country in both oil and natural gas production last year, with the vast majority of both increases coming from onshore shale plays," he added.

"At the same time, renewable energy, led by wind and solar power, continued to grow far more rapidly than any other form of energy," stated the CEO.

Europe's natural gas demand contracted by a little over 2 percent (11 Bcm) last year, but this fall in demand was more than matched (minus-13 Bcm) by continuing declines in Europe's ageing gas fields.

Diversions

The small increase in European gas imports was largely met by LNG cargos diverted from Asia towards the end of the year as the Asian premium over European prices almost disappeared.

Russian pipeline exports to Europe were largely unchanged on the year, maintaining the record levels built up in recent years, although with a slight decline in their share of Europe's gas imports.

"A key factor determining the role that Europe will play in balancing the global LNG market over coming years will be the extent to which Russia

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seeks to maintain its market share," said BP.

However, the US continued to lead the way in both natural gas output and consumption as the gas sector also expanded around the world.

"The main actor here was the US, accounting for almost 40 percent of global demand growth and over 45 percent of the increase in production," said Spencer Dale, BP Chief Economist in presenting the Review.

US gas production increased by 86 Bcm, an increase of almost 12 percent, driven by shale-gas plays in Marcellus, Haynesville and Permian.

"In case there was any doubt: the US shale revolution is alive and kicking," stated Dale.

Output

BP said the gains in global gas production were supported by Russia (34 bcm), Iran (19 Bcm) and Australia (17 Bcm).

Although some of the increase in US gas supplies was used to feed the three new US LNG Trains which were on stream in 2018, the majority was used to quench the thirst of domestic demand.

"US gas consumption increased by 78 Bcm last year. To put that in context, that is roughly the same growth as achieved over the previous six years in the US; or broadly equivalent to the entire gas consumption of the UK," explained Dale.

This Review said that the "exceptional strength" of US gas demand appears to be largely driven by same weather-related effects, with rising demands for space heating and cooling leading to an increase in gas consumption, both directly in commercial and residential buildings, and, more importantly, indirectly via growing power demand.

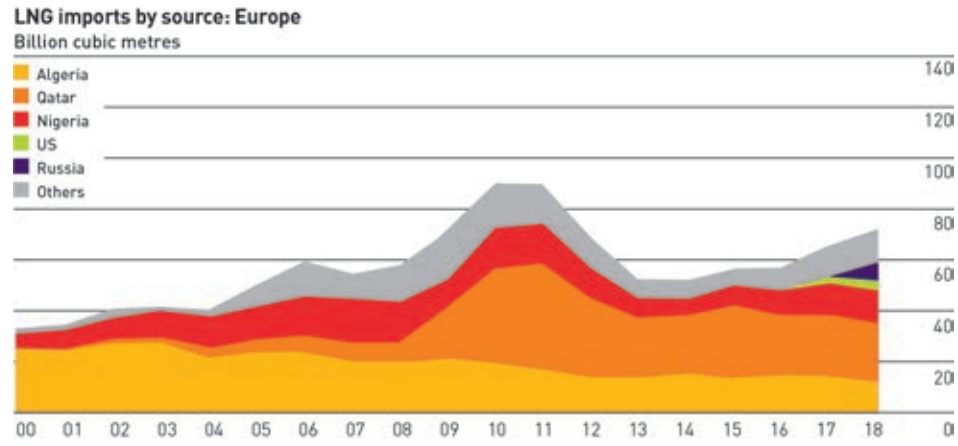
The expansion of gas consumption within the US power sector was further boosted by around 17 gigawatts of coal-fired generation capacity being retired last year.

Overall, the growth in gas-fired power generation accounted for around half of the increase in US gas consumption last year.

Concentrated

Outside of the US, the growth in global gas demand was concentrated across three other countries: China (43 Bcm), Russia (23 Bcm) and Iran (16 Bcm), which together with the US, accounted for 80 percent of global growth.

"China gas consumption grew by an astonishing 18 percent last year. This strength stemmed largely from a continuation of environmental policies encouraging coal-to-gas switching in industry and buildings in order to improve local air quality, together with robust growth in industrial activity during the first half of the year," said the Review.



Supplies to Europe are from traditional sellers with US and Russia emerging

"These coal-to-gas switching polices have been instrumental in increasing Chinese gas consumption by over a third in the past two years alone," it said.

"Official estimates suggest that as many as 10 million households, roughly half the number of households in the UK, switched from coal-to-gas boilers over this 2-year period, with even greater switching in the industrial sector," it added.

BP said that a series of improvements in import capacity, distribution and demand management meant that this second successive year of rapid growth in Chinese gas consumption was achieved largely without a repeat of the price spikes and shortages which characterised the winter of 2017-2018, with increased imports from both LNG and pipelines.

Emissions

At the same time, carbon emissions from energy use grew by 2.0 percent, again the fastest expansion for many years.

"The strength in energy consumption was pretty much reflected across all the fuels, most of which grew more strongly than their historical averages," said the report.

"Growth in renewable energy (14.5 percent) eased back slightly relative to past trends although remained by far the world's fastest-growing energy source," it added.

BP said that primary global energy consumption grew at a rate of 2.9 percent, almost double its 10-year average of 1.5 percent per year, and the fastest since 2010.

By fuel, energy consumption growth was driven by natural gas, which contributed more than 40 percent of the increase.

All fuels grew faster than their 10-year averages, apart from renewables, although renewables still accounted for the second-largest increment to energy growth.

China, the US and India together accounted for more than two thirds of the global increase in energy demand, with US consumption expanding at its fastest rate for 30 years.

Challenge

BP CEO Dudley added in his overview of the statistics that the developments documented this year highlighted a critical challenge facing the global power sector.

"Power demand increased even more strongly than overall energy demand in 2018, as the world continued to electrify," he said.

"But this shift towards greater electrification can play an important part in the energy transition only if it is accompanied by a decarbonization of the power sector," added the CEO.

"Despite the continuing rapid growth in renewable energy last year, it provided only a third of the required increase in power generation, with coal providing a broadly similar contribution," said Dudley.

"Indeed, the increasing use of coal within the power sector is estimated to have more than accounted for the entire growth of global coal consumption last year," he stated.

According to BP's findings, decarbonizing the power sector while also meeting the rapidly expanding demand for power, particularly in the developing world, is perhaps the single most important challenge facing the global energy system over the next 20 years. ■

China leads nations of Asia towards LNG import and regasfication boom through 2024

Paris-based International Energy Agency issues forecasts through to 2024 with 2019 Gas Report

Global LNG trade is expected to reach 546 billion cubic metres per annum by 2024, increasing by 26 percent compared with 2018 and with the bulk of additional imports heading for emerging Asian economies, and especially China.

The International Energy Agency said in its 2019 Gas Report that China is accounting for almost one-third of total LNG import growth and is expected to become the world's largest importer by around 2024 with 109 Bcm per annum (82 million tonnes) against 105 Bcm per annum for Japan (78MT).

Asia market

Other rapidly growing Asian markets represent another sizeable source of LNG import growth, accounting for 74 Bcm per year of additional volumes during the forecast period.

"India emerges as one of the leaders in terms of LNG growth, driven by its strong domestic consumption and the doubling of its regasification capacity over the forecast period to reach 80 Bcm/y by 2024," said the IEA.

"India has four projects under construction plus the Ennore terminal, which started operations during the first quarter of 2019," said the report.

"Pakistan and Bangladesh are also likely to see their imports grow over the coming years, due to their strong reliance on natural gas in their energy mix and their stagnating or declining domestic production," it added.

"South East Asian countries also see their import capacity further develop in the near future, with several projects currently under development to expand Thailand's existing regasification capacity and build new infrastructure in Vietnam and the Philippines," stated the IEA.

The two large traditional Asian LNG importers, Japan and South Korea, see their imports decline by 15 Bcm/y during the forecast period.

"Japan's import needs slowly decrease in parallel with the expected progressive restart of its nuclear power generation fleet, ceding its position as number one LNG importer to China by 2024, whereas Korea's imports are expected to stabilise after 2022," according to the IEA forecasts.

European regas

Outside Asia, Europe is the main source of LNG import growth, helped by a combination of decreasing domestic production in northwest Europe and the ambition to increase the diversity of supply vis-a-vis traditional pipeline suppliers. Some European countries are still considering the LNG option, including Germany with four projects proposed.

India emerges as one of the leaders in terms of LNG growth, driven by its strong domestic consumption and the doubling of its regasification capacity over the forecast period

"The German government, which is promoting the development of at least two of the said projects to provide alternative sources of supply to its domestic market, announced in March 2019 a plan to incentivise investment by lowering the cost of connection to the transport network by 90 percent," said the IEA.

Africa already saw its LNG imports shrink in 2018 as Egypt moved back to self-sufficiency, and most import projects in sub-Saharan Africa are currently stalled.

LNG imports are expected to remain stable in the Middle East and in Central and South America, and progressively decline in North America as Mexico sees greater access to pipeline gas from the US.

LNG supply

By the end of 2018 global liquefaction nameplate capacity reached 553 Bcm/y, increasing by 48 Bcm/y or 10 percent y-o-y, due to new projects commissioned in Australia, the United States, Russia and Cameroon.

This report only considers liquefaction projects that had taken their final investment decisions as of early June 2019 as contributing to future export capacity for the forecast period.

"Based on this assumption, total nameplate liquefaction capacity is expected to reach above 670 Bcm/y by 2024," stated the report.

Australia, which had surpassed Qatar as number one country in terms of liquefaction nameplate capacity by the end of 2018, reached the end of its LNG export investment cycle, with a total of 80 Bcm/y of nameplate capacity added between 2015 and end 2018.

The last remaining project, Prelude FLNG, shipped its first condensate cargo in March 2019 and LNG in June.

"The US accounts for over 80 percent of new liquefaction capacity due to be commissioned in the coming five years, with a large majority of projects starting operations between 2019 and 2021: Cameron (3 Trains), Freeport (3 Trains), Elba Island (10 small-scale LNG modules), Sabine Pass Train 5 and Corpus Christi Trains 2 and 3," said the IEA.

Golden Pass

The US Golden Pass LNG project in Texas, which took an FID in February 2019, is scheduled to be commissioned by the end of the forecast period in 2024, and the Calcasieu Pass LNG project, which started construction in April 2019, is set to be commissioned in 2022.

Sabine Pass train 6 took its FID in early June 2019, with long-term contracts with Vitol and Petronas starting in 2022 and 2024 respectively.

The IEA report added that three other projects - Tangguh LNG Train 3 in Indonesia, Petronas FLNG 2 in Malaysia and Yamal LNG Train 4 in Russia -are all expected to start operations by the end of 2020, altogether adding almost 9 Bcm/y to global export capacity.

LNG TERM CONTRACTS SIGNED BY CHINESE BUYERS, 2018-19

Date of signature	Seller	Buyer	Volume (bcm/y)	Start	Duration (years)
Sale of purchase agreements (SPAs)					
February 2018	Cheniere Energy		1.63 (total)	2018 2023	25 20
July 2018	ExxonMobil		0.61	2018	3
September 2018	Qatargas		4.60	2018	22
October 2018	ExxonMobil	Zhejiang Energy	1.60	2020	20
October 2018	Total		+0.68*	2008	20*
December 2018	Petronas		0.68	2019	5
April 2019	Total	Guanghui	0.95	-	10
Heads of agreement (HOAs)					
October 2018	Woodfibre LNG	CNOOC	1.00	2023	13
April 2019	Woodside	ENN	1.36	2025	10

* Extension from the original 15-year contract for 1.36 bcm/y.

Chinese companies have been opting for more guarantees of supplies

"Africa also contributes to LNG export capacity expansion. After the commissioning of Cameroon's floating unit in 2018 (the first new project on the continent since the development of Angola LNG), two offshore projects - Coral South FLNG in Mozambique and Tortue FLNG in Mauritania and Senegal - are scheduled to start operations by 2022," said the report.

These developments result in a concentration of capacity additions over the coming two years.

However, a significant proportion of global liquefaction capacity has remained offline in recent years: over the past four years, unplanned capacity disruptions resulted in 12-14 percent of total nameplate capacity being offline.

This forecast assumes that several liquefaction plants will remain offline or will run below their nameplate capacity until 2024 for several reasons.

Exports

The IEA stated that in accordance with its strong position in new capacity development, the US is the largest contributor to LNG export growth over the forecast period, accounting for two-thirds of additional volumes to be marketed between 2018 and 2024.

"US LNG is expected to become the largest source of supply by the end of the forecast period, reaching 113 Bcm/y in 2024, ahead of Australia (107 Bcm/y) and Qatar (105 Bcm/y)," said the report.

Australia will see its exports increase by 16 Bcm/y as the last projects to be commissioned ramp up, while Qatar's output is assumed to remain flat until the Ras Laffan expansion comes on stream.

On a regional basis, the Middle East remains the second-largest exporting

region at 120 Bcm/y after Asia Pacific (183 Bcm/y) and ahead of North America.

The continuous development of LNG short-term and spot trade in Asia is a positive precondition to the development of market-driven pricing mechanisms in the region, and several mature LNG buyers have recently liberalised their domestic gas markets - fully in the case of Japan, and more progressively in Singapore and Korea.

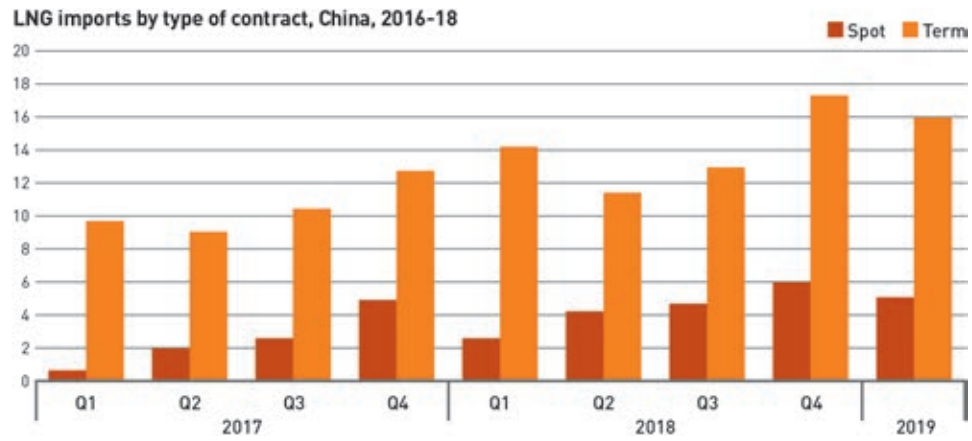
High demand

Countries with strong natural gas consumption and import growth, such as China, India and Pakistan, are reforming their domestic markets with the objective of greater convergence with international market prices.

"In producing countries, similar reforms are also being enacted - over the past decade in the Russian Federation and more recently in Egypt as part of a wider set of economic reforms," said the report.

The past year has marked a third year of strong LNG trade growth and another 12 months with a double-digit growth rate for LNG trade, with flows increasing by 10 percent to reach 432 Bcm (including reloads).

"This third consecutive year of strong growth follows an almost 11 percent increase in 2017 and 10 percent in 2016, after two years of relative stagnation in 2014 and 2015," noted the EIA.



How spot and term contracts signed by Chinese parties have evolved

On the consumer side, Asian markets accounted for most of the growth recorded in 2018, with an increment of almost 39 Bcm, or 85 percent of the net growth in LNG imports.

China was the single largest contributor to LNG import growth for a third consecutive year, with an increase of almost 22 Bcm to reach a total of 73 Bcm of LNG imported, thus accounting for 55 percent of global import growth.

First cargo

South Asia was another major source of growth, with India increasing

by 13 percent and passing the 30 Bcm mark, Pakistan growing by almost 60 percent to reach 10 Bcm, and Bangladesh importing its first LNG cargo in the first half of 2018 and with almost 1 Bcm of imports at the end of the year.

Other emerging Asian buyers such as Thailand, Singapore and Indonesia saw their imports grow at double-digit rates (up 16 percent, 15 percent and 11 percent respectively).

The report added that South Korea saw its LNG flows increase by 16 percent y-o-y to reach an all-time record of almost 60 Bcm on strong power generation consumption to compensate for low nuclear utilisation, while Japanese imports slightly decreased by 1 percent.

"Other regions of the world experienced a variety of import trends in 2018: LNG flows increased by 4 percent in Central and South America in spite of a decrease in Argentina's import needs, with new import facilities ramping up in Colombia and the Caribbean, and Panama starting imports," stated the IEA.

"LNG flows into the Middle East decreased sharply (down 21 percent) on lower imports into Jordan and the United Arab Emirates, and into Africa (down 63 percent) due to Egypt's domestic production recovery," it stated. ■

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For the Record

ANADARKO Petroleum, the US company that has agreed to be taken over by Occidental Petroleum and whose liquefied natural gas assets will be sold to French major Total, has awarded the main engineering contract for the onshore Mozambique LNG plant to a consortium of companies from Italy, the US and Japan. The engineering, procurement and construction contract valued at more than $8 billion is led by Saipem of Italy and its main partner McDermott International of the US, while Chiyoda Corp. of Japan will fill an advisory role. Anadarko is proceeding with its Mozambique LNG commitments after agreeing to a takeover by Occidental after a bid valued at $55Bln, when Anadarko's debts are included, was chosen in May 2019 in preference to a rival bid from Chevron Corp. Occidental has already offset $8.8Bln of its acquisition agreement for Anadarko by agreeing to sell Total its Mozambique LNG stake and its African oil and gas assets. Anadarko is still operator of the Mozambique project and has a 26.5 percent stake and operatorship of the Area 1 of the offshore Rovuma Basin reserves that underpin the LNG venture. Other shareholders in the Area 1 licence and LNG project include the Japanese trading house Mitsui & Co. and three Indian companies, Bharat Petro Resources, ONGC Videsh and Oil India Ltd., as well as Thailand's national energy company PTTEP and the Mozambique state-owned oil and gas firm ENH. The onshore Mozambique project will have phase one output of almost 12.9 million tonnes per annum of LNG from two liquefaction Trains, as well as all necessary associated infrastructure, storage tanks and export jetty facilities. Saipem said its portion of the initial EPC contract was worth $6Bln and was subject to a full notice to proceed, expected to be issued after the final investment decision is taken. "After many years of dedication to this project, we are very happy to announce that we have reached full agreement for the contract," said Saipem Chief Executive Stefano Cao. "We congratulate Anadarko and its co-venturers for the achievement and are grateful for the confidence demonstrated towards our joint venture," added Cao. "With this project, we will strengthen our presence in East Africa, confirming Saipem's role among the leaders in the LNG market for the energy transition," he stated.

McDermott said its initial portion of the EPC contract award is worth approximately $2Bln. "LNG is helping to shape an entirely new era of energy solutions, and McDermott is playing a significant role in this global shift," said Tareq Kawash, McDermott's Senior Vice President for activities outside North America. "The Area 1 Mozambique LNG project will build on McDermott's industry-leading experience and demonstrate our ability to deliver comprehensive EPC solutions globally for world-scale LNG developments," added Samik Mukherjee, McDermott's Group Senior Vice President for Projects. Saipem and McDermott said they had established a new office in the Italian city of Milan, where a team from both companies will lead the project management, engineering and procurement in advance of sharing on-site construction management responsibilities. McDermott said it would perform engineering from both London as well as Gurgaon in India, a technology hub near New Delhi. The third EPC partner, Chiyoda. will only provide advisory services for the joint venture. Two other LNG projects are planned in Mozambique from another licence consortium. The Area 4 licence for Rovuma Basin resources is held by Italian energy company Eni and partners. The ventures include the Coral floating LNG joint venture with capacity of around 3.4 MTPA already under construction and scheduled to come on stream in 2022. The Area 4 onshore Mamba LNG project is also expected to be sanctioned in 2019 and production is scheduled to start in 2024. The Area 4 consortium is formed by Mozambique Rovuma Ventures, comprising Eni 25 percent, ExxonMobil 25 percent and China National Petroleum Corp. (PetroChina) with 20 percent. The remaining 30 percent of shares in that licence are held in parcels of 10 percent by South Korean utility and energy company Korea Gas Corp., Galp Energia of Portugal and Mozambique's ENH.

ANGOLA, the southwest African nation, a liquefied natural gas exporter to nations such as India and China, has signed an accord with an American company to set up LNG import facilities as part of a gas-to-power project. New Fortress Energy, the New York-based company listed on the Nasdaq global stock exchange, said it signed a memorandum of understanding with the Angolan Ministry of Mineral Resources and Petroleum for the development of a liquefied natural gas terminal to supply LNG to Angola for power generation. New Fortress is the operator of Jamaica's LNG import arrangements through the chartered floating storage and regasification unit, the "Golar Freeze", deployed offshore the Caribbean island. Under the accord, New Fortress would fund, build, and operate an Angolan LNG import and regasification terminal and supply gas for use in power and industrial facilities across Angola as part of economic development. The agreement was signed in the Angolan capital Luanda by New Fortress Chairman and Chief Executive Wes Edens and Diamantino Azeved, the Angolan Minister of Mineral Resources and Petroleum. President Joao Lourenco of Angola has also approved the accord with New Fortress.

"This partnership will provide cleaner, affordable natural gas to Angola, creating significant economic and environmental benefits," said New Fortress CEO Edens. "With Angola's transition to a gas economy, significantly lower fuel costs will encourage further investment and directly benefit Angolans," added Edens. "We commend President Lourenco and the government of Angola for their leadership and look forward to building this historic partnership," he stated. Angola itself has been an LNG exporter since 2012 from a $10 billion project in the north of the country and whose main shareholders are Chevron Corp., France's Total, BP of the UK, Italy's Eni and Angolan state energy company Sonangol. The liquefaction plant is located at the town of Soyo, near the Congo River, and has a nameplate capacity of 5.5 million tonnes per annum from a single Train. The African nation's current LNG trading also sees volumes shipped to Middle East countries like the United Arab Emirates and Kuwait as well as to Europe. "The signing of this MOU is the first step in moving Angola to become a gas economy," said Angolan Minister Azeved. "This unprecedented event involves the approval of three ministries and is supported by the President of Angola to move the country in a new direction," he stated. The MOU is non-binding on the parties and the actual terms of any definitive agreement have still to be worked out.

APA GROUP, Australia's largest natural gas infrastructure company, has signed a preliminary agreement to identify a pipeline route to connect the Galilee Basin in Queensland to Australia's East Coast domestic gas market and to LNG export plants. APA is the leading pipeline company with its gas transmission network spanning every state and territory on mainland Australia and delivering about half the nation's gas. The company has signed a memorandum of understanding with Vintage Energy and Comet Ridge, two exploration and production companies. Under the terms of the accord, APA said its proposed route to market would also allow for gas to be supplied to large mining projects planned for the Galilee Basin, giving them an alternative to using diesel for their operations. APA said the work programme would include ground surveys and engaging with local stakeholders, undertaking initial environmental studies and applying for a Pipeline Survey Licence. APA, Vintage and Comet Ridge have agreed on a framework to negotiate a Gas Transportation Agreement (GTA). Under this GTA, APA would build, own and operate the pipeline infrastructure and other related facilities to transport gas from the Galilee Basin's joint venture permits held by Vintage and Comet Ridge.

The nearest town to the Basin is Moranbah, about 250 miles west of Curtis Island and the port of Gladstone, where three coal-seam-gas to-LNG plants are located, the Queensland Curtis facility, the Gladstone LNG joint venture and the Australia-Pacific plant. "We are pleased to be progressing to the next stage of work with Comet Ridge and Vintage to enable the development of the Galilee Basin as a new source of gas for Australia's East Coast," said APA Managing Director Mick McCormack. "APA continues to work collaboratively with gas producers in the Galilee and Bowen basins to enable gas resources to be connected to market," added McCormack. "The interconnected nature of APA's East Coast grid will enable producers such as Comet Ridge and Vintage, to explore opportunities to market their gas in domestic and international gas markets," he stated.

AUSTRALIAN liquefied natural gas shipments have just been recorded at 81 million tonnes per annum on an annualised basis, keeping the nation ahead of Qatar's nameplate capacity of 77 MTPA and maintaining its new leadership as the No. 1 global exporter. With the start-up of the Royal Dutch Shell Prelude floating LNG project offshore northwest Australia,

the country's total capacity will soon rise to 87.5 MTPA, according to a monthly report on volumes up until April from consultants EnergyQuest. The report noted that while LNG contract prices generally improved in the first quarter of 2019, the volume of Australian exports came off the boil due to a series of technical issues at West Coast plants and the brief interruption of Cyclone Veronica. National production in the first quarter totalled 18.0MT, down 7.2 percent from the 19.4MT recorded in the fourth quarter of 2018, though still 12.6 percent up compared with the first quarter of 2018. "Production from Western Australian LNG projects dropped by 17.9 percent, or 2.2MT, to 10.1MT in the first quarter compared to the fourth quarter," said EnergyQuest. "East Coast LNG shipments reached a record 5.6MT in the first quarter on the back of record coal-seam-gas production," added the report.

CANADIAN LNG project company Woodfibre, thee Asian-based developer of a small-scale venture in British Columbia, has received provincial authorization to continue clearing the brownfield site near the town of Squamish that was previously a pulp mill. "The Environmental Assessment Office has formally accepted an application from Woodfibre LNG for an amendment to the Environmental Assessment Certificate," said BC EAO. A request to alter the certificate came from David Keane, President of the Woodfibre LNG project company. The Woodfibre venture is owned by Pacific Oil & Gas, a subsidiary of the Royal Golden Eagle group of Indonesian businessman Sukanto Tanoto and whose headquarters are in Singapore. The Woodfibre liquefaction and export plant is being built on the former pulp mill north of Vancouver and is licensed to export more than 2 million tonnes per annum of LNG. The relatively small-scale Canadian LNG project is expected to start commercial operations by about 2023. Woodfibre has now received clearance to continue site management and remediation activities unrelated to the actual construction of the liquefaction plant. The company said that it considered continuing the ongoing remediation of the Woodfibre property and removal of existing infrastructure was required regardless of the future use of the Woodfibre property and whether or not the project proceeds. The LNG project site is about seven kilometres southwest of Squamish and there was still infrastructure remaining from the Woodfibre pulp mill that operated from the early 1900s to 2006.

"Examples of facilities that are operating at the Woodfibre property and must be managed in accordance with existing permits are a small craft dock, small hydroelectric plant, wastewater treatment plant, and landfill," said Woodfibre. "Since acquiring the property in 2015, Woodfibre LNG has been working to remove the remnants of the previous pulp mill beginning with infrastructure that poses a safety or environmental hazard, particularly structures that contain asbestos, lead paint or other hazardous materials," it added. Woodfibre said that in order to continue the remediation work at the Woodfibre property in accordance with the wishes of the Squamish First Nation project stakeholders, Woodfibre has received permission to undertake various works in the short term. These include the removal and crushing of concrete slabs, the demolition and disposal of a former First Aid building, the removal of a pedestrian bridge and other work such as sludge removal and the capping of a landfill. "Remediation and removal of additional legacy infrastructure will be ongoing. There will not be any remediation or removal work below the high-tide mark or within Mill or Woodfibre creeks," stated Woodfibre. The Squamish First Nation supported Woodfibre's request and explained in an accompanying letter to the BC Environmental Assessment Office that the remedial work was being carried out by a First Nation-owned company. Project owner Pacific Oil & Gas continues to advance its project activities and recently agreed to acquire Calgary-based Canbriam Energy, a low-cost producer of shale gas in the Montney basin of northeast BC ahead of a final investment decision. The PO&G purchase of Canbriam includes its natural gas processing plants and water-handling infrastructure to support natural gas pipeline transportation. "Canbriam is one of the lowest cost producers in the Montney and we welcome the opportunity to work in Canada and produce some of the cleanest natural gas," said PO&G. The Woodfibre LNG project is one of the few moving forward on the Canadian West Coast where more than a dozen were previously planned. Woodfibre owner PO&G also has LNG import assets in China. It holds a 35 percent stake in the Rudong LNG import terminal in China's eastern Jiangsu Province, with 55 percent held by Kunlun Energy, a Hong Kong-listed subsidiary of PetroChina.

CHART INDUSTRIES, the US LNG and industrial gases equipment provider, received commitments for $1.1 billion in financing to help fund the acquisition and integration of Harsco Corp.'s industrial Air-X-Changers business, Harsco AXC. The acquisition is now complete. The financing provided cash for Chart's previously announced takeover of Harsco AXC. "We are very pleased with the overwhelming support from existing and new banks to offer committed funding to Chart," said Jill Evanko, the Chart Chief Executive. "Their support further affirms the strategic direction of this acquisition and our plan for profitable future growth," added Evanko. Chart, based in the outskirts of Atlanta, Georgia, agreed in May 2019 to take over Harsco in its fourth acquisition in two years as it continues to receive LNG orders for key equipment. The Harsco AXC business specializes in gas compression coolers.

Harsco AXC is projected to generate net sales of around $260 million in 2019, and a 23 percent gross earnings margin as a percentage of sales. "With over $20M of cost synergies expected in the first 12 months of ownership, we expect further margin expansion in the business," said Chart. The Chart acquisition is the fourth in the past two years after other takeovers in the US and Europe. Chart first expanded its business in 2017 by acquiring German company VCT Vogel, a servicer of cryogenic and mobile gas tank equipment and trucks and a European leader in truck-mounted drive and control systems. The takeover of the German company followed its $410M cash purchase of smaller US sector rival Hudson Products for its range of air-cooled heat exchangers and axial flow cooling fans for the refining, petrochemical and natural gas markets. Then in September 2018, Chart agreed to acquire Italian company VRV S.p.a., an engineer and designer of cryogenic equipment whose offerings also complement Chart's products. The Harsco group said the proceeds from selling its Harsco AXC gas compression subsidiary would be used to pay debts and provide the parent company with additional financial flexibility to continue investing in other growth opportunities. Harsco recently entered into an agreement to acquire Clean Earth Inc., a specialty waste company, further accelerating its transformation into an environmental solutions operator.

CHART said it booked another order for a liquefier, compressor and tank equipment for a utility-scale project in the US Northeast. The Towanda project is a 50,000 gallon per day nitrogen cycle liquefier in Pennsylvania and the order is valued by Chart at $10.4 million. The venture is scheduled to be in production by the end of 2019. Chart said it was working on the project with a US company called Odin, formerly Northstar Industries, a leading LNG and natural gas infrastructure engineering firm that Chart has partnered with many times. Chart noted that there was growing utility-scale demand in the LNG market in various parts of the US. Duke Energy, the parent of Piedmont Natural Gas, continues to progress its LNG strategy. Piedmont announced the start of its construction of a 1 billion-cubic-foot storage facility with an estimated completion date in the summer of 2021. Earlier in 2019, Chart said it booked an order from Nikkiso Cosmodyne for the supply of brazed aluminum heat-exchangers for a major utility company.

"Our unique position of providing equipment and process for liquefaction, storage and transport across the LNG cycle supports the utility-scale LNG and small-scale LNG customers," stated Chart Chief Executive Jill Evanko. "We expect this LNG application to gain momentum as utility companies seek alternative, standardized, cost effective solutions to the increasing demand on power grids," she added. Small-scale and utility-scale LNG is projected to grow to between 75 million and 95 million tonnes by 2030. "In the next three years, we estimate total market opportunity to be over $650 million for Chart equipment and process on these applications," said the company, based near Atlanta, Georgia. Outside of the US, Chart said there were significant opportunities for LNG to drive power demand, especially in southern Europe and the Southeast Asian regions.

CHENIERE Energy, owner of the Sabine Pass export plant in Louisiana and the Corpus Christi facility in Texas, has signed a long-term feed-gas supply agreement with US exploration and production company Apache Corp. to underpin its expansion plans at the Texan plant. The Houston, Texas-based company said its Cheniere Corpus Christi Liquefaction Stage III subsidiary signed an agreement with Apache for 140,000 million British thermal units per day of natural gas for a term of around 15 years. The Apache feed-gas will come from the Permian Basin, the prolific shale production region in West Texas and southeast New Mexico. The expected LNG

output associated with this gas supply, approximately 0.85 million tonnes per annum, will be marketed by Cheniere to global LNG customers. Apache will receive an LNG price, net of a fixed liquefaction fee and certain costs incurred by Cheniere, for the natural gas delivered to Corpus Christi Stage III under this agreement. Cheniere said the LNG price was based on international LNG indices. The company has already filed an application with the Federal Energy Regulatory Commission to site, construct and operate the Stage III Corpus Christi expansion. Cheniere's Stage III development is for up to seven mid-scale liquefaction Trains adjacent to the current Corpus Christi development of three large-scale Trains with output of 13.5 MTPA, with two Trains already completed.

The seven mid-scale Trains will each have nominal capacity of around 1.4 MTPA. The total expected nominal production capacity of the mid-scale Trains is about 9.5 MTPA of LNG, taking total production at the Texas plant to 23 MTPA. "This first-of-its-kind long-term agreement with Apache represents a commercial evolution in the US LNG industry, as it will ensure the continued reliable delivery of natural gas to Cheniere from one of the premier producers in the Permian Basin, while enabling Apache to access global LNG pricing and receive flow assurance for its gas," said Jack Fusco, Cheniere's President and Chief Executive. "This commercial agreement, which is expected to support the Corpus Christi Stage III project, reinforces Cheniere's track record of creating innovative, collaborative solutions to meet customers' needs and support Cheniere's growth," added Fusco. John J. Christmann, Apache's CEO and President said Apache's agreement with Cheniere was part of the company's long-term strategy to leverage the scale of its Permian assets and diversify its customer base and cost structure. "We are pleased to partner with Cheniere in this innovative marketing agreement," added Christmann.

CHINESE liquefied natural gas imports increased in April by almost 34 percent compared with the same month of 2018 amid a slump in spot cargo prices and overall demand. China imported a total of 4.54 million tonnes of LNG in April 2019 compared with 3.39MT in April 2018, a rise of 33.9 percent over the same month a year ago, according to the nation's General Administration of Customs. The total of LNG imports for the January-April period was given as 19.45MT, an increase of 40.3 percent for the fourth-month period year-on-year. The shipments were encouraged by lower LNG cargo prices for North Asia of under $6.00 per million British thermal units for April 2019. Chinese LNG imports had risen 25 percent in March compared with the same month a year ago as the nation has also begun to improve its natural gas storage facilities to help meet peak demand. The March LNG imports were 4.06MT versus 3.25MT in March 2018. Prices in March 2019 had been above $6.00 per MMBtu before dropping at the end of the month. Among the main suppliers of shipments to China in April 2019 were nations such as Qatar, Australia, Indonesia and Nigeria. Among the high volume of Australian cargoes, the 74,100 cubic metres capacity carrier "Cesi Gladstone" unloaded a shipment on April 13 at the Chinese Tianjin onshore terminal, operated by Sinopec, from the Australia-Pacific export plant in Queensland.

China's National Development and Reform Commission has been working to encourage companies to expand the gas pipeline network, improve gas storage and is now seeing results in enabling the system to meet peak demand when required. China generally uses depleted or abandoned gas fields and reservoirs to build underground storage as they are more effective and economical compared with spherical tanks above ground. The state-owned major, China Petroleum & Chemical Corp., also known as Sinopec, has now started sending natural gas imported at its Tianjin LNG terminal east of Beijing, to the newly-built Wen 23 underground gas storage facility at Puyang in northern Henan province. The Wen gas storage was part of the China's 13th Five-Year Plan to benefit Hebei and Henan provinces and was rebuilt from an exhausted gas field and put into operation in mid-March 2019. Sinopec said that the storage is connected to its own Ordos-Anping-Cangzhou gas pipeline, which is 700 kilometres long and includes one trunk line and two branch lines linking eight cities and 23 counties. The pipeline has been in commercial operation since November 2018. The underground storage gives Sinopec's gas supply optionality and flexibility during peak demand in northeast China.

EXMAR, the Belgian shipping line and owner of the "Tango FLNG" hull chartered to Argentina, said the production vessel has now been fully commissioned after the loading of the first cargo. "The performance acceptance tests have been successful, the first cargo has been offloaded and will be exported out of Argentina," said Exmar. "With this first shipment the start-up of the Tango FLNG is accomplished in a record time following the contract signing in November 2018 and delivery acceptance of the unit in Bahia Blanca in February 2019," explained Exmar. Antwerp-based Exmar said the First Argentine shipment has been possible thanks to the excellent cooperation between the teams of Argentine energy company YPF and Exmar. Exmar stated that the first YPF LNG cargo amounted to around 25,000 cubic metres of gas from Vaca Muerta shale gas reserves in northwest Argentina and marked the entry of Argentina to the club of global LNG exporting nations.

"For Exmar, the successful performance test in Bahia Blanca confirms the technical capabilities of the 'Tango FLNG', the first such vessel operating in the Americas," said Nicolas Saverys, Exmar's Chief Executive. "The unit is generating earnings since early May and is expected to be fully on stream after the Argentine winter season," added the CEO. "Exmar's Board of Directors and Executive Committee wish to thank all employees and stakeholders in this project for the great dedication and impressive execution work over the past months," said the Belgian company. The "Tango FLNG" plant is chartered under a 10-year agreement from Belgian shipping company Exmar. The vessel is the former floating liquefaction unit, "Caribbean FLNG", constructed for a cancelled venture in the South American state of Colombia and renamed before being sent to Argentina. YPF did not specify the destination of the first shipment, though said the sales operation was helped by the marketing arm of US LNG exporter Cheniere Energy. Growing natural gas production from the Vaca Muerta shale play in northwest Argentina will eventually meet all of the nation's energy requirements and leave a surplus for export.

EXXONMOBIL Corp and BP of the UK plan to invest more administrative funds with Alaska Gasline Development Corp. into the Alaska LNG project to keep it moving forward in terms of resource availability and the regulatory process. The two energy majors will spend a further $20 million to help advance the state's $43 billion Alaska liquefaction and export plant using their natural gas resources from the state's North Slope reserves. The two companies, along with ConocoPhillips, had backed out of the project as investors in 2016 amid concerns about its global competitiveness after they had already spent $500M on studies, field preparations and regulatory presentations. Since then, the state of Alaska has tried to advance the project on its own with potential support from Chinese energy and banking companies. Damian Bilbao, vice president of commercial ventures for BP in Alaska, said at an oil and gas conference in Anchorage that the company was optimistic that the project's cost could be reduced to below $40Bln. Alaska's deputy governor Kevin Meyer said at the conference that ExxonMobil and BP had each committed an additional $10M as the project continues to refine details while it seeks authorization from the Federal Energy Regulatory Commission. The state will cover the remaining $10 million of the expected costs before FERC makes that decision in 2020. The Alaska project is designed to liquefy 3.5 billion cubic feet per day of gas for sale to customers in the Asia-Pacific region from a liquefaction facility to be built in Nikiski on the Kenai Peninsula, south of Anchorage. The venture includes a pipeline of 807 miles in length linking the gas fields to the liquefaction facilities with several interconnections for domestic supplies. The FERC recently delayed the date it expects to finally decide on the LNG project to June 2020 from February 2020.

"When the governor took office, he made it clear that we needed participants with the credentials and the resources necessary in order to make a project of this scope work," said Meyer, the deputy of Alaska Governor Michael Dunleavy. "The involvement of BP and Exxon provides confidence that all future decisions regarding Alaska LNG will be rooted in world-class LNG experience," added Meyer. Damian Bilbao, Vice President of Commercial Ventures for BP in Alaska, said the company has at least one big reason to put money into the project. "Alaska gas remains BP's single largest global undeveloped resource," he said. Bilbao said it was significant that industry and the state were collaborating on the project again. "The state has made good progress over the last several years. And, working together with Exxon and AGDC we think we can unlock some additional opportunities," he said. "But we'll just have to see in a few months after some work gets done where the project is relative to other opportunities around the world," stated Bilbao. ConocoPhillips has also said at the conference that it was willing to sell its natural gas to the project and was engaged with the state in negotiating a

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gas-sales agreement. BP and ExxonMobil have provided technical expertise to Alaska LNG as it moves through the federal regulatory process. Last year, they signed precedent agreements spelling out the price and other terms of gas sales to the project. AGDC has been negotiating with several parties interested in the project, though these efforts have been weighed down by the political and trade disputes between the US and China. Alaska LNG had been expecting to sign a joint development agreement with the Chinese energy major China Petroleum & Chemical Corp., also known as Sinopec, and possible finance deals with China's sovereign wealth fund, China Investment Corp. Capital and the state-owned Bank of China. A formal agreement was been delayed several times because of the US-China trade dispute and has now been side-lined until trade relations improve.

FLEX LNG, the growing LNG shipping company with four vessels operating and nine others on order and whose largest shareholder is a company controlled by Norwegian magnate John Fredriksen, reported wider first-quarter loss, though remained confident of a market turnaround. The company, listed on the Oslo bourse, reported a first-quarter net loss of $3.4 million compared with a loss of $1.77M in the same three months of 2018 and net income of $15.2M in the last quarter of 2018. The nine carriers under construction are set for delivery between 2019 and 2021 and will give Flex the ability to be present in all three trading basins. Flex said its first-quarter vessel operating revenues were $19.14M in the first quarter compared with $15.05M in the year-ago quarter and $36.10M in the final quarter of 2018., while ship operating expenses jumped. "Vessel operating costs, which include voyage related costs, broker commissions, claim expense, technical operating expenses and charter hire expense amounted to $8.3M in the first quarter 2019, compared to $6.0M in the fourth quarter of 2018. The increase in vessel operating costs was primarily due to vessels being off-hire in the first quarter, with associated positioning and idle costs, partly offset by reduced claims expense," it added. Flex said the outlook for LNG shipping demand remained sound due to new liquefaction capacity coming on-line in the western hemisphere, coupled with robust demand growth in the eastern parts of the world. "Traditionally market analysts have estimated shipping demand to increase by 1.3 LNG carriers per new million ton of liquefaction capacity per annum. Recent liquefaction growth in USA and Russia yield a higher multiple as the distance from supply to key markets are considerably longer implying tonne miles growth," explained Flex. "Flex expects the market for energy efficient modern LNG carriers to improve going forward, as mere seasonal effects fade, and the markets stabilize," added the company.

The company has also just announced that it had publicly filed to list its shares on the New York Stock Exchange as well as Oslo. "The first half of 2019 has been challenging due to the disruption in the LNG trade caused by a unseasonably mild winter, a glut of LNG hitting the market as well as shift in trading patterns favouring shorter hauls to Europe," said Flex Chief Executive Oystein M. Kalleklev. "We in Flex have deliberately elected to sail against the current to be able to position us for the shift in currents expected to take place in the second half of the year. With tighter market and significant contango (where the future spot price is below the current price) in the gas market we are upbeat about the outlook for owners of uncommitted two stroke LNG carriers," he added. "Furthermore we continue to strengthen the organization with insourcing of ship management with the aim of delivering the highest standard in terms of customer experience," stated Kalleklev. "Additionally, our US listing will give us access to a larger and deeper capital market which is advantageous in such a capital intensive shipping segment as LNG transportation," said the CEO. At the end of the quarter reporting period in April, the company signed a $250M secured term loan facility for the financing of "Flex Constellation" and "Flex Courageous". "The facility is expected to be drawn upon delivery of the vessels from the shipyard, scheduled for June and August 2019, respectively," said Flex. "In April, the company also entered into a $300M sale and charter-back transaction with Hyundai Glovis (South Korea) for the vessels 'Flex Enterprise' and 'Flex Endeavour'. The transaction is expected to close in the third quarter 2019," the company said.

FREEPORT LNG, the project advancing towards first output by the end of 2029 in Quintana Island in Texas, has received approval from the US Department of Energy for the export of Train 4 volumes to Non-Free Trade Agreement countries, opening the way for marketing to start. Freeport LNG's fourth liquefaction Train is part of the company's existing natural gas liquefaction and LNG export facility being completed. The company recently received approval from the Federal Energy Regulatory Commission to site, construct and operate its fourth Train. Freeport LNG's Train 4 is expected to add more than 5 million tonnes per annum of LNG production to its existing project, increasing the total export capability of the 4-Train facility to over 20 MTPA. About 13.5 MTPA of this capacity has been contracted under 20-year tolling agreements to Japanese utilities Osaka Gas and JERA Co. Inc., BP of the UK, South Korea's SK E&S, while a fifth deal with Toshiba Corp. is currently being off-loaded by the troubled Japanese company.

There is also a sixth deal, a sales agreement for 500,000 tonnes per annum contracted to international commodities firm Trafigura in the form of a three-year accord starting in 2020. "We appreciate the Department of Energy's swift approval, closely coupled with the recent FERC approval, which enables us to further advance our project development and marketing efforts for Train 4," said Michael Smith, Chairman and Chief Executive of Freeport LNG. "Having DOE's approval marks another significant milestone for Freeport LNG, which brings us one step closer to our goal of moving ahead with Train 4 construction later this year," added Smith. Train 4 will come on stream in 2023. Freeport LNG's export facility currently consists of three liquefaction Trains, with Train 1 scheduled for commercial start-up in the third quarter of 2019, and full three-Train operations are anticipated by mid-2020.

GAS AUTHORITY of India, one of the main liquefied natural gas importers for the nation and with US volumes from Cove Point in Maryland and Sabine Pass in Louisiana, recorded its highest ever annual net profit, boosted by its LNG business. State-run GAIL said its annual profits for the fiscal year just ended came to 6,026 crore rupees ($865.26 million), a rise of 30 percent from 4,618 crore rupees ($663.08M) reported in the previous year. The company said it aimed to use its healthier balance sheet to raise funds for more natural gas pipelines, particularly for East Coast cities. GAIL said its turnover during the past year was up by 39 percent to 74,808 crore rupees ($10.74 billion) while profit before tax rose by 31 percent year-on-year to 9,085 crore rupees ($1.30Bln). During the year, GAIL said it registered 14 percent growth in the natural gas marketing division and 10 percent growth in the fourth quarter. Natural gas transmission volumes were up by 3 percent and Petrochemicals sales increased by 12 percent. "All segments contributed positively to the company's profit during the year," said Managing Director B. C. Tripathi. "The Gas Marketing, Gas Transmission, Liquid Hydrocarbons and Petrochemicals segments performed better than the last year due to improved volumes coupled with better sales," added Tripathi GAIL will be importing more US volumes in the coming year from the 20-year LNG supply contract it has with Cheniere Energy's Sabine Pass plant. The company additionally has a 20-year tolling agreement for its own feed-gas to process cargoes and export them from the Cove Point plant on the US Atlantic Coast. GAIL said it aimed to import 75 LNG cargoes to Indian terminals in fiscal 2019-2020 compared with 62 cargoes in the previous fiscal year. Its Indian competitor in LNG imports is Petronet LNG which has a contract for 1.4 MTPA from ExxonMobil's share of the Gorgon LNG volumes in Western Australia.

Petronet also receives 7.5 MTPA from Qatar's Ras Laffan plant under a contract running until 2028. The Indian West Coast terminals near Mumbai at Dahej and Hazira, as well as Dabhol, receive most of India's LNG imports. The re-elected Indian Prime Minister Narendra Modi also inaugurated the first Indian East Coast LNG terminal earlier in 2019 at Kamarajar Port near Chennai in the state of Tamil Nadu. The facility is owned by Indian Oil Corp., the refining and fuel marketing company, and has 5 MTPA of capacity. GAIL is at the centre of India's build-out of a natural gas pipeline network to improve economic development prospects and the switch to cleaner fuel in the cities. "GAIL is fully committed to build the natural gas infrastructure in the country hitherto untouched until the last mile of connectivity," explained Tripathi. "Pipelines like other infrastructure have a long gestation period and GAIL would be borrowing substantially by leveraging its strong balance sheet to complete the natural gas infrastructure in the larger national interest," he stated. The Indian East Coast is also securing more pipeline infrastructure being pushed forward by Prime Minister Modi to boost city-gas connections. The current phase pipeline expansions involves laying an additional

2,540 kilometres of pipelines in five eastern states to provide gas for 40 districts and 2,600 towns and villages.

HOEGH LNG, the Norwegian LNG fleet owner and project developer, posted lower profits and higher revenues in the first quarter as it expects four new regasification ventures, two of them in Australia. Hoegh reported first-quarter net profits of $4.51 million compared with $13.21M in the same three months of 2018. The company said the decrease in profits was the result of lower earnings from the amended contract for the "Höegh Gallant" floating storage and regasification charter with Egypt Natural Gas Holdings Company at Ain Sokhna port in the Gulf of Suez and higher depreciation and interest expenses. Hoegh's total quarterly revenues rose by 16.5 percent to $84.29M from $72.29M in the same quarter of 2018. Operating profit was $29.74M versus $26.79M in the year-ago quarter. In its operations and marketing, Hoegh said it won exclusivity and had been selected for a total of three FSRU contracts. "Of these, two developments are based in southeast Australia while the third addresses a south Asian market. In addition, the group remains involved in the final round for one ongoing FSRU tender," said Hoegh. The Norwegian company was selected during December 2018 by a subsidiary of AGL Energy as the FSRU provider for its LNG import facility under development at Crib Point in the Australian state of Victoria. The signed time charter party (TCP) is for a period of 10 years with anticipated start-up in 2020-2021. "The contract remains conditional on a final investment decision by AGL in relation to the project, and on the receipt of key regulatory approvals," said Hoegh. The FSRU assigned to the Crib Point project is expected to generate annual earnings of between US$29M and US$31M, depending on planned technical modifications which may be specified by AGL before project start-up. The most likely FSRU candidate for this project is the "Hoegh Giant" FSRU. Hoegh added that it had achieved exclusivity for the Australian Industrial Energy (AIE) import project at Port Kembla in Australia. AIE has received a development consent award from the New South Wales government, meaning the project is ready for construction subject to a final investment decision. AIE intends to install an FSRU to supply the New South Wales natural gas market and is backed by a consortium consisting of Squadron Energy, owned by Australian industrialist Andrew Forrest, JERA Co. Inc. of Japan, the largest buyer of LNG in the world, and Japanese trading house Marubeni Corp., a major trading and investment firm.

Hoegh plans to use its FSRU No.10 for this project. The latest vessel is scheduled for delivery from the Samsung Heavy Industries shipyard in South Korea by August 2019, "Progress has also been made by the third project to which the group has been granted exclusivity. Intended for a south Asian market, this is in the process of securing the operating permits it needs and a final investment decision," said Hoegh without disclosing the name of the other party nor its exact location. The fourth project, where Hoegh is in the final selection round, is targeting a decision by mid-2019. Hoegh said it was additionally involved in several other tender processes at various stages of development. "China remains a key focus area, since growth in regasification capacity has lagged behind the increasing demand for natural gas for the Chinese market," stated Hoegh. The company also noted that its FSRU "Independence" deployed on the Baltic coast of Lithuania successfully underwent its first class-renewal survey while afloat in Klaipeda harbour. "Since the survey was performed without the requirement to re-position to a dry dock, time out of service was minimised," said Hoegh. "The 'Independence' is now approved for another five years of service until its next renewal survey, which comes up in 2024," added the company. Hoegh said that three other vessels, the "Hoegh Gallant", the "Neptune" in Turkey and the "FSRU Lampung" in Indonesia, will undergo their five-year class renewal surveys later this year. "While 'FSRU Lampung' and 'Neptune' are to be surveyed afloat, the 'Hoegh Gallant' will be dry-docked since it currently trades as an LNG carrier," added Hoegh.

KINDER MORGAN, the US pipeline company, said it was still delaying the start-up of its Elba Island LNG export plant in Georgia after receiving regulatory permission in early March to introduce feed-gas into its systems comprising 10 small-scale liquefaction Trains. Elba Island is an existing import terminal that has been transformed into an export plant to produce an initial 2.5 million tonnes per annum of LNG. The Georgia terminal is among three US liquefaction facilities that are expected to begin service in 2019, adding to the country's growing energy export industry. Kinder had initially expected the first Train to come on stream by the end of March and the remaining Trains following during the year. However, the project had also been hit by minor construction delays and the original start-up day was gradually pushed back from the end of 2018. "The start-up of Elba has been delayed due to additional common commissioning issues that are systematically being addressed on the first of the 10 liquefaction units," said the company. "We will issue a press release when we have resolved the issues and are in service," it added. Kinder did not say how long the delay would last. Kinder's project near Savannah is utilizing Shell's Movable Modular Liquefaction System. The small-scale liquefaction trains were largely assembled off-site. Kinder, based in Houston, will have feed-gas needs equivalent to around 350 million cubic feet per day.

Of the three plants set for start-up in 2019, only Sempra Energy's Cameron LNG facility at Hackberry in Louisiana has shipped its first cargo after a series of delays. When Elba Island begins commercial operations soon followed by the Freeport plant in Texas, the US will double the number of export plants in operation. According to the Federal Energy Regulatory Commission, the liquefaction Trains 1-6 at Elba Island are expected to start entering service at one-month intervals. Elba Island's Trains 7-10 are then scheduled to come on stream in the third quarter of 2019. The Georgia project is supported by a 20-year supply contract with Royal Dutch Shell. The coming on stream of Elba Island on the East Coast would follow the shipping of the first cargo more than a year ago from the Cove Point in Maryland on Chesapeake Bay, operated by Dominion Energy. The two Cheniere Energy plants on the Gulf Coast at Sabine Pass in Louisiana and Corpus Christi in Texas and Sempra's Cameron plant give the US a current total of four plants in operation.

KOSMOS ENERGY, the Dallas-based company that made the natural gas discoveries to establish floating LNG export projects offshore Mauritania and Senegal, has announced a find in its home waters of the US Gulf of Mexico as it continues the sale process for parts of its African FLNG stakes. The US Gulf oil find was in Gladden Deep, a sub-sea tie back which is expected to be brought online through the existing Gladden pipeline to the Medusa spar in the fourth quarter of 2019. Kosmos said Gladden Deep was the first well of a four-well, infrastructure-led exploration program in the US Gulf for 2019. "Kosmos will drill the Moneypenny prospect in the third quarter, followed by the Oldfield and Resolution prospects in the fourth quarter," said Kosmos. "These three prospects are collectively targeting around 100 million barrels of oil equivalent net to Kosmos," it added. Kosmos has an exploration program balanced between proven basin infrastructure-led exploration in Equatorial Guinea and the US Gulf while pushing forward with its Atlantic Margin activities in the emerging basins of Mauritania and Senegal in West Africa and in Suriname on the northeast coast of South America.

"Although Gladden Deep is the smallest prospect in this year's drilling campaign, it is a prime example of our strategy in action, targeting high margin, high return barrels that can be quickly brought online through existing facilities," said Chairman and Chief Executive Andy Inglis. "This discovery continues the strong momentum we have seen in our Gulf of Mexico business unit, following the recent lease sale results and increased production from the Tornado-3 well coming online," added Inglis. The company is also exploring in frontier basins from Namibia in southwest Africa to the Ivory Coast in West Africa and offshore the island nation of Sao Tome and Principe. Kosmos revealed its intention in May 2019 to sell down its position in Mauritania and Senegal to around 10 percent and the sale process had "generated significant industry interest", with formal bids expected to be tabled in the third quarter of 2019. Kosmos made the Mauritania and Senegal discoveries and in 2016 and agreed to sell BP of the UK around 60 percent of the licences, while BP also took over operatorship. The US company retained around 30 percent of the Senegal fields and licence and about 28 percent of the project's Mauritania holdings. As of early May, all major contracts had been awarded for phase one of the West African FLNG project and construction had started on a floating production storage and offloading unit. The first gas from the Kosmos-BP FLNG Train 1 is scheduled for 2021 and the start of the second FLNG Train is set for 2023.

NOVATEK, the Russian natural gas company and operator of the Yamal liquefied natural gas plant and developer of the Arctic LNG II project, has signed an accord to set up a joint venture with a Russian bank and China Petroleum and Chemical Corp., or Sinopec, to market LNG in China. Novatek's Russian bank

partner is state-run lender Gazprombank, an arm of the largest natural gas company Gazprom. The heads of agreement was signed by China Petroleum & Chemical Corp., Novatek and Gazprombank following talks in Moscow between Russian President Vladimir Putin and Chinese President Xi Jinping. Final details of the Novatek-Gazprombank-Sinopec joint venture will still have to be worked out and company structures and shareholdings agreed. Novatel said other Chinese companies were already investing in the development of Novatek's LNG projects in the Arctic region as stakeholders in Yamal LNG and the Arctic II project on the Gydan Peninsula. "Creating a joint venture to trade LNG and natural gas in the domestic market of China not only facilitates sales of LNG produced, but also opens up opportunities for investments in the development of the end-customer segment in one of the largest and the fastest-growing gas and LNG markets in the world," said Novatek Chairman Leonid Mikhelson. "This represents another step in implementing our long-term strategy across the entire value chain from the extraction and liquefaction of natural gas to the sale of LNG to the customers," added Mikhelson.

Another Chinese major, China National Petroleum Corp. (CNPC), a shareholder in the Yamal LNG plant, said in April 2019 it would become a shareholder in Novatek's second venture Arctic LNG II. CNPC, whose affiliate PetroChina is listed on the Hong Kong Stock Exchange, said another subsidiary called China National Oil and Gas Exploration and Development Co. (CNODC) would hold the Arctic LNG II shares. The April binding agreement was signed in Beijing in front of Leonid Mikhelson, Chairman of Novatek, and Wang Yilin, Chairman of CNPC, and gives CNODC a 10 percent stake in the venture. Feed-gas for Arctic II will come from the Utrenneye natural gas field where reserves are estimated at 1,138 billion cubic metres. Novatek is making fast progress with its second project by signing equipment and engineering contracts for the liquefaction plant. Another Arctic II shareholder is French energy major Total, also a partner in Yamal LNG. Total has acquired a direct 10 percent stake in the venture. Total already owns a 19.4 percent stake in the Novatek company so its 10 percent direct stake gives it 21.6 percent of the Arctic II project. Contracts have also been signed with turbo-machinery provider Siemens of Germany and the oil and gas engineering firm, Saipem of Italy. The Arctic II project's final investment decision is expected to be taken in the second half of 2019, with plans to start up the first liquefaction Train in 2023. The venture will have three Trains, each with a capacity to produce around 6.6 million tonnes per annum. The Trains will be installed on Gravity Based Structures (GBSs) made of concrete and including LNG storage facilities totaling 687,000 cubic metres capacity.

OIL SEARCH, the Australian-based oil and gas producer based in the Papua New Guinea capital Port Moresby, said it was confident about the future of PNG LNG and its expansion project as the nation recovers from a political crisis. Oil Search Managing Director Peter Botten said in a speech to the Sydney Mining Club that success in PNG required a different approach to other parts of the world. "We face the same challenges as any producer, that of safety and economically getting oil and gas out of the ground and to market," explained Botten. "But we face different challenges in maintaining operational stability that requires us to take on a role in social development and nation building," he stated as PNG emerges from a month-long political dispute and change of government. "We work collaboratively with our joint venture partners, communities and government to develop resources in a responsible and equitable manner," he added. Botten outlined Oil Search's history from being an exploration company in 1929 to receiving its first production revenues 63 years later in 1992. It then became PNG's largest company and investor as it celebrates its 90th year in 2019.

Describing PNG as a "beautiful and constantly changing landscape" with its fair share of challenges, Botten said he had worked productively with all eight PNG prime ministers during his 26 years as head of Oil Search, including the newly elected Prime Minister James Marape. "Prime Minister Marape is a passionate new leader with strong values, and I look forward to working with him and his new government," said Botten. Talking about the LNG expansion, Botten said the next phase in PNG's gas development must move forward in a responsible manner and must consider lessons learnt on optimising a sustainable, responsible process. "The recent signing of the Papua LNG Gas Agreement was a major milestone," he noted. "The signing has allowed all project parties to proceed with confidence into FEED-related activities," he said. Botten also emphasized the importance of working with the new PNG government to complete the P'nyang Gas Agreement in a timely manner. "A lot of projects have been sanctioned around the world and we can't wait too long otherwise our place in the queue will change," said Botten. He mentioned that business and social imperatives intertwined in PNG and emphasised the importance of maintaining operational stability through social responsibility. "Respectful, open relationships with local landowners and all levels of government are at the heart of our current and future success," said Botten. "We invest in a range of social programmes and continue to support local communities to rebuild after last year's devastating earthquake, especially in public health and infrastructure," he added.

OLT OFFSHORE LNG Toscana, the Italian LNG import facility on the Mediterranean coast, said German utility Uniper has sold its stake in the terminal company to global equity fund First State Investments. OLT Offshore said the German-owned stake from Uniper amounted to 48.24 percent and has been transferred to First State Investments, though the value of the transaction was not disclosed. The remaining original shareholders are Italian utility, the Iren Group with 49.07 percent, and vessel owner Golar LNG with 2.69 percent. The company operates the "FSRU Toscana", moored 22 kilometres off the coast between the cities of Livorno and Pisa. The floating storage and regasification unit is connected to the Italian national gas transmission grid through a 36.5km pipeline from the shore to the mainland. OLT Offshore provides mainly peak-shaving services as part of the Italian government's energy security and diversification plan. The new investor First State said it was looking forward to working with its co-shareholders and employees to ensure OLT continues to provide a safe and reliable service. Since operations began in 2013, the FSRU has handled cargoes from 10 different countries, Algeria, Cameroon, Egypt, Equatorial Guinea, Nigeria, Norway, Peru, Qatar, Trinidad & Tobago and the United States. Re-loaded cargoes are also received from other European terminals such as Rotterdam and those in Spain. At full capacity, OLT Offshore's terminal can regasify 3.75 billion cubic metres per annum of natural gas, the equivalent of 2.77 million tonnes a year of LNG, or around 4 percent of Italy's annual needs. As part of the First Investment stake purchase Giovanni Giorgi, currently OLT's Operations Manager, has been appointed Managing Director in succession to Uniper's nominee Richard Fleischmann. Giorgi will serve as joint MD with Alessandro Fino, who has held the role since December 2014.

PAPUA NEW GUINEA has named former Finance Minister James Marape as the nation's new Prime Minister after a week-long crisis that has raised concerns about the timetable for the Oceania nation's liquefaction natural gas expansion project. Marape replaces Peter O'Neill after he stepped down amid a political crisis sparked by a loan for the government's energy activities and a share placement by Oil Search, the Australian Securities Exchange-listed PNG oil and gas company based in the capital Port Moresby. The new PM said in his appointment speech that he wanted PNG to be "the richest black Christian nation" in the world and added that he was committed to reviewing resource laws. Marape had led a series of high-profile defections from the former government and had raised concerns about key projects, including the Papua LNG expansion, which is set to double exports with more than $18 billion of investments by international energy companies. "We're not here to break legally binding project agreements but those project agreements must be sanctioned by law, if they have every tick ticked off, as prescribed by laws governing our nation, then they will stand the test of scrutiny," stated Marape. "But if we find that any project agreement, whether it's the PNG LNG project, or any project for that matter that does not have full provisions of law, then we are open to review," added the new PM. Marape also called for a leaked report from regulators into a US$830 million loan through an Australian branch of Swiss bank UBS to the PNG Government be immediately tabled in parliament. The report has allegedly made claims involving O'Neill and several other senior figures, including the new PM. The PNG LNG plant is operated by ExxonMobil and has several shareholders, including Australia-listed companies Oil Search and Santos and Japan Nippon Oil & Gas Exploration. French major Total has also acquired assets in the expansion. LNG project and expansion stakeholder Oil Search said there had been many false reports in PNG surrounding the UBS loan issue, including one that Oil Search Managing

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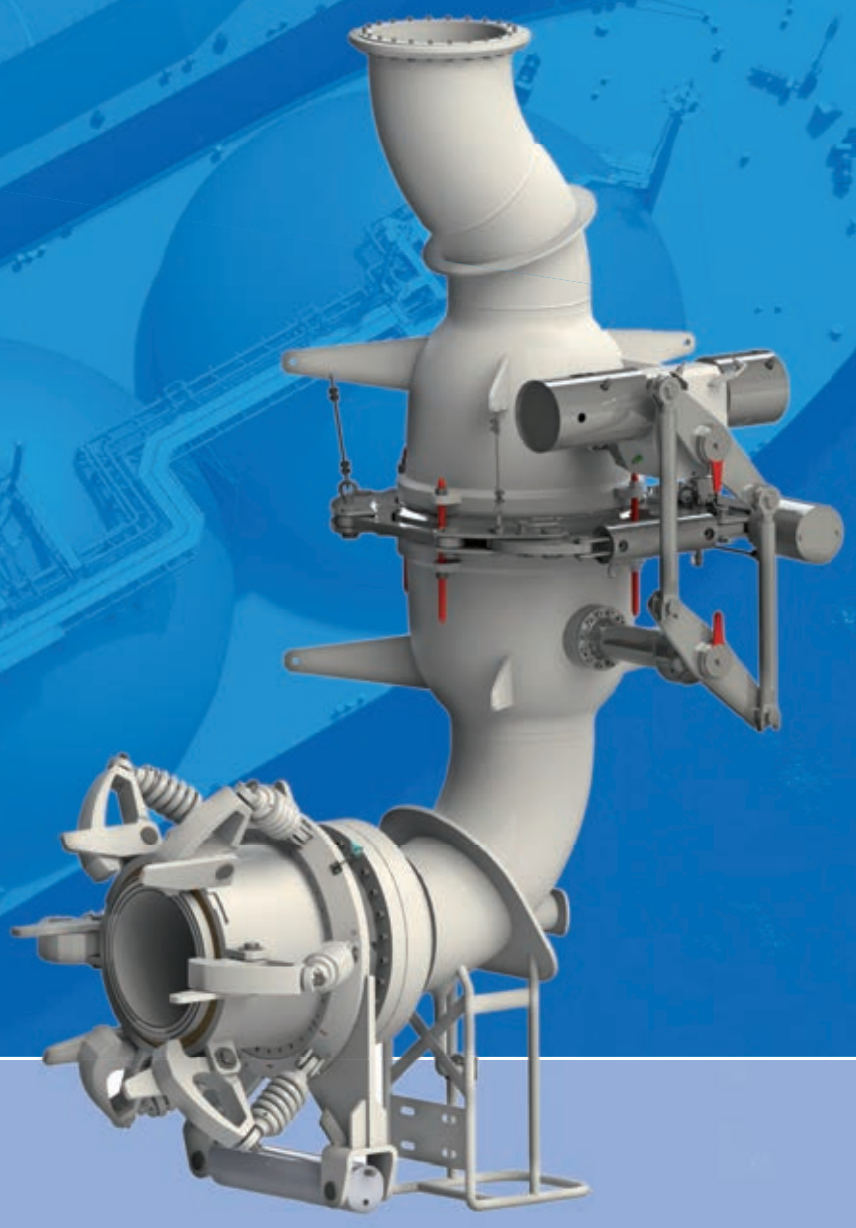

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Director Peter Botten had resigned, which was false.

"Oil Search is aware of recent media reports regarding a Union Bank of Switzerland (UBS) loan to the Government of Papua New Guinea. We are also aware of a report by the Ombudsman Commission of PNG into this UBS loan," said the PNG-based company. "As Oil Search and others were not contacted by the Ombudsman Commission during its investigations or given any opportunity to provide evidence or comment before issuing its final report, we wish to clarify some facts surrounding the UBS loan matter," it added. "Oil Search was not involved in, or a party to, the UBS loan, and no allegations have been made against Oil Search or Oil Search officers," stated the company. Oil Search did explain that the PNG Government subsequently approached Oil Search and expressed an interest in acquiring Oil Search shares via a share placement as the company had acquired a stake in the prolific onshore Elk-Antelope gas fields. "The rationale was that the PNG Government wanted to maintain a shareholding in the country's biggest oil and gas company and the largest investor in-country," said Oil Search. "The share placement was executed at a price of A$8.20 per share. The price was assessed by the Oil Search Board to be fair and reasonable for all Oil Search shareholders based on the alternative share issue opportunities and transactions by other companies at the time," explained Oil Search. "Oil Search and Oil Search officers were not involved in, or a party to, the UBS loan arrangements and have breached no laws," stated Oil Search. "The execution of this share placement to the PNG Government followed all standard market practices and was in full compliance with all relevant laws and regulations," it added. The PNG LNG expansion is for three new liquefaction Trains. Two of the proposed new Trains will receive gas from the Elk-Antelope fields and one Train will have feed-gas from the P'nyang field. Each of the three new PNG Trains will be constructed at the existing liquefaction plant northwest of the capital Port Moresby and will each have capacity of around 2.7 million tonnes per annum. The PNG plant currently produces almost 8 MTPA and the expansion will double the country's output.

Diary of events

September

Gastech
17-19 September 2019
NRG Center, Houston, TX, USA
www.gastechevent.com

Japan LNG Producer-Consumer
26 September 2019
Conference, Convention Center, Grand Prince Hotel New Takanawa, Tokyo, Japan
www.lng-conference.org/ english/

October

Singapore International Energy Week
29 October - 1 Movember 2019
Marina Bay Sands, Singapore
www.siew.sg

QATAR PETROLEUM has awarded the front-end engineering and design contract for the North Field expansion project's offshore pipelines and topsides facilities to liquefy and export an additional 33 million tonnes per annum of LNG. The contract was given to US energy engineering company McDermott Inc. and is expected to take 12 months to complete. The scope includes FEED for eight unmanned wellhead platform topsides, four 38-inch trunk lines and four 28-inch intrafield lines, and is expected to take 12 months to complete. The scope of the expansion at the Ras Laffan production complex involves an additional four Trains, each with 7.8 MTPA of output This would take nameplate output up to 110 MTPA from 77 MTPA when the expansion is completed by 2023 and 2024. The Qatari expansion amounts to more in volume than the LNG currently produced by nations such as Malaysia, Indonesia and Nigeria. Qatar's new onshore facilities will receive about 4.6 billion standard cubic feet per day of feed gas from the southern sector of Qatar's North Field gas reserves in the Gulf.

"The offshore topsides and pipelines are an important component of the North Field Expansion Project's implementation," said Saad Sherida Al-Kaabi, Qatar's Minister of State for Energy Affairs and President and Chief Executive of Qatar Petroleum. "We are pleased to have McDermott take part in this important effort," he added. Qatar has the southern portion of the North Field in Gulf waters and the other part is under the jurisdiction of neighbouring Iran. Qatar Petroleum added that progress was taking place on all other aspects of the expansion project. The company has issued an invitation to tender for the reservation of ship construction capacity mainly in South Korea for an initial 60 new LNG carriers to transport its volumes from the expansion at Ras Laffan and other projects such as its Golden Pass facility in the US Gulf Coast. Qatar Petroleum has asked executives of South Korean shipyards to free up berths over the next 12 months for a wave of Qatari LNG newbuilds. Samsung Heavy Industry, Hyundai Heavy Industries and Daewoo Shipbuilding & Marine Engineering specialize in constructing the Qatari Q-Flex and Q-Max tanker with between 210,000 cubic metres and 266,000 cubic metres capacity. Between 2004 and 2007, Qatar ordered 45 LNG carriers from the Korean yards when Daewoo built 19 Qatari carriers, Samsung constructed 18 vessels and Hyundai received orders for eight ships.

SANTOS, the Australian energy company and LNG market participant Santos has confirmed major oil and gas resources from well tests in the Bedout Basin, offshore Western Australia. Santos, a shareholder in the Gladstone and Darwin LNG plants and in the Papua New Guinea LNG facility, made its announcement citing analysis of its Dorado-2 appraisal well in the Bedout Basin. "Dorado opens a new basin with high prospectivity in permits where Santos has a high equity position and rich exploration inventory with potential to substantially grow the resource base," said Santos Chief Executive Kevin Gallagher. The Dorado-2 well is located in petroleum permit WA-437-P, about 160 kilometres north of Port Hedland and two kilometres away from the Dorado-1 discovery made in July 2018. The town of Port Hedland is 230km north of the major Western Australian LNG export terminal at Karratha, operated by Woodside Petroleum. Santos has an 80 percent share in the permit and Carnarvon Petroleum owns 20 percent. "The well was drilled down-dip approximately two kilometres from the Dorado-1 discovery and encountered 85 metres of net reservoir," said Adelaide-based Santos. "As expected, an oil-water contact was intersected at 4,003 metres measured depth, with 40 metres of net oil pay encountered," explained Santos. "An additional 11 metres of pay was encountered in the Upper Caley sands. Preliminary wellsite analysis indicates this upper zone is oil-bearing, but is subject to further analysis to confirm the hydrocarbon phase," said the company. "A further 32 metres of net pay was encountered in the underlying Baxter and Milne sandstones, with no fluid contacts intersected. Both sands are currently interpreted to be gas bearing, although similar to the Upper Caley, the Milne hydrocarbons will require further analysis," added Santos.

"The well result has increased confidence in the presence of large hydrocarbon columns in the Baxter and Milne reservoirs, which should result in a significant increase in natural gas resources relative to pre-drill estimates," stated the company. Santos said that wireline pressure testing confirmed that all the reservoirs are in pressure communication with the equivalent intervals in the earlier Dorado-1 well, mitigating one of the key pre-drill risks to a future development. "Initial indications are that fluid compositions are similar to the light oils and gases that were sampled in Dorado-1, where condensate yields ranged from 190 to 245 barrels per million standard cubic feet in the Upper Caley, Crespin and Milne Formations, and from 70 to 90 barrels per million standard cubic feet in the Baxter Formation," said the Santos statement. "The value of the discovery is greatly enhanced by the high quality reservoirs and fluids and the shallow-water setting, which should facilitate a cost-competitive development," said CEO Gallagher. "Acquisition of a major new seismic survey, the Keraudren 3D survey, is in progress to mature additional exploration opportunities for drilling along this significant hydrocarbon resource play," he added. The Dorada-2 well was drilled using the jack-up mobile offshore drilling unit, "Noble Tom Prosser" in a water depth of 91 metres and reached a total depth of 4,573 metres. Santos said that once wireline logging operations are completed, the well will be plugged and abandoned as planned, and the rig will move to the Roc South-1 exploration well before returning to drill Dorado-3.

SANTOS said it would embark on a battery project for the Darwin LNG plant in the Northern Territory to reduce carbon emissions by 20 percent from power generation, as well as cutting fuel-gas consumption and operating costs. Santos said the project was a world first for an LNG plant, and involves the integration of battery technology with existing power generation turbines so they run more efficiently. This will not only result in a significant cut in carbon emissions, but also a reduction in costs by saving on fuel use and maintenance. The project will now move into the front-end engineering and design phase of development, and is targeting completion by the middle of next year. Santos Managing Director and Chief Executive Kevin Gallagher said Santos was

committed to working with its joint venture partners towards a lower-carbon future.

"This is the latest of a number of carbon reduction actions we are taking across the company, and not the first time we are employing battery technology," said Gallagher. "We are converting oil well beam pumps to solar and batteries in the Cooper Basin, as well as investing $10 million to test the potential for carbon capture, utilisation and storage, also in the Cooper," explained Gallagher. Santos owns an 11.5 percent stake in the ConocoPhillips-operated Darwin LNG plant and is operator itself of the Gladstone facility in Queensland, as well as being a shareholder in the Papua New Guinea LNG plant and in its expansion project. Santos said it was also working on "significant solar installations" across our operations, including at Port Bonython in South Australia. "In Western Australia, we're replacing existing power generation turbines at our Devil Creek plant with higher fuel efficiency ones - not only reducing emissions by more than 25 percent but also generating carbon credit units as a registered project with the Emission Reduction Fund," added the CEO. "These initiatives are steps along the way to achieving our goal of net zero emissions by 2050," he added. "As well as cutting our carbon footprint, the Darwin LNG battery project - as with our solar and battery project in the Cooper - cuts costs and means we can sell more gas," stated Gallagher.

SHELL in Australia told the nation's main energy conference that in the wake of the election result, which saw the conservative coalition returned to power, the industry had an opportunity to "plant the seeds of positive public debate" around energy. "In the wake of the election, when armchair experts are hoarse from shouting, we have a real opportunity to drive real change," said Shell Australia chief Zoe Yujnovich in a speech at the annual Australian Petroleum Production and Exploration Association conference being held in Brisbane. "What we can do now is assist this coalition government to overcome the tumult that has surrounded energy and resources policy in Australia for too long," said Yujnovich. She stated that natural gas was the way forward for the traditional energy sector, because it enabled investment in renewables by providing the baseline gas-fired power which is much cleaner than the coal currently used. Gas-fired power is needed alongside renewable projects such as wind and solar ventures to prevent power cuts when the sun doesn't shine and the wind doesn't blow. She said getting the message out that natural gas was an ally, not an enemy, of renewable energy was key if the sector wanted to move forward with the support of the general public. "Armed with megaphones or iPhones, an increasing number of professional activists and increasing numbers of ideologically-driven volunteers are waging a virtual war with religious zealotry," she said. "What the industry needs to avoid is being drawn into the trap of either-or debates," added Yujnovich. Another speaker, Rick Wilkinson of Australian consultants EnergyQuest, warned against complacency as current circumstances point to a potential energy crunch with natural gas and LNG shortfalls.

Wilkinson said East Coast natural gas supplies coming mostly from Queensland are currently balanced, though at historically high prices, and are continuing to provide seasonal swing supplies for the states of southern Australia such as New South Wales and Victoria. However, the Gippsland field supplying Victoria, Tasmania and NSW is expected to decline from 2022. "East Coast reserves have additional uncertainty and the conversion rates of contingent resources to reserves must improve," added Wilkinson in a call for more investment. The East Coast is expected to be short of gas from 2026. Without additional gas, prices will remain high and several LNG export Trains may have to be shut down. "Around 2026, we move from the current balanced situation, to a shortfall when gas supply from 2P gas reserves will not be able to meet demand," he stated. "LNG regas on the East Coast is the lowest-cost way to deliver gas from Western Australia or the North Territory to southern markets. We export oil and liquified petroleum gas from WA, and import them to the East Coast. Gas by ship instead of pipeline is no different," said Wilkinson. Queensland Natural Resources Minister Anthony Lynham said gas was important to the Queensland economy and would be a way forward as they transitioned to renewable power generation. "Fracking remains a sensitive issue, and there is much work for us to do in dispelling the fear and providing the community with more information on this practise," said Lynham. "There is much for this industry to be proud of for what it has done," he added. Lynham said in his speech that Australian energy company Senex had just awarded contracts for gas exploration in a 153 square kilometres area in Queensland. The minister said that the natural gas produced would be earmarked for Australian domestic supply only.

SHELL has started production at its huge Appomattox platform in the deepwater zone of the US Gulf of Mexico a few months ahead of schedule with a Chinese major as its partner in one of the few Gulf ventures to start in the past few years in the face of investment competition from onshore for LNG and pipeline gas exports. Appomattox is the only platform start-up in the Gulf in 2019 and is expected to produce 175,000 barrels of oil equivalent a day from its position about 80 miles southeast of the Louisiana coastline. The project is the first large-scale production from Gulf's Norphlet formation. Appomattox is a joint venture between Shell and China National Offshore Oil Corp. Inc., a subsidiary of Beijing-based CNOOC. Shell owns 79 percent and CNOOC has a 21 percent stake. The Appomattox venture is named after the courthouse building in the state of Virginia where Confederate General Robert E. Lee surrendered in 1865 to end the American Civil War. Shell had made the decision to authorize and build the project back in 2015 during the most recent energy slump and Appomattox had not originally been expected to start production until the fourth quarter of 2019.

"That Appomattox was safely brought online ahead of schedule and far under budget is a testament to our ongoing commitment to drive down costs through efficiency improvements during execution," said Andy Brown, Shell's Upstream director. "Appomattox creates a core long-term hub for Shell in the Norphlet through which we can tie back several already discovered fields as well as future discoveries," Brown explained. Shell announced in 2018 the Dover discovery near the Appomattox platform and means it can be developed through connections, called tie-backs, to the Appomattox platform. The Mattox Pipeline is also part of the project and is 90 miles (145km) in length with 300,000 barrels per day capacity that will move the produced crude oil from Appomattox westward to the Proteus pipeline system and then onshore. The Mattox pipeline is jointly owned by Shell GoM Pipeline Company and CNOOC Petroleum Sales USA Inc.

SPAIN received its first cargo delivered from the US Cheniere Energy-operated Corpus Christi export plant in Texas on behalf of the international commodities company Trafigura. The shipment was delivered to Reganosa's terminal at Mugardos in the northwest Spanish port of Ferrol. The Spanish company's name, Regasificadora del Noroeste (Reganosa), stands for northwest regasification. The terminal has been in operation since 2006 and its berth is suitable for the docking of the largest carriers. The unloading arms are connected to two tanks capable of storing up to 300,000 cubic metres of LNG. Reganosa owns a 75 percent stake in the Mugardos terminal assets while Japanese conglomerate Sojitz Corp. owns 15 percent and Algerian energy company Sonatrach has a 10 percent share. In addition to owning the Mugardos terminal, Reganosa is certified as a Transmission System Operator at European level. It operates a natural gas pipeline network and also manages the first regasification facility opened last year in the Mediterranean nation of Malta.

Reganosa said the shipment from Corpus Christi was delivered on June 4 on the carrier "Excalibur", a Belgian-flagged ship with 138,200 cubic metres capacity. The Mugardos terminal has been a pioneer of the Trans-Atlantic LNG trade as it also received the first shipment in Spain of US LNG from Cheniere's Sabine Pass plant in July 2016. That cargo was delivered onboard the 138,000 cubic metres capacity vessel "Sestao Knutsen". "The new route between the US and Spain has highlighted the strategic location of the port of Ferrol as an energy hub," said Reganosa. "Cheniere estimates that the US will become the third-largest world supplier of LNG in 2020, with production capacity of 60 million tonnes per year," added the company.

SWEDEN'S Gothia Tanker Alliance has had its sixth vessel with LNG-powered capability named "Ramelia" at a ceremony held at the Avic Dingheng shipyard in eastern China from a series of seven orders and one option. The Alliance, based in the Swedish port of Gothenburg, is a group of seven companies operating in the Baltic and North Sea regions and who cooperate in the coastal tanker business with a combined fleet of more than 50 vessels. The companies include the Swedish shipping lines Furetank Rederi AB, Rederi AB, Alvtank and Thun Tankers BV. The Swedish ship design company FKAB said that the latest vessel to be named is an ice-class 1A tanker equipped

with batteries and dual-fuel engines for LNG-powered operations. The "Ramelia" is 16,300 deadweight tons and with 19,900 cubic metres of capacity and was developed by FKAB together with the owner Furetank.

"Through our FKAB offices in Sweden and China we delivered basic design and detailed design to the Avic Dingheng shipyard," said FKAB. The Gothia Alliance is increasing its use of LNG fuel in its operational region, which is the Emissions Control Area of Northwest Europe. China's Avic Dingheng yard was only founded in 2006 in the Jiangdu Development Zone on the Yangtze River in China's eastern Jiangsu Province. The yard specializes in stainless-steel chemical tankers and gas carriers. The other Alliance tankers delivered and able to run on LNG fuel are the "Fure Vinga", the "Fure Ven", the "Ramanda", the "Thun Venern" and the "Fure Valo". The vessels fulfil clean-fuel rules with dual-fuel LNG propulsion, including LNG for port consumption and LNG for inert gas production.

TANZANIA said it expected to join the group of liquefied natural gas exporters by 2023 in a project involving companies such as Norwegian oil and gas player Equinor and Singapore-based Pavilion Energy as well as two oil majors. "Construction of this project is expected to start in 2022 and will be concluded in 2028," Medard Kalemani, Tanzania's Energy Minister, said in a statement to Parliament in the capital Dar es Salaam. Construction of the onshore LNG liquefaction and export plant is planned for the southern region of Lindi, near the border with Mozambique, its East African neighbour already in the midst of an LNG export plant build-out. The Lindi LNG project to monetize Indian Ocean natural gas discoveries has been delayed for several years because of regulatory hold-ups and the investment climate in the country. The Tanzanian government now plans to conclude talks by September 2019 with the group of natural gas resource licence holders, Equinor, Pavilion Energy, Ophir Energy of the UK and Royal Dutch Shell and ExxonMobil Corp. "The project will have capacity to produce 10 million tonnes per annum of liquefied natural gas," said Energy Minister Kalemani. Kalemani told parliament that the government launched a new round of talks in April with each company in order to speed up the process.

The natural gas discoveries were made in 2011 onwards in four Blocks in a location known as the Mafia Deep Basin. The Basin occupies an area of some 75,000 square kilometres between the Tanzanian continental shelf edge and an area 200km east of the coast in water depth ranging from 500 metres to 3,300 metres. Shell became the operator of two of the Tanzanian blocks in February 2016 after its takeover of BG Group and has been working closely with the Tanzania Petroleum Development Corp. Net contingent resources in the four Blocks are estimated to be at least 20 trillion cubic feet, sufficient to support a three-Train LNG development. Shell is the operator of three Tanzanian blocks, 1, 3 and 4 and has been working closely with the Tanzania Petroleum Development Corporation. Equinor operates the exploration licence on Block 2 and has a 65 percent working interest while ExxonMobil has 35 percent of the block. "We instructed the government negotiation team to hold separate talks with each individual investor, instead of the previous arrangement of holding joint talks with all the investors," said the Minister. The talks are aimed at negotiating a host government agreement which is seen as a crucial step towards a final investment decision for the project.

TEEKAY General Partners, which oversees Teekay LNG Partners and its fleet of almost 50 LNG carriers, has overhauled its board of directors to help tackle the evolving strategies in the shipping sector. Teekay GP said that current director Kenneth Hvid will become Chairman of the Board. Hvid is also the President and Chief Executive of Teekay Corp., which owns the company founded in the Canadian city of Vancouver. In four other changes, Sylvia Barnes, Alan Semple, David Schellenberg and Richard Paterson have joined the board. All the changes are effective immediately. "Alan, David, Richard, and Sylvia bring a wealth of operational and financial expertise to Teekay LNG Partners," said Hvid. "We are very pleased that they have all agreed to join the Board, and we look forward to their contributions as we continue to execute on Teekay LNG's strategy in the years to come," he added. In connection with these new appointments to the board, Ida Jane Hinkley, Joseph McKechnie and Beverlee Park, have stepped down. As previously announced, Teekay GP director William (Bill) P. Utt will be stepping down from the board effective on June 10 and director C. Sean Day will remain on the board. "Jane, Joe and Bev have made valuable contributions to the success of Teekay LNG during their tenure," said Hvid "On behalf of Teekay LNG, we are grateful for their years of service and dedication. I look forward to working with our new directors, Sean Day and the management team on the next phase for Teekay LNG as we complete the delivery of our remaining newbuildings this year," stated Hvid.

Teekay LNG Partners is one of the world's largest independent owners and operators of LNG carriers. The company also own liquefied petroleum gas and crude oil tankers, including 22 mid-size LPG carriers, seven multi-gas carriers and one conventional tanker. Teekay LNG Partners is a publicly-traded master limited partnership formed by Hamilton, Bermuda-based Teekay Corp. Such corporate partnerships offer tax advantages for companies involved in the energy industry and listed in the US. The various Teekay entities are quoted on the New York Stock Exchange. The company said Semple has served as a Teekay Corp. director since 2015 and brings over 30 years of finance experience primarily in the energy industry as former Chief Financial Officer at John Wood Group, the oil and gas engineering firm. Schellenberg joined the board in 2017 and will take over as Chairman on June 10. He has also been nominated to stand for election to the board of Teekay Tankers at its June annual meeting. He is currently a Managing Director of Highland West Capital, a private equity firm in Vancouver, Canada. Teekay said Barnes brings extensive financial experience, energy sector expertise and an engineering background to the company's board from her 37-year career. Since 2015, she has been Principal and Head of Energy Advisory Services at Houston, Teas-based Tanda Resources. From 2011 to 2014, she was Managing Director and head of Oil & Gas Investment and Corporate Banking at Keybanc Capital Markets. Paterson was on the board of Teekay Tankers from August 2017 and is a certified public accountant who retired from PriceWaterhouseCoopers in 2011 after 37 years of service.

TEEKAY LNG Partners, the US affiliate of the tanker fleet owner and operator of almost 50 LNG vessels, said it secured charters on three LNG carriers at attractive rates and was preparing to start the floating Bahrain LNG terminal in the Gulf as it swung to a net profit from a previous loss. Teekay Partners, based in Bermuda and listed on the New York Stock Exchange, said first-quarter net profits were $21.61 million compared with a loss of $6.89M in the same three months of 2018. Adjusted gross earnings came to $158.21M versus $117.59M in the prior-year quarter. "During the first quarter, the Partnership continued to report significant cash flow growth, mainly driven by recent newbuild deliveries and the contract start-up of various LNG carriers at higher rates," said Mark Kremin, Teekay Gas Group's President and Chief Executive. "Looking ahead, we expect contract start-up of four additional LNG carrier newbuildings and the Bahrain LNG terminal in the second half of 2019," added Kremin. One of Teekay's shipping projects includes the provision of a floating LNG import facility for the kingdom of Bahrain. Bahrain's first LNG terminal will be deployed about 5 kilometres from the existing breakwater at the Khalifa Bin Salman Port. It includes a floating storage unit (FSU) provided by Teekay and a regasification platform. Bahrain has already taken over the charter of the FSU, the 173,000 cubic metres capacity "Bahrain Spirit".

The FSU is on a 20-year charter from Teekay to the development company, Bahrain LNG, and will enable the Gulf nation to support its growing domestic natural gas needs. The Bahrain LNG ownership consortium comprises four companies, owning between 30 percent and 20 percent of the shares, including the Gulf state's National Oil & Gas Authority, Teekay, South Korea's Samsung C&T and the Gulf Investment Corp. "Despite the near-term weakness in the spot LNG carrier market since the start of the year, we have recently been able to take advantage of the improving medium-term fundamentals by securing multiple attractive charters on our LNG carriers for periods ranging from one to three years," stated CEO Kremin. Teekay also owns and operates 29 liquefied petroleum gas and multi-gas carriers. In its recent LNG chartering activities, Teekay Partners said that in April 2019 it secured a three-year, fixed-rate charter contract for the "Magellan Spirit" LNG carrier, which is expected to commence at the end of May 2019. The company also extended the fixed-rate charter contract of the "Polar Spirit" LNG carrier for three additional years at a charter rate in excess of the previous fixed rate. The charter extension commenced on May 7. In addition, the partnership secured one-year, fixed-rate charter contracts on the "Arwa Spirit" and "Marib Spirit" LNG carriers, which are expected to commence

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in mid-June and early-July respectively. Both vessels are owned by the joint venture comprising Teekay and Japanese company Marubeni Corp.

TOTAL, the French energy major, has signed an agreement with Toshiba Corp. to take over the troubled Japanese group's interests in the Freeport liquefied natural gas export project at Quintana Island in Texas for a sum of $800 million. Total has signed an agreement with Toshiba to take over its 20-year tolling agreement for 2.2 million tonnes per annum of LNG from Freeport LNG's Train 3 and the corresponding gas transportation agreements on the pipelines feeding the plant. The Freeport facility's Train 3 is expected to come on stream by the second quarter of 2020. Under the transaction, Total will acquire all the shares of Toshiba America LNG for a consideration of $15M to be paid by Total to Toshiba and will be assigned all contracts related to their LNG business for a consideration of $815M to be paid by Toshiba to Total. The agreement means that Total will receive from Toshiba a net cash consideration of $800M payable at the closing date of the transaction, expected by the end of 2019. Toshiba's energy business began to decline in 2017 when it decided to withdraw from the nuclear business outside Japan after huge losses forced its Westinghouse Electric unit to file for bankruptcy.

The Japanese group entered the LNG market in 2013 by signing its agreement with Freeport. Its tolling and pipeline deals meant financial commitments in the future it wanted to avoid as it restructured, hence its willingness to pay a third party to take over its agreements. Toshiba had previously discussed a deal with ENN Group for China, an expanding player in the LNG business, before opting for Total. "The takeover of Toshiba's LNG portfolio is in line with Total's strategy to become a major LNG portfolio player," said Philippe Sauquet, President of Gas, Renewables and Power at Total. "Adding 2.2 MTPA of LNG to our existing positions in the US, in particular Cameron LNG, will enable optimizations of the supply and operations of these LNG sources," added Sauquet. "Already an integrated player in the US gas market, Total is set to become one of the leading US LNG exporters by 2020 with a 7 MTPA portfolio," he stated. The Freeport transaction gives the French group a portfolio of around 40 MTPA of LNG through its stakes in leading export ventures in about a dozen countries, including Australia, Nigeria, Russia and Qatar.

TRINIDAD & Tobago, the Caribbean liquefied natural gas exporter from its plant at Point Fortin in Trinidad, has signed a new energy agreement with Royal Dutch Shell featuring an enhanced revenue package for the sale of LNG. The agreement followed talks at Shell's Dutch headquarters in The Hague involving Trinidad & Tobago Prime Minister Keith Rowley and Shell Chief Executive Ben van Beurden, as well as other officials and executives. "The energy deal is the result of months of positive and relationship-building discussions between Shell and the Government," said a statement from the PM's office. "The agreement reflects the mutual importance of the relationship and the value Shell has placed on Trinidad and Tobago," it added, though no financial details were released. The Anglo-Dutch company and Trinidad has also committed to continue their discussions surrounding the development of the energy sector. The Caribbean nation's Minister of Energy and Energy Industries Franklin Khan signed on behalf of the government while Derek Hudson, Vice President and Country Chairman of Shell Trinidad and Tobago signed on behalf of Shell.

Prime Minister Rowley also held talks with Shell executive Maarten Wetselaar who is the Integrated Gas and New Energies Director at Shell and is responsible for LNG. Trinidad is one of the longest-standing LNG exporting nations and started its first Train in 1999. It quickly became the main supplier of LNG to the United States before the shale-gas boom enabled the US itself to join the exporter ranks. Trinidad's liquefaction plant, which has found new customers in South America, Europe and Asia, boosted its production last year by 14.2 percent to 11.63MT from its four Trains. The plant's main shareholders are Shell and BP of the UK. In the past two years, the LNG plant has boosted its feed-gas resources with projects such as the Angelin development, the Juniper venture and the Trinidad Onshore Compression project. Two other developments are planned. These are the Cassia Compression venture and the Matapal gas project for a discovery made in 2017. They are expected to come on stream in 2021 and 2022 respectively.

VENTURE GLOBAL LNG, the company based in Virginia with three LNG export projects in Louisiana, said it had secured a $1.3 billion investment from New York equity firm Stonepeak Infrastructure Partners for its Calcasieu Pass project in the Gulf Coast state. The equity fund has also previously invested in the Magnolia plant in Louisiana, being developed by LNG Ltd. of Australia, and in Golar LNG's gas-to-power project in the small northeast Brazilian state of Sergipe. "We are happy to announce this important milestone for Calcasieu Pass and very proud to partner with a world-class investor like Stonepeak," said Venture Global. "Their team brings a great depth of LNG knowledge and a track record of investing in exceptional infrastructure projects," said the company. Stonepeak Managing Director Jack Howell said his firm was a long-term believer in the increasing importance of LNG as a global source of greener, cheaper energy. "Calcasieu Pass will be a critical provider of LNG to its blue-chip customer base and we look forward to supporting Venture Global, who we believe to be a global leader in developing low-cost LNG production," explained Howell. Venture Global's most advanced project is at Calcasieu Pass with current nameplate export volumes of 12 million tonnes per annum and it is expected to come on stream in 2022, along with associated facilities, including the TransCameron Pipeline.

The development company is owned by former investment banker Michael Sabel and lawyer Robert Pender who act as joint chief executives. They are also constructing a second plant at Plaquemines near river mile-marker 55 on the west side of the Mississippi River, 30 miles south of New Orleans. Venture Global additionally filed with regulators in April 2019 for construction of a third plant in Louisiana. The company asked the Federal Energy Regulatory Commission for permits for a venture called Delta LNG and its associated Delta Express pipeline. The second plant, the Plaquemines venture on the Mississippi River, has current output targets of 20 MTPA of LNG and is set to include small-scale liquefaction Trains, four LNG storage tanks and three marine loading berths. The Delta LNG plant is also proposed for Plaquemines Parish and would have peak capacity to process 24 MTPA. Venture Global is also seeking a permit for a 287-mile pipeline called Delta Express between Perryville in Louisiana, crossing into the neighbouring state of Mississippi, and then back into Louisiana to connect to the Delta LNG plant.

YPF, the Argentine oil and gas producer, loaded its first shipment of liquefied natural gas for export at the "Tango FLNG" facility deployed at the port of Bahia Blanca. YPF said the shipment included 30,000 cubic metres of natural gas from the Vaca Muerta shale basin that has helped the South American nation boost its energy reserves. The cargo was lifted on June 2 by the Malta-registered and Japanese-built "Fuji LNG", according to shipping data. "This is the first step of a process that will enable YPF to export gas to the world," said YPF in the statement. The "Tango FLNG" plant is chartered under a 10-year agreement from Belgian shipping company Exmar. The vessel is the former floating liquefaction unit, "Caribbean FLNG", constructed for a cancelled venture in the South American state of Colombia and renamed before being sent to Argentina. YPF did not specify the destination of the shipment, which would be ready by mid-week, though said the sales operation was helped by the marketing arm of US LNG exporter Cheniere Energy. Argentina's medium-term aim in the LNG sector is to halt its own LNG imports, which will number at least nine large-scale cargoes or more for the Southern Hemisphere winter, and to become an exporter.

Growing natural gas production from the Vaca Muerta shale play in northwest Argentina will eventually meet all of the nation's energy requirements and leave a surplus for export. However, production costs for shale will have to be reduced to make exports economic and infrastructure built to handle large-scale gas volumes and onshore liquefaction, though the floating LNG project is viewed as a good introduction to the export market for YPF. The "Tango FLNG" plant will produce up to eight cargoes per annum from the Vaca Muerta supplies. The shale-gas production has also enabled the resumption of pipeline supplies to neighbouring Chile. The FLNG vessel arrived at the Argentine port in February 2019 and will make Argentina the first South American exporter of LNG from a floating facility. Bahia Blanca port is where Argentina established its first floating LNG import facility with Exmar and US partner Excelerate Energy in 2008 before the shale-gas resources were discovered. Peru was South America's first LNG exporter in 2010 from its onshore liquefaction plant at Pampa Melchorita and continues to supply Europe and Asia with cargoes. ■

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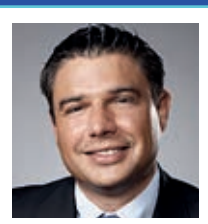

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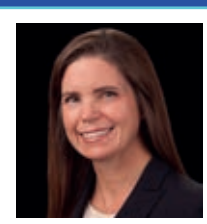

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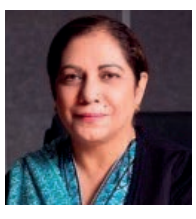

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Interchangeability challenges in China gas market for multi-source scheduling to supply Shenzhen City

Natural gas technical and market developments in southeast China, focusing on mixed LNG and pipeline supplies

With the development of the natural gas market in Shenzhen City in Guangdong Province of southeast China, multi-source patterns have emerged from different gas supply sources, mainly LNG from three import terminals.

The three import terminals are Hua'an LNG, Diefu LNG and the Dapeng facility on the Pearl River Delta, China's oldest terminal in operation since 2006.

Pipeline and LNG

The market also includes pipeline natural gas on the West-East Long-Distance Transmission Pipeline Phase II.

Access to natural gas has increased dramatically in China in recent decades.

Between 2010 and 2017 the proportion of the population with access to natural gas grew at an annual average rate of 10 percent, while the transmission and distribution network grew by 14 percent per year on average.

This resulted in the population with natural gas access doubling over the period, while the pipeline network grew by 143 percent.

Regions such as Beijing increased their total network length by 13 percent from 2016 to 2017, while others such as Liaoning increased their network length by 57 percent and the population with access to natural gas by 23 percent in just over a year.

Intelligent

The interchangeability of LNG to existing gas sources should be taken into account, especially to meet the requirements for caloricity stability of power plant users.

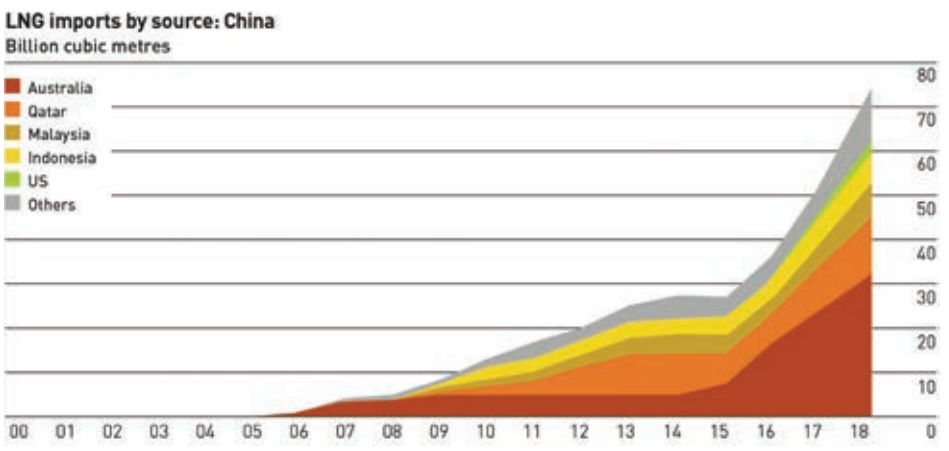
With the design and application of an intelligent gas pipe network, the acquisition of pipe network data via information technology has been realized, providing a decision-making basis for scheduling through simulation analysis.

The challenge in the Shenzhen market, for example, is how to optimize the gas source scheduling under the multi-source system while predicting the peaking volume of LNG and the optimizing of the proportion of gas.

The introduction of LNG sources has brought challenges to the dispatching operation of natural gas pipeline networks, mainly in the network peak shaving and in the safe supply of natural gas to power plants.

The challenge in the Shenzhen market... is how to optimize the gas source scheduling under the multi-source system while predicting the peaking volume of LNG and the optimizing of the proportion of gas.

In order to solve the scheduling problem of various LNG gas sources, Shenzhen Gas introduced gas network simulation technology, further promoting the intelligent gas-dispatching process.



The different sources of natural gas supplies received by China via LNG cargoes

Other issues that are more under control are the basis for LNG and pipeline gas dispatching and the accurate declaration of purchased volumes.

Power plants

For power plant users, due to the stringent requirements of the gas turbine for the calorific value of natural gas, the calorific is monitored via online real-time simulation technology.

In the application of simulation technology in LNG peak-shaving, one of the tasks undertaken is ensuring the safe and stable operation of the pressure of the sub-high pressure pipe network in Shenzhen, guaranteeing that it is not less than 1.1 MPa.

The calculated pressure curve is taken from the Luofang Pressure Regulating Station located at the end of the sub-high pressure during two peak consumption periods from 10:00am to 15:00pm and from 17:45pm to 23:40pm.

The simulation technology is also used for the interchangeability analysis of the multi-sourced LNG.

Process data including composition, calorific value and the Wobbe index is changeable on real-time depending on the different volume ratios of multi-gas sources.

Based on simulation, the boil-off-gas from the Diefu LNG terminal affects the change of heating value maximally among all the gas sources of Shenzhen Gas.

The deviation of process parameters including Wobbe index and calorific value of natural gas is required to be controlled within ± 5 % for power plant users.

For the Huadian Power Plant, there is a risk that there could be unstable heat value due to mixing of gas from Dapeng LNG, Diefu LNG, Hua 'an LNG and the West-East Long-Distance Transmission Pipeline Phase II.

The gas sources for the Huadian Power Plant fluctuate at a high of 7.15 percent. Therefore, measures including isolating gas sources and adjusting parameters.

The process data of the pipeline network can be integrated by simulation analysis proving support for multi-gas source scheduling, taking into account the scientific formulation of the peaking adjustment plan and the safety guarantee of gas supply to power plants.

For daily peaking of city-gas users. simulation technology can be used to accurately predict peaking volume, the supply period of LNG sources. One can also rationally formulate daily peaking adjustment plans and gas source procurement.

Supply safety

For gas supply safety at power plants, the data of gas sources components can be captured by simulation systems in real time, which can be analyzed, including any changes in the Wobbe index and the calorific value.

Out with the technical issues in the gas market, the Guangdong provincial government has recently published a

plan to promote the use of more natural gas in the province.

The main actions are increasing natural gas supply by encouraging private companies to invest in LNG terminals and storage facilities, the development of the Huizhou and Maoming LNG terminals and the Guangzhou Nansha and Yangjiang peak-shaving stations are to be accelerated.

The opening of existing LNG terminals to third-party access, especially the Dapeng, Diefu and Zhuhai terminals, will also be promoted, as will the signing of medium-term and long-term contracts.

The plan also looks to reduce pipeline transport costs, control the city-gas companies' profits and push forward the construction of interconnection projects.

By 2020 all 21 cities of Guangdong should be connected to the pipeline grid, reaching 830 kilometres, as should the terminals and facilities of different companies.

Coal-to-gas

The plan also looks to continue the coal-to-gas reform, especially in major areas and industries. Distributed heating systems in industrial areas will be eliminated and by 2019 a new gas-fuelled district heating system will be brought into operation.

In February 2019 the government issued another notice to further develop the Greater Bay Area, focusing on Guangdong, Shenzhen, Hong Kong and Macao.

The plan, with a timeline set between now and 2022 in the short term and then until 2035 in the long term, foresees turning the Greater Bay Area into a global technology innovation centre and building advanced manufacturing and modern services industries.

Regarding energy, the plan promotes the development of green and low-carbon energy such as renewables, nuclear, clean coal and natural gas.

The construction of new LNG import terminals, expansion of the capacity of the existing ones, and increasing pipeline coverage and gas reserves are also promoted.

Enhancement

Gas supply pipelines to Hong Kong and Macao should also be enhanced to ensure security of supply in both areas.

Manufacturing is the main gas-consuming industry subsector, with energy-intensive users for smelting, process heat, chemical feedstocks and fertilisers.

In the "three-year action plan to win the battle for the blue sky", the State Council encourages industrial furnaces to use clean energy such as electricity and gas.

Growth in gas demand for power generation is estimated to have been almost 30 percent in 2018, with about 281 terawatt hours (TWh) of electricity produced from natural gas.

The growth trend for the coming years is expected to be less robust, at an average annual rate of 7.5 percent.

This assumes that the 13th Five-Year Plan (FYP) objective of 110 gigawatts (GW) of installed gas-fired capacity by 2020 is only achieved by 2023, due to the strong competition from renewable capacity development.

Over-capacity in coal-fired power generation has also been an issue for several years, especially since approval of new plants was transferred to the provinces. ■

This article is based on extracts from the paper "Application of Pipeline Simulation Technology in LNG Interchangeability for Multi-Source Scheduling in Shenzhen City" by Yang Guang, Meng Wei and Luo Donglin with associates at Shenzhen Gas Corp. Ltd. Other sources include gas industry reports from the International Energy Agency.

ABS and CMA CGM subsidiary Containerships bring LNG fuel power to the Baltic feeder trade

Daniele Bottino, ABS Regional Business Development Manager

The two remaining LNG-fuelled feeder containerships from a series of four classed by the American Bureau of Shipping are being delivered during 2019 from the Wenchong Shipyard in China to the Finland-based company, Containerships.

The "Containerships Nord" was the first delivered in December 2018 and along with the three others of 1,400-twenty-foot equivalent unit (TEU) will be the first LNG-powered feeder containerships to regularly serve northern European ports.

Experience

ABS has decades of experience in classing dual-fuelled LNG vessels and has leveraged that experience into assessing the application of LNG as fuel for mainstream cargo vessels.

Containerships' LNG-story started in 2013, when the decision to build the new environmentally-friendly LNG-powered vessels was taken.

LNG is a relatively new fuel source and these vessels would be the first newbuilds based on this technology to regularly serve European ports and trade.

Containerships is investing in a logistics chain based on LNG and its clean-fuel concept covers sea and land; its target is to create a complete, LNG-based door-to-door supply chain in Europe.

In addition to LNG-powered vessels, the company is looking to expand LNG-fuelled transport capacity for land logistics by investing in LNG-fuelled trucks.

Following the delivery of Containerships' first three LNG-powered vessels, the company will offer its customers a service based fully on LNG-fuelled transport with the support of the French-based parent company CMA CGM, the first deep sea shipping line to make a public commitment to LNG as fuel.

Logistics

Containerships estimates that using LNG throughout the logistics supply chain saves up to 25 percent in greenhouse gas emissions compared to traditional multimodal transportation and up to 60 percent compared to traditional land transportation.

The primary role of the ABS Global Gas Solutions team in the Containerships project is to assess whether the vessels are designed and built in accordance with its rule requirements as well as with statutory regulations.

This includes being involved in the risk assessments as required by the Interim Guidelines.

ABS also participated in the Risk Assessments required for the LNG bunkering operation (Simultaneous Operations study SIMOPS and HAZOP for LNG bunkering process).

Using LNG as fuel on non-gas carriers creates numerous challenges and for this series of containerships, the main ones included the location and arrangement of the LNG fuel tanks and the fuel gas supply system.

Premium space

Space on a small containership is at a premium so locating the fuel tanks and fuel gas supply systems to minimise the impact on the vessel's cargo capacity and operations is important.

In this case, the vessel is designed to transport containers holding numerous different types of cargo and the fleet will operate in the Baltic Sea, where Finnish and Swedish ice navigation guidelines are applicable.

Another challenge was that building a ship with LNG as a fuel was a new endeavour for the chosen shipyard.

With interest in LNG as fuel growing, many yards have entered this sector with limited expertise in working with complex gas and cryogenic systems.

For ABS, this required a more proactive approach than the typical supervisory role of class, helping the yard to understand the key design and construction challenges.

The vessel was designed with fuel gas handling room rather than the conventional Tank Connection Space, with fabrication and welding completed onboard during the construction by the yard under the supervision of the vendor's service engineer.

Additional innovations on the Containerships vessels include a shaft generator with a Controllable Pitch Propeller (CPP) to supply the ship's power while the main engine is running.

The shaft generator is fitted at the output side of main engine So that whenever the main engine is running to drive the propulsion shafting, the shaft generator can produce supplementary electrical power for use onboard. As a result, the use of auxiliary engines can be minimized, reducing overall fuel consumption and operating costs.

The 'Containerships Nord' sailed from China to Europe in two and a half weeks to join the Baltic trading vessels and is fueled with LNG

The "Containerships Nord" successfully underwent its first marine LNG bunkering at the Port of Rotterdam in January 2019.

Around 240 metric tons of marine LNG was bunkered to the vessel – an amount that can take the ship on a roundtrip from Rotterdam to St. Petersburg and back sailing through the Kiel canal twice.

Bunkering

This operation made Containerships the first container shipping line in Europe to perform ship-to-ship bunkering with LNG.

The first bunkering was carried out at lay berth in a ship-to-ship operation from Shell's bunker vessel, "Cardissa".

In future, bunkering will be carried out at a normal operational berth simultaneously with loading and discharging operations. This means no reduction in operational efficiency compared to traditional fuel-oil-burning vessels.

Hazard identification

Bunkering procedures are based on detailed hazard identification and safety assessments. All vessel crew have undergone essential LNG bunkering-specific training, since safety is a priority throughout the bunkering operation

The Containerships parent, CMA CGM introduced new technologies between 2005 and 2015 to improve fleet efficiency which resulted in a 50 percent reduction in CO_2 emissions.

By 2025, emissions will be reduced by an additional 30 percent and the fleet owner has said the sustainability of its ships will be further optimised through the use of LNG.

Containerships took delivery of its second vessel with LNG capability in June 2019

The new dual-fuel vessel that can be powered by LNG is called "Containerships Polar".

The LNG-capable ship complies with all current and future clean-shipping regulations from the International Maritime Organization and Northwest Europe's Emission Control Areas.

Volumes

CMA CGM says that each of the vessels will receive around 240 metric tons of LNG via ship-to-ship bunkering.

The two other LNG-powered vessels, the "Containerships Arctic" and the "Containerships Aurora", are expected to join the fleet by the end of 2019.

The Containerships Baltic service covers seven major European ports, including Rotterdam, which acts as an important trans-shipment hub and also as a bunkering port for the vessels to receive LNG.

The six other ports served are Teesport in the UK, Zeebrugge in Belgium, Helsinki in Finland, St. Petersburg in Russia, Riga in Latvia and the Polish port of Gdynia. ■

This article is based on extracts from the paper "ABS and Containerships - CMA CGM GmbH bring LNG as fuel to Baltic feeder trades" by Daniele Bottino, ABS Regional Business Development Manager. Containerships parent company CMA CGM supplied additional information

IMO Marine Environment Protection body uses session to clarify the sulfur cap guidance

IMO approves and adopts set of guidelines to support the consistency of the regulations

The International Maritime Organization (IMO) has approved and adopted a comprehensive set of guidelines to support the consistent implementation of the lower 0.5 percent limit on sulfur in fuel oil for shipping, entering into effect from 1 January 2020.

Related draft amendments were also approved for the International Convention for the Prevention of Pollution from Ships, known as MARPOL.

More guidance

The IMO Marine Environment Protection Committee (MEPC) met in May 2019 for its 74th session and approved various guidelines to support implementation of the sulfur limits.

However, enforcement, compliance with and monitoring of the limits are in the remit and responsibility of the states who are party to the MARPOL Annex VI treaty.

Most ships are expected to utilize new blends of fuel oil which will be produced to meet the 0.5 percent limit on sulfur in fuel oil or compliant marine gas-diesel oil.

The IMO has previously noted that the viability for ships to burn LNG as fuel depends very much on the availability of a worldwide network of LNG bunkering infrastructure, which to date is under-developed.

LNG bunkering infrastructure is considered to be in its infant stage, as most LNG-powered ships are mainly coastal vessels limited to European waters, and major bunkering ports in the world have yet to develop full-scale LNG bunkering facilities.

There continues to be interest in some countries such as Singapore, Japan and the Netherlands in pursuing the development of LNG bunkering infrastructure.

LNG limits

But there has not been any indication that developments will blossom to a global scale to offer any real change for LNG to become a viable option until a few years post-2020.

There is a need for demand to increase in order to generate greater LNG supply for bunkering.

LNG as bunker fuel continues to face issues such as the need for increased and dedicated storage space, a gap in supply chain logistics, and requirements for costly modifications to existing port infrastructure.

Additional costs to carry out LNG bunkering include delivery of the clean gas to the import terminal, breakbulk charges, the need for shuttle vessels delivering to LNG bunker tankers, and the fee of bunker tanker delivering LNG fuel ship-to-ship.

Another dampener is the retrofitting of ships to burn LNG as it is a sophisticated, complex operation that requires modification of existing engines or addition of gas tanks, as well as the huge cost of fitting LNG tanks and gas piping systems.

The LNG option makes more sense for newbuilds rather than conversions of existing ships.

Costs

On top of these, a good-sized LNG bunker tanker costs $60 million to $80M to build, vastly more expensive than a fuel oil barge.

Last but not least, there is an absence of a global regulatory standard on LNG fuel propulsion.

All these factors make LNG as bunker fuel before 2020 only a third-tier option for shipowners.

The stricter limit will be applicable globally under IMO's MARPOL treaty.

However, in designated emission control areas (ECAs), the sulfur limit will remain at 0.10 percent.

The IMO has been working with member states and the industry to support implementation of the new limit, including the preparation of amendments to MARPOL Annex VI and the development of better guidelines.

Machinery impact

The guidelines for consistent implementation of the 0.5 percent sulfur limit under MARPOL Annex VI has sections on the impact on fuel and machinery systems resulting from new fuel blends or fuel types.

Verification issues are also included along with control mechanisms and actions, including port State control and samples of fuel oil used on board, a standard reporting format for fuel oil non-availability and possible safety implications relating to fuel oils meeting the 0.5 percent sulfur limit.

Adopted 2019 Guidelines for port State control under MARPOL Annex VI Chapter 3, now provide updated enforcement guidance for provisions including regulation 13 "nitrogen oxides" and regulation 14 "sulfur oxides and particulate matter".

IMO Marine Environment Protection Committee meeting in May for 74th session

There is also approved guidance on ongoing compliance in the case of the failure of a single monitoring instrument, and recommended actions to take if the exhaust gas-cleaning system (EGCS) fails to meet the provisions in the guidelines.

There is also an approved guidance procedure for port State control on contingency measures for addressing non-compliant fuel oil.

Verification

"The guidance covers possible actions to be taken, following discussions between ship, flag State and port State, when a ship is found to have on board non-compliant fuel oil either as a consequence of compliant fuel oil being not available when the ship bunkered fuel oil or the ship identifying through post bunkering testing that the fuel oil on board is non-compliant," said the IMO.

The IMO has also approved the 2019 guidelines for on board sampling for the verification of the sulfur content of the fuel oil used on board ships.

The latest meeting also approved an MSC-MEPC circular on Delivery of compliant fuel oil by suppliers, subject to approval by the Maritime Safety Committee.

The draft circular says that Members States should urge fuel oil suppliers to take into account, as relevant best practice for fuel oil purchasers-users for assuring the quality of fuel oil used on board ships; and guidance on best practice for fuel oil suppliers for assuring the quality of fuel oil delivered to ships.

Carriage ban

A related MARPOL Annex VI amendment to prohibit the carriage of non-compliant fuel oil used by ships, which was adopted last year, is expected to enter into force on 1 March 2020.

Related MARPOL Annex VI amendments approved for future adoption included the status of exhaust-gas cleaning systems.

Some ships use the EGCS, also known as scrubbers, and accepted by their flag States as an alternative equivalent means to meet the sulfur limit requirement.

The Sub-Committee on Pollution Prevention and Response (PPR) is undertaking a review of the 2015 Guidelines on EGCS use. The guidelines include, among other things, washwater discharge standards.

Analysts had said that between 2,500 and 4,500 ships were likely to install an EGCS to meet the regulations instead of buying the more expensive low-sulfur fuel or switching to LNG.

However, some ports including the Port of Singapore and others in China, plan to prohibit the discharge of wash water from open-loop EGCS in their ports.

Restrictions

Ships fitted with open-loop scrubbers calling at Singapore will be required to use compliant fuel.

Ships with hybrid scrubbers will be required to switch to the closed-loop mode of operation.

It should also be noted that Singapore has also said it would be providing reception facilities for the collection of residues generated from the operation of scrubbers.

Fitting exhaust cleaners to ships costs at least $2 million per commercial vessel.

Looking ahead, meetings are planned for 2020 to provide an opportunity for wider stakeholder engagement on how the IMO rules were working.

The IMO plans to hold an "IMO2020" seminar at the IMO in London in the third quarter of 2020, as by then there should be a clearer understanding of the availability of compliant fuel oil and some experience of implementation that can be shared. ■

World LNG Carrier Fleet

LNG carrier	Capacity m^3	Owned or Ordered by	Builder	Delivery Date	Flag	Power Plant	Cargo System	No. of tanks	Ship built for Export plant
Aamira	266,000	QGTC	Samsung	Dec-10	Liberia	DRL	GTT	5	Qatargas IV
Abadi	135,000	Brunei Gas Carriers	Mitsubishi Nagasaki	Jun-02	Brunei	S	Moss	5	Brunei LNG
Abalamabie	174,900	Bonny Gas	Samsung	June-16	Bermuda	DFDE	GTT	4	Nigeria LNG
Adam LNG	162,000	Oman LNG	Hyundai	Dec-14	Marshall Is.	DFDE	GTT	4	Oman LNG
Al Aamriya	210,100	J5 Consortium	Daewoo	Feb-08	Marshall Is.	DRL	GTT	4	Qatargas
Al Areesh	151,700	Teekay LNG	Daewoo	Jan-07	Qatar	S	GTT	4	Ras Gas II
Al Bahiya	210,185	QGTC	Samsung	Oct-09	Liberia	DRL	GTT	5	Qatar-Atlantic
Al Biddah	135,275	J4 Consortium	Kawasaki Sakaide	Nov-99	Japan	S	Moss	5	Qatargas
Al Daayen	151,700	Teekay LNG	Daewoo	Apr-07	Qatar	S	GTT	4	RasGas II
Al Dafna	266,000	QGTC	Samsung	Oct-09	Marshall Is.	LR DRL	GTT	4	Qatar-Atlantic
Al Deebel	145,000	Peninsular LNG	Samsung	Dec-05	Bahamas	S	GTT	4	Qatargas
Al Gattara	216,200	OSG/Nakilat	Hyundai	Oct-07	Marshall Is.	DRL	GTT	4	Qatargas II
Al Ghariya	210,100	ProNav	Daewoo	Feb-08	Bahamas	DRL	GTT	4	Qatargas
Al Gharaffa	216,200	OSG/Nakilat	Hyundai	Jan-08	Marshall Is.	DRL	GTT	4	Various
Al Ghashamiya	216,000	QGTC	Samsung	Mar-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Al Ghuwairiya	261,700	QGTC	Daewoo	Aug-08	Marshall Is.	DRL	GTT	5	Qatar-Atl'c Basin
Al Hamla	216,000	OSG	Samsung	Feb-08	Marshall Is.	DRL	GTT	4	QatarGas
Al Hamra	137,000	National Gas Shipping	Kvaerner-Masa	Jan-97	Liberia	S	Moss	4	ADGAS
Al Huwaila	217,000	Teekay	Samsung	May-08	Bahamas	DRL	GTT	4	RasGas III
Al Jasra	137,100	J4 Consortium	Mitsubishi Nagasaki	Jul-00	Japan	S	Moss	5	Qatargas
Al Jassasiya	145,700	Maran-Nakilat	Daewoo	May-07	Greece	S	GTT	4	RasGas
Al Kharaitiyat	216,200	QGTC	Hyundai	May-09	Liberia	DRL	GTT	4	Qatargas III
Al Kharaana	210,000	QGTC	Daewoo	Oct-09	Marshall Is.	DRL	GTT	4	Qatargas IV
Al Kharsaah	217,000	Teekay	Samsung	May-08	Bahamas	DRL	GTT	4	RasGas III
Al Khattiya	210,000	QGTC	DSME	Oct-09	Marshall Is.	DRL	GTT	4	Qatargas IV
Al Khaznah	135,500	National Gas Shipping	Mitsui Chiba	Jun-94	Liberia	S	Moss	5	ADGAS
Al Khor	137,350	J4 Consortium	Mitsubishi Nagasaki	Dec-96	Japan	S	Moss	5	Qatargas
Al Khuwair	217,000	Teekay LNG	Samsung	Jul-08	Korea	DRL	GTT	4	RasGas
Al Mafyar	266,000	OSG/Nakilat	Hyundai	Oct-07	Marshall Is.	DRL	GTT	4	Qatargas II
Al Marrouna	151,700	Teekay	Daewoo	Nov-07	Bahamas	S	GTT		Ras Gas I
Al Mayeda	266,000	QGTC	Samsung	Jan-09	Liberia	DRL	GTT	5	Qatar-US/Var.
Al Nuaman	210,000	QGTC	DSME	Dec-09	Marshall Is.	DRL	GTT	4	Qatargas IV
Al Oraiq	210,000	J5 Consortium	Daewoo	Apr-08	Marshall Is.	DRL	GTT	4	Various
Al Rayyan	135,360	J4 Consortium	Kawasaki Sakaide	Mar-97	Japan	S	Moss	5	Qatargas
Al Rekayyat	216,200	QGTC	Hyundai	Jun-09	Bahamas	DRL	GTT	4	Qatar-Atlantic
Al Ruwais	210,100	ProNav	Daewoo	Nov-07	Germany	DRL	GTT	4	Qatargas II
Al Sadd	210,100	QGTC	Daewoo	Mar-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Al Safliya	210,100	ProNav	Daewoo	Dec-07	Bahamas	DRL	GTT	4	Qatargas II
Al Sahla	216,200	J5	Hyundai	Jun-08	Japan	DRL	GTT	4	Ras Gas III
Al Samriya	261,700	QGTC	Daewoo	Sep-08	Marshall Is.	DRL	GTT	5	Qatargas II
Al Sheehaniya	210,100	QGTC	Daewoo	Feb-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Al Shamal	217,000	Teekay LNG	Samsung	Jun-08	Qatar	DRL	GTT	4	RasGas
Al Thakhira	145,000	Peninsular LNG	Samsung	Sep-05	Bahamas	S	GTT	4	Qatargas
Al Thumama	216,000	J5 Consortium	Hyundai	Apr-08	Japan	DRL	GTT	4	Rasgas
Al Utouriya	215,000	J5	Hyundai	Sep-08	Panama	DRL	GTT	4	RasGas
Al Utourma	215,000	J5	Hyundai	Sep-08	Panama	DRL	GTT	4	Ras Gas III
Al Wajbah	137,350	J4 Consortium	Mitsubishi Nagasaki	Jun-97	Japan	S	Moss	5	Qatargas
Al Wakrah	135,360	J4 Consortium	Kawasaki Sakaide	Dec-98	Japan	S	Moss	5	Qatargas
Al Zhubarah	137,570	J4 Consortium	Mitsui Chiba	Dec-96	Japan	S	Moss	5	Qatargas
Alto Acrux	147,000	LNG Marine Transport	Mitsubishi	Mar-08	Bahamas	S	Moss	4	Various
Amali	148,000	Brunei-Shell	DSME	Jul-11	Brunei	DFDE	GTT	4	Brunei LNG
Amanl	154,800	Brunei-Shell	Hyundai	Nov-14	Brunei	DFDE	GTT	4	Brunei LNG
Aman Bintulu	18,928	Perbadanan / NYK Line	NKK Tsu	Oct-93	Malaysia	S	GTT	3	Petronas
Aman Hakata	18,800	Perbadanan / NYK Line	NKK Tsu	Nov-98	Malaysia	S	GTT	3	Petronas
Aman Sendai	18,928	Perbadanan / NYK Line	NKK Tsu	May-97	Malaysia	S	GTT	3	Petronas
Arctic Aurora	160,000	Dynagas	Hyundai	Jul-13	Marshall Is.	DFDE	GTT	4	Various
Arctic Discoverer	140,000	K Line	Mitsui Chiba	Jan-06	Bahamas	S	Moss	4	Various
Arctic Lady	147,200	MOL/Hoegh LNG	Mitsubishi Nagasaki	Apr-86	Norway	S	Moss	4	Various
Arctic Princess	147,200	MOL/Hoegh LNG	Mitsubishi Nagasaki	Jan-06	Norway	S	Moss	4	Various
Arctic Sun	89,880	Arctic LNG Shipping	IHI Chita	Dec-93	Liberia	S	IHI SPB	4	ConocoPhillips/Marathon
Arctic Voyager	140,000	K Line	Kawasaki	Jul-06	Bahamas	S	Moss	4	Statoil
Arkat	148,000	Brunei-Shell	DSME	Feb-11	Brunei	DFDE	GTT	4	Brunei LNG
Arwa Spirit	165,000	Teekay LNG	Samsung	Sep-08	Marshall Is.	DFDE	GTT	4	Various
Aseem	154,850	K Line-Petronet	Samsung	Nov-09	Malta	S	GTT	4	Qatar-India
Asia Endeavour	160,000	Chevron	Samsung	Dec-14	Bahamas	DFDE	GTT	4	Various
Asia Energy	160,000	Chevron	Samsung	Sept-14	Bahamas	DFDE	GTT	4	Various
Asia Excellence	160,000	Chevron	Samsung	Sept-13	Bahamas	DFDE	GTT	4	Various
Asia Venture	160,000	Chevron	Samsung	Sept-17	Bahamas	DFDE	GTT	4	Various

Asia Vision	160,000	Chevron	Samsung	June-14	Bahamas	DFDE	GTT	4	Various
Bahrain Spirit	173,000	Teekay	Daewoo	Sept-18	Bahamas	DFDE	GTT	4	Various
Barcelona Knutsen	173,400	Knutsen	Daewoo	May-10	N.I.S.	DFDE	GTT	4	Various
Bebatic	75,060	Brunei Shell Tankers	Atlantique	Oct-72	Brunei	S	GTT	6	Brunei LNG
Beidou Star	172,000	MOL	Hudong	Oct-15	Hong Kong	DRL	GTT	4	Various
Berge Arzew	138,088	BW Gas	Daewoo	Jul-04	Norway	S	GTT	4	Sonatrach
Boris Vilkitsky	172,600	Dynagas	Daewoo	Jan-17	Cyprus	DFDE	GTT	4	Yamal LNG
BW GDF-Suez Boston	138,059	BW Gas	Daewoo	Jan-03	Norway	S	GTT	4	Suez LN
BW GDF Suez Everett	138,028	BW Gas	Daewoo	Jun-03	Norway	S	GTT	4	Suez LNG
BW Integrity	170,000	BW Gas	Samsung	May-17	Singapore	DFDE	GTT	4	FSRU
BW Pavilion Leeara	161,880	BW Gas	Hyundai	Feb-15	Singapore	DFDE	GTT	4	Various
BW Pavilion Vanda	161,880	BW Gas	Hyundai	Feb-15	Singapore	DFDE	GTT	4	Various
BW Singapore	170,000	BW Gas	Samsung	May-15	Singapore	DFDE	GTT	4	FSRU
BW Suez Paris	162,400	BW Gas	Daewoo	May-09	N.I.S.	DFDE	GTT	4	Yemen-Atlantic
Bilbao Knutsen	138,000	Knutsen / Marpetrol	IZAR Sestao	Jan-04	Spain	S	GTT	4	Atlantic LNG
Bilis	77,730	Brunei Shell Tankers	La Seyne	Mar-75	Brunei	S	GTT	5	Brunei LNG
Bishu Maru	162,000	K Line-Transpacific	Kawasaki Sakaide	Dec-15	Panama	S	Moss	4	Australia-Japan
Boris Davydov	172,600	Dynagas	Daewoo	Sept-18	Cyprus	DFDE	GTT	4	Yamal LNG
British Achiever	173,644	BP Shipping	Daewoo	June-18	IOM	MEGI-DF	GTT	4	Various
British Contributor	173,644	BP Shipping	Daewoo	Oct-18	IOM	MEGI-DF	GTT	4	Various
British Diamond	155,000	BP Shipping	Hyundai	Sep-08	IOM	DFDE	GTT	4	Indonesia-Various
British Emerald	155,000	BP Shipping	Hyundai	Jun-07	UK	DFDE	GTT	4	Tangguh LNG
British Innovator	138,200	BP Shipping	Samsung	Jul-03	Isle of Man	S	GTT	4	Various
British Merchant	138,000	BP Shipping	Samsung	Apr-03	Isle of Man	S	GTT	4	Various
British Partner	173,644	BP Shipping	Daewoo	Mar-18	IOM	MEGI-DF	GTT	4	Various
British Ruby	155,000	BP Shipping	Hyundai	Jan-08	U.K.	DFDE	GTT	4	Various
British Sapphire	155,000	BP Shipping	Hyundai	Sep-08	IOM	DFDE	GTT	4	Tangguh
British Trader	138,000	BP Shipping	Samsung	Dec-02	Isle of Man	S	GTT	4	Engas
Broog	135,466	J4 Consortium	Mitsui Chiba	May-98	Japan	S	Moss	5	Qatargas
Bu Samara	266,000	QGTC	Samsung	Dec-08	Qatar	DRL	GTT	5	Qatargas
BW Suez Paris	162,400	BW Gas	Daewoo	May-09	N.I.S.	DFDE	GTT	4	Yemen-Atlantic
BW Suez Brussels	162,400	BW Gas	Daewoo	May-09	N.I.S.	DFDE	GTT	4	Yemen-Atlantic
Cadiz Knutsen	138,826	Knutsen / Marpetrol	IZAR Puerto Real	Jun-04	Spain	S	GTT	4	Engas
Cape Ann	145,000	Hoegh LNG/MOL	Samsung	May-10	Liberia	DFDE	GTT	4	Various
Castillo de Santisteban	173,600	Elcano	STX	Aug-10	Malta	S	GTT		Various
Castillo de Villalba	138,000	Elcano	IZAR	Nov-03	Spain	S	GTT	4	Sonatrach
Catalunya Spirit	138,000	Teekay LNG Partners	IZAR Sestao	Mar-03	Liberia	S	GTT	4	Atlantic LNG
Celestine River	145,000	KLNG	Kawasaki	Dec-07	Bahamas	S	Moss		Various
Cesi Beihai	174,100	MOL-China LNG	Hudong	June-17	Hong Kong	S	GTT	4	Australia-China
Cesi Gladstone	174,100	MOL-China LNG	Hudong	Oct-16	Hong Kong	S	GTT	4	Australia-China
Cesi Lianyungang	174,100	MOL-China LNG	Hudong	June-18	Hong Kong	S	GTT	4	Australia-China
Cesi Qingdao	174,100	MOL-China LNG	Hudong	Nov-16	Hong Kong	S	GTT	4	Australia-China
Cesi Tianjin	174,100	MOL-China LNG	Hudong	Sept-17	Hong Kong	S	GTT	4	Australia-China
Challenger FSRU	263,000	MOL LNG	Daewoo	Oct-17	St Kitts	DFDE	GTT	4	Various
Cheikh Bouamama	75,500	Skikda LNG Transport	USC	Jul-08	Bahamas	S	GTT	4	Sonatrach
Cheikh El Mokrani	75,500	Med LNG Corp	USC	Jun-07	Bahamas	S	GTT	4	Sonatrach
Christophe de Margerie	172,600	SCF	Daewoo	Nov-16	Cyprus	DFDE	GTT	4	Various
Clean Energy	150,000	Dynagas	Hyundai	Mar-07	Marshall Is.	S	GTT	4	Various
Clean Force	150,000	Dynagas	Hyundai	Jan-08	Marshall Is.	S	GTT	4	Various
Clean Ocean	155,900	Dynagas	Hyundai	Mar-14	Marshall Is.	DFDE	GTT	4	Various
Clean Planet	155,900	Dynagas	Hyundai	Mar-14	Marshall Is.	DFDE	GTT	4	Various
Clean Vision	160,000	Dynagas	Hyundai	Jun-15	Marshall Is.	DFDE	GTT	4	Various
Cool Explorer	160,000	Thenamaris	Samsung	Oct-13	Bermuda	DFDE	GTT	4	Various
Cool Runner	160,000	Thenamaris	Samsung	May-14	Bermuda	DFDE	GTT	4	Various
Cool Voyager	160,000	Thenamaris	Samsung	Oct-13	Bermuda	DFDE	GTT	4	Various
Corcovado LNG	160,106	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GTT	4	Various
Creole Spirit	174,000	Teekay	Daewoo	Jan-16	Bahamas	MEGI-DF	GTT	4	Cheniere
Cubal	160,400	Mitsui/NYK/Teekay	Samsung	Jan-12	Bahamas	DFDE	GTT	4	Various
Cygnus Passage	145,400	Cygnus LNG	Mitsubishi	Feb-09	Panama	S	Moss	4	Various
Dapeng Moon	147,000	China Ships	Hudong	Jul-09	China	S	GTT	4	Various
Dapeng Star	147,000	China Ships	Hudong	Nov-09	China	S	GTT	4	Various
Dapeng Sun	147,000	China Ships	Hudong	Jul-07	China	S	GTT	4	Woodside Energy
Diamond Gas Orchid	165,000	MOL-Jera	MHI-Nagasaki	Aug-18	Japan	S-gas	Moss	4	US-Japan
Diamond Gas Rose	165,000	MOL-Jera	MHI-Nagasaki	Aug-18	Japan	S-gas	Moss	4	US-Japan
Disha	136,000	Petronet LNG Ltd.	Daewoo	Jan-04	Malta	S	GTT	4	Qatargas
Doha	137,350	J4 Consortium	Mitsubishi Nagasaki	Jun-99	Japan	S	Moss	5	Qatargas
Duhail	210,100	ProNav	Daewoo	Jan-08	Germany	DRL	GTT	4	Various
Dukhan	135,000	J4 Consortium	Mitsui Chiba	Oct-04	Japan	S	Moss	4	Qatargas
Dwiputra	127,385	Humpuss Consortium	Mitsubishi Nagasaki	Mar-94	Bahamas	S	Moss	4	Pertamina
Ebisu	147,547	Golar LNG	Kawasaki	Sep-08	Bahamas	S	Moss	4	Various
Eduard Toll	172,000	Teekay-CLNG	Daewoo	Dec-17	Bahamas	MEGI-DF	GTT	4	Various
Ejnan	145,000	4J	Samsung	Jan-07	Bahamas	S	GTT		RasGas
Ekaputra	136,400	Humpuss Consortium	Mitsubishi Nagasaki	Jan-90	Liberia	S	Moss	5	Pertamina
Energy Advance	145,000	Tokyo LNG Tankers	Kawasaki Sakaide	Mar-05	Japan	S	Moss	4	Darwin

Energy Atlantic	159,924	Alpha	STX Jinhae	Sep-15	Malta	DFDE	GTT	4	Various
Energy Confidence	155,000	Tokyo LNG Tankers	Kawasaki	Apr-09	Panama	S	Moss	4	Various
Energy Frontier	147,600	Tokyo LNG Tankers	Kawasaki Sakaide	Sep-03	Japan	S	Moss	4	Darwin
Energy Glory	165,000	Tokyo LNG Tankers	JMU	Sept-18	Japan	S	Moss	4	Various
Energy Horizon	177,000	Tokyo LNG Tankers	Kawasaki	Jul-11	Japan	S	Moss	4	Pluto LNG
Energy Liberty	165 000	MOL	JMU Tsu	Oct-18	Japan	TFDE	IHI-SPB	4	Various
Energy Navigator	147,000	Tokyo LNG Tankers	Kawasaki Sakaide	May-08	Japan	S	Moss	4	Various
Energy Progress	145,000	MOL	Kawasaki	Nov-06	Japan	S	Moss	4	Bayu Undan LNG
Enshu Maru	165,257	K Line	Kawasaki	June-18	Japan	S	Moss	4	Various
Esshu Maru	162,000	K Line-Transpacific	Kawasaki Sakaide	Dec-14	Panama	S	Moss	4	Australia-Japan
Excalibur	138,200	Exmar/ Excelerate	Daewoo	Oct-02	Belgium	S	GTT	4	Various
Excel	138,106	Exmar/ MOL	Daewoo	Sep-03	Belgium	S	GTT	4	Various
Excelerate	138,000	Exmar/Excelerate	Daewoo	Oct-06	Belgium	S	GTT	4	Various
Excellence	138,000	GKFF Ltd.	Daewoo	May-05	Belgium	S	GTT	4	Excelerate Energy
Excelsior	138,000	Exmar	Daewoo	Jan-05	Belgium	S	GTT	4	Various
Exemplar	150,900	Excelerate	Daewoo	Jun-10	Belgium	S	GTT	4	Various
Expedient	151,000	Excelerate	Daewoo	Nov-09	Belgium	S	GTT	4	Various
Experience RV	174,000	Exmar/Excelerate	Daewoo	Jul-14	Marshall Is.	DFDE	GTT		Various
Explorer	150,900	Exmar/Excelerate	Daewoo	Mar-08	Belgium	S	GTT	4	Excelerate
Express	151,000	Exmar/Excelerate	Daewoo	May-09	Belgium	S	GTT	4	Various
Exquisite	150,900	Excelerate	Daewoo	Sep-09	Belgium	S	GTT	4	Various
Fedor Litke	172,636	Dynagas	Daewoo	Nov-17	Cyprus	DFDE	GTT	4	Various
Flex Endeavour	173,400	Flex LNG	Daewoo	Jan-18	Marshall Is.	MEGI-DF	GTT	4	Various
Flex Enterprise	173,400	Flex LNG	Daewoo	Jan-18	Marshall Is.	MEGI-DF	GTT	4	Various
Flex Rainbow	174,000	Flex LNG	Samsung	July-18	Marshall Is.	MEGI-DF	GTT	4	Various
Flex Ranger	174,000	Flex LNG	Samsung	April-18	Marshall Is.	MEGI-DF	GTT	4	Various
Fraiha	210,100	J5 Consortium	Daewoo	Sep-08	Marshall Is.	DRL	GTT	4	Qatargas
FSRU Independence	170,000	Hoegh	Hyundai	Feb-14	NIS	DFDE	GTT	4	Various
FSRU Lampung	170,000	Hoegh	Hyundai	May-14	Indonesia	DFDE	GTT	4	Various
Fuji LNG	147,895	TMSC Gas	Kawasaki	Jun-04	Malta	S	Moss	4	Various
Fuwairit	138,000	Peninsular LNG	Samsung	Jan-04	Bahamas	S	GTT	4	RasGas II
Galea	134,425	Shell Shipping	Mitsubishi Nagasaki	Oct-02	Singapore	S	Moss	5	Shell
Galicia Spirit	140,620	Teekay LNG Partners	Daewoo	Jul-04	Liberia	S	GTT	4	Engas
Gaselys	153,500	GdF/NYK	Atlantique	Mar-07	France	DFDE	CS 1	4	Engas
Gallina	134,425	Shell Shipping	Mitsubishi Nagasaki	Oct-02	Singapore	S	Moss	5	Shell
GasLog Chelsea	153,000	GasLog	Hanjin Korea	Dec-09	Panama	TFDE	GTT	4	Various
Gaslog Geneva	174,000	GasLog	Samsung	Sept-16	Bermuda	TFDE	GTT	4	Shell charter
Gaslog Genoa	174,000	GasLog	Samsung	June-18	Bermuda	TFDE	GTT	4	Various
Gaslog Gibraltar	174,000	GasLog	Samsung	Oct-16	Bermuda	TFDE	GTT	4	Shell charter
Gaslog Glasgow	174,000	GasLog	Samsung	Jun-16	Bermuda	TFDE	GTT	4	Shell charter
Gaslog Greece	174,000	GasLog	Samsung	Mar-16	Bermuda	TFDE	GTT	4	Shell charter
GasLog Hongkong	174,000	GasLog	Hyundai	June-18	Bermuda	TFDE	GTT	4	Various
GasLog Houston	174,000	GasLog	Hyundai	Jan-18	Bermuda	TFDE	GTT	4	Various
GasLog Salem	165,000	GasLog	Samsung	Apr-15	Liberia	TFDE	GTT	4	Various
GasLog Santiago	155,000	GasLog	Samsung	Mar-13	Liberia	TFDE	GTT	4	Various
GasLog Saratoga	155,000	GasLog	Samsung	Dec-14	Bermuda	TFDE	GTT	4	Various
Gaslog Savannah	155,000	GasLog	Samsung	May-10	Bermuda	DFDE	GTT	4	Various
GasLog Seattle	155,000	GasLog	Samsung	Oct-13	Bermuda	TFDE	GTT	4	Various
GasLog Shanghai	155,000	GasLog	Samsung	Jan-13	Liberia	TFDE	GTT	4	Various
Gaslog Singapore	155,000	GasLog	Samsung	Jul-10	Bermuda	DFDE	GTT	4	Various
Gaslog Skagen	155,000	GasLog	Samsung	Oct-13	Bermuda	DFDE	GTT	4	Various
Gaslog Sydney	155,000	GasLog	Samsung	May-13	Bermuda	DFDE	GTT	4	Various
GDF-Suez Global Energy	74,000	Gaz de France	Chantiers	Dec-06	France	DFDE	CS1	4	Sonatrach
GDF-Suez Point Fortin	154,200	LNG Japan	Imabari/Koyo	Feb-10	Panama	DFDE	GTT	4	Various
Gemmata	138,100	Shell Shipping	Mitsubishi Nagasaki	Mar-04	Singapore	S	Moss	5	Shell
Georgiy Brusilov	172,000	Dynagas	Daewoo	June-18	Cyprus	DFDE	GTT	4	Yamal LNG
Ghasha	137,510	National Gas Shipping	Mitsui	Jun-95	Liberia	S	Moss	5	ADGAS
Gigira Laitebo	177,000	MOL-Itochu	Hyundai	Feb-09	Panama	DFDE	GTT	4	Various
Golar Arctic	140,645	Golar LNG	Daewoo	Dec-03	Marshall Is.	S	GTT	4	Shell Spot
Golar Bear	160,000	Golar	Samsung	Mar-14	Bermuda	DFDE	GTT	4	Various
Golar Celsius	160,000	Golar LNG	Samsung	Sep-13	Bermuda	DFDE	GTT	4	Various
Golar Crystal	160,000	Golar LNG	Samsung	Oct-13	Bermuda	DFDE	GTT	4	Various
Golar Eskimo (FSRU)	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	GTT	4	Various
Golar Freeze	125,850	Golar LNG	HDW	Feb-77	UK	S	Moss	5	Various
Golar Glacier	162,000	Golar LNG	Hyundai	Sep-14	Marshall Is.	DFDE	GTT	4	Various
Golar Grand	145,880	Golar LNG	Daewoo	2006	IoM		GTT	4	Various
Golar Ice	160,000	Golar LNG	Samsung	Feb-15	Bermuda	DFDE	GTT	4	Various
Golar Igloo (FSRU)	160,000	Golar LNG	Samsung	Oct-13	Bermuda	DFDE	GTT	4	Various
Golar Kelvin	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	GTT	4	Various
Golar Maria	145,950	Golar LNG	Daewoo	2006	Marshall Is.		GTT	4	Various
Golar Mazo	135,225	Golar LNG/CPP	Mitsubishi	Jan-00	Liberia	S	Moss	5	Pertamina
Golar Penguin	160,000	Golar LNG	Samsung	Mar-14	Marshall Is.	DFDE	GTT	4	Various
Golar Seal	160,000	Golar LNG	Samsung	Aug-13	Bermuda	DFDE	GTT	4	Various
Golar Singapore (FSRU)	160,000	Golar LNG	Samsung	June-15	Bermuda	DFDE	GTT	4	Various

Golar Snow	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	GTT	4	Various
Golar Tundra (FSRU)	160,000	Golar LNG	Samsung	Dec-15	Bermuda	DFDE	GTT	4	Various
Golar Viking	140,000	Golar LNG	Hyundai	Jan-05	Marshall Is.	S	Moss	4	Various
Golar Winter	138,250	Golar LNG	Daewoo	Apr-04	Marshall Is.	S	GTT	4	Petrobras
Grace Acacia	150,000	Algaet Shipping	Hyundai	Jan-07	Japan	S	GTT	4	Various
Grace Barleria	150,000	Swallowtail Ship	Hyundai	Oct-07	Japan	S	GTT	4	Various
Grace Cosmos	150,000	AGH Shipping	Hyundai	Mar-08	Japan	S	GTT	4	Various
Grace Dahlia	177,000	Tokyo Gas	Kawasaki	Oct-13	Japan	S	Moss	4	Various
Gracilis	138,830	Golar LNG	Hyundai	Jan-05	Marshall Is.	S	GTT	4	Shell BG
Granatina	140,645	Shell Shipping	Daewoo	Dec-03	Singapore	S	GTT	4	Shell
Grand Aniva	147,200	Sovcomflot/NYK	Mitsubishi	Jan-08	Japan	S	Moss	4	Various
Grand Elena	147,200	Sovcomflot/NYK	Mitsubishi	Oct-07	Japan	S	Moss	4	Various
Grand Mereya	147,200	Primorsk/MOL/K Line	Chiba	May-08	Japan	S	Moss	4	Sakhalin II
Hanjin Muscat	138,200	Hanjin Shipping	Hanjin	Jul-99	Panama	S	GTT	4	Oman Gas
Hanjin Pyeong Taek	130,600	Hanjin Shipping	Hanjin	Sep-95	Panama	S	GTT	4	Pertamina
Hanjin Ras Laffan	138,214	Hanjin Shipping	Hanjin	Jul-00	Panama	S	GTT	4	QatarGas
Hanjin Sur	138,333	Hanjin Shipping	Hanjin	Jan-00	Panama	S	GTT	4	Oman Gas
Hispania Spirit	140,500	Teekay LNG Partners	Daewoo	Sep-02	Spain	S	GTT	4	Atlantic LNG
Hoegh Esperanza FSRU	170,000	Hoegh	Hyundai	April-18	Norway	DFDE	GTT	4	Various
Hoegh Gallant FSRU	170,050	Hoegh LNG	Hyundai	May-14	Marshall Is.	DFDE	GTT	4	chartered
Hoegh Giant FSRU	170,050	Hoegh LNG	Hyundai	Jan-18	Marshall Is.	DFDE	GTT	4	various
Hoegh Grace FSRU	170,050	Hoegh LNG	Hyundai	May-15	Marshall Is.	DFDE	GTT	4	various
Hyundai Aquapia	135,000	Hyundai MM	Hyundai	Mar-00	Panama	S	Moss	4	Oman Gas
Hyundai	135,000	Hyundai MM	Hyundai	Jan-00	Panama	S	Moss	4	RasGas
Hyundai Ecopia	145,000	Hyundai	Hyundai	Nov-08	Panama	S	GTT	4	Various
Hyundai Greenpia	125,000	Hyundai MM	Hyundai	Nov-96	Panama	S	Moss	4	Pertamina
Hyundai Oceanpia	135,000	Hyundai MM	Hyundai	Jul-00	Panama	S	Moss	4	Oman Gas
Hyundai Technopia	135,000	Hyundai MM	Hyundai	Jul-00	Panama	S	Moss	4	RasGas
Hyundai Utopia	125,182	Hyundai MM	Hyundai	Jun-94	Panama	S	Moss	4	Pertamina
Iberica Knutsen	138,000	Knutsen OAS	Daewoo	Aug-06	Norway	S	GT 96	4	Gas Natural
Ibra LNG	147,100	Oman Gas	Samsung	Jun-06	Panama	S	GTT	4	Oman LNG
Ibri LNG	145,000	Oman Gas	Mitsubishi	Jul-06	Panama	S	GTT	4	Oman LNG
Ish	137,540	National Gas Shipping	Mitsubishi Nagasaki	Nov-95	Liberia	S	Moss	5	ADGAS
K Acacia	138,017	Korea Line	Daewoo	Jan-00	Panama	S	GTT	4	Oman Gas
K Freesia	135,256	Korea Line	Daewoo	Jun-00	Panama	S	GTT	4	RasGas
Kinisis	173,400	K-Line	Daewoo	Jan-18	Liberia	MEGI-DF	GTT	4	Various
K Jasmine	145,700	Korea Line	Daewoo	Mar-08	Panama	S	GTT	4	Kogas offtake
K Mugungwha	152,000	K Line	Daewoo	Nov-08	Panama	S	GTT	4	Various
Kita LNG	160,106	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GTT	4	Various
Kotawaka Maru	125,200	J3 Consortium	Kawasaki Sakaide	Jan-84	Japan	S	Moss	5	Darwin
Kumul	172,000	MOL	Hudong	May-16	Hong Kong	DRL	GTT	4	PNG-Asia
Lalla Fatma N'Soumer	145,000	Algeria Nippon Gas	Kawasaki Sakaide	Dec-04	Bahamas	S	Moss	4	Various
Lijmilya	261,700	QGTC	Daewoo	Sep-08	Marshall Is.	DRL	GTT	5	Various
LNG Abalamabie	174,900	Bonny Gas	Samsung	Nov-16	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Abuja	126,530	Bonny Gas Transport	GD Quincy	Sep-80	Bahamas	S	Moss	5	Nigeria LNG
LNG Abuja II	174,900	Bonny Gas	Samsung	Oct 16	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Adamawa	141,000	Bonny Gas Transport	Hyundai	Jun-05	Bermuda	S	Moss	4	Various
LNG Akwa Ibom	141,000	Bonny Gas Transport	Hyundai	Nov-04	Bermuda	S	Moss	4	Various
LNG Aquarius	126,300	MOL/LNG Japan	GD Quincy	Jun-77	Marshall Is.	S	Moss	5	Various
LNG Barka	153,000	NYK	Kawasaki	Jan-09	Bahamas	S	Moss	4	Various
LNG Bayelsa	137,500	Bonny Gas Transport	Hyundai	Feb-03	Bermuda	S	Moss	4	Nigeria LNG
LNG Benue	145,700	BW Gas	Daewoo	Mar-06	Bermuda	S	GTT	4	Nigeria LNG
LNG Bonny	177,000	Bonny Gas Transport	Hyundai	Oct-15	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Borno	149,600	NYK Line	Samsung	Aug-07	Japan	S	GTT	4	Nigeria LNG
LNG Capricorn	126,300	MOL/LNG Japan	GD Quincy	Jun-78	Marshall Is.	S	Moss	5	Pertamina
LNG Cross River	141,000	Bonny Gas Transport	Hyundai	Sep-05	Bermuda	S	Moss	4	Various
LNG Dream	145,000	Osaka Gas	Kawasaki	Sep-06	Japan	S	Moss	4	Woodside Energy
LNG Ebisu	147,500	MOL	Kawasaki	Sep-08	Bahamas	S	Moss	4	Various
LNG Edo	126,530	Bonny Gas Transport	GD Quincy	May-80	Bahamas	S	Moss	5	Nigeria LNG
LNG Enugu	145,000	BW Gas	Daewoo	Oct-05	Bermuda	S	GTT	4	Nigeria LNG
LNG Fimina	175,000	Bonny Gas Transport	Samsung	Oct-15	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Flora	127,700	J3 Consortium	Kawasaki Sakaide	Mar-93	Japan	S	Moss	4	Pertamina
LNG Fukurokuju	165,000	MOL	Kawasaki	June-15	Japan	S	Moss	4	Various
LNG Gemini	126,300	MOL/LNG Japan	GD Quincy	Sep-78	Marshall Is.	S	Moss	5	Pertamina
LNG Imo	148,300	BW Gas	Daewoo	Jun-08	Bermuda	S	GTT	4	Nigeria LNG
LNG Jamal	135,330	Osaka Gas/J3 Consortium	Mitsubishi Nagasaki	Oct-00	Japan	S	Moss	5	Oman Gas
LNG Juno	177,300	MOL-Osaka	Mitsubishi	Oct-18	Marshall Is.	DFDE	Moss	4	Freeport LNG/Various
LNG Jupiter	145,000	NYK Line	Kawasaki	Jul-09	Bahamas	S	Moss	4	Various
LNG Jurojin	155,300	MOL	MHI Nagasaki	Nov-15	Japan	S	KM	4	Various
LNG Kano	148,471	BW Gas	Daewoo	Jan-07	Bermuda	S	GTT	4	NLNG
LNG Lagos	177,000	Bonny Gas	Hyundai	Oct-15	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Leo	126,400	MOL/LNG Japan	GD Quincy	Dec-78	Marshall Is.	S	Moss	5	Pertamina
LNG Lerici	65,000	Exmar	Italcantieri Sestri	Mar-98	Italy	S	GTT	4	Sonatrach
LNG Libra	126,400	Hoegh LNG	GD Quincy	Apr-79	Marshall Is.	S	Moss	5	Various

LNG Lokoja	148,300	BW Gas	Daewoo	Dec-06	Bermuda	S	GTT	4	Nigeria LNG
LNG Mars	155,000	MOL/Osaka Gas	Mitsubishi	Oct-16	Marshall Is.	S	Moss	5	Various
LNG Ogun	148,300	NYK Line	Samsung	Aug-07	Japan	S	GTT	4	Nigeria LNG
LNG Ondo	148,300	BW Gas	Daewoo	Sep-07	Bermuda	S	GTT	4	Nigeria LNG
LNG Oyo	140,500	BW Gas	Daewoo	Dec-05	Bermuda	S	GTT	4	Nigeria LNG
LNG Pioneer	138,000	MOL	Daewoo	Jul-05	Bahamas	S	GTT	4	Idku
LNG Port Harcourt	175,000	Bonny Gas	Samsung	Oct-15	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Portovenere	65,000	Exmar	Italcantieri Sestri	Jun-96	Italy	S	GTT	4	Sonatrach
LNG River Niger	141,000	Bonny Gas Transport	Hyundai	May-06	Bermuda	S	Moss	4	Various
LNG River Orashi	145,910	BW Gas	Daewoo	Nov-04	Bermuda	S	GTT	4	Nigeria LNG
LNG Rivers	137,231	Bonny Gas Transport	Hyundai	Jun-02	Bermuda	S	Moss	4	Nigeria LNG
LNG Saturn	153,000	MOL	MHI	Nov-15	Japan	S	Moss	4	Various
LNG Sokoto	137,231	Bonny Gas Transport	Hyundai	Aug-02	Bermuda	S	Moss	4	Nigeria LNG
LNG Taurus	126,300	MOL/LNG Japan	GD Quincy	Aug-79	Marshall Is.	S	Moss	5	Various
LNG Venus	155,000	Osaka/MOL	MHI	Oct-14	Japan	S	Moss	4	Various
LNG Vesta	127,547	Tokyo Gas Consortium	Mitsubishi Nagasaki	Jun-94	Japan	S	Moss	4	Pertamina
LNG Virgo	126,400	MOL/LNG Japan	GD Quincy	Dec-79	Marshall Is.	S	Moss	5	Pertamina
Lobito	160,400	Mitsui/NYK/Teekay	Samsung	Oct-11	Bahamas	DFDE	GTT	4	Various
Lusail	138,000	Peninsular LNG	Samsung	May-05	Bahamas	S	GTT	4	Qatar
Macoma	173,400	Teekay	Daewoo	Oct-17	Bahamas	DFDE	GTT	4	Various
Madrid Spirit	138,000	Teekay LNG Partners	IZAR Puerto Real	Jan-05	Spain	S	GTT	4	Engas
Magdala	173,400	Teekay	Daewoo	Feb-18	Bahamas	DFDE	GTT	4	Various
Magellan Spirit	165,500	Teekay LNG Partners	Samsung	Sep-08	Denmark	DFDE	GTT	4	Various
Malanje	160,400	Mitsui/NYK/Teekay	Samsung	Jul-11	Bahamas	DFDE	GTT	4	Various
Maran Gas Achilles	174,000	Maran	Hyundai Samho	Feb-16	Greece	DFDE	GTT	4	Various
Maran Gas Agamemnon	174,000	Maran	Hyundai Samho	May-16	Greece	DFDE	GTT	4	Various
Maran Gas Alexandria	161,870	Maran	Hyundai Samho	Sep-15	Greece	DFDE	GTT	4	Various
Maran Gas Amphipolis	173,400	Maran	Daewoo	Aug-16	Greece	DFDE	GTT	4	Various
Maran Gas Apollonia	161,870	Maran	Daewoo	Jan-14	Greece	DFDE	GTT	4	Various
Maran Gas Asclepius	145,000	Kristen Navigation	Daewoo	Jul-05	Bermuda	S	GTT	4	Qatar
Maran Gas Coronis	145,700	Maran	Daewoo	Sep-07	Greece	S	GTT	4	Rasgas II
Maran Gas Delphi	159,800	Maran	Daewoo	Feb-14	Greece	DFDE	GTT	4	Various
Maran Gas Efessos	159,800	Maran	Daewoo	Jun-14	Greece	DFDE	GTT	4	Various
Maran Gas Hector	174,000	Maran	Hyundai Samho	Nov-16	Greece	DFDE	GTT	4	Various
Maran Gas Lindos	159,800	Maran	Daewoo	Jun-15	Greece	DFDE	GTT	4	Various
Maran Gas Mystras	155,900	Maran Gas	Daewoo	May-15	Greece	DFDE	GTT	4	Various
Maran Gas Olympias	174,500	Maran	DSME	Feb-17	Greece	DFDE	GTT	4	Various
Maran Gas Pericles	174,000	Maran	Hyundai Samho	June-16	Greece	DFDE	GTT	4	Various
Maran Gas Posidonia	161,870	Maran	Daewoo	May-14	Greece	DFDE	GTT	4	Various
Maran Gas Roxana	173,400	Maran	Daewoo	Jan-17	Greece	DFDE	GTT	4	Various
Maran Gas Sparta	161,870	Maran	Hyundai Samho	April-15	Greece	DFDE	GTT	4	Various
Maran Gas Spetses	174,000	Maran	Daewoo	Feb-18	Greece	DFDE	GTT	4	Various
Maran Gas Troy	155,900	Maran Gas	Daewoo	May-15	Greece	DFDE	GTT	4	various
Maran Gas Ulysses	174,000	Maran	Hyundai Samho	Jan-17	Greece	DFDE	GTT	4	Various
Maria Energy	174,000	Tsakos	Hyundai	Mar-15	Marshall Is.	TFDE	GTT	4	Various
Marib Spirit	165,000	Teekay LNG	Samsung	May-08	Marshall Is.	DFDE	GTT	4	Various
Marvel Crane	177,000	NYK-Mitsui	Mitsubishi	Mar-19	Singapore	S	Moss	4	US/Various
Marvel Eagle	155,000	MOL-Osaka	Kawasaki	Sept-18	Marshall Is.	S	Moss	4	Cameron LNG/Various
Marvel Falcon	174,000	NYK-Mitsui	Samsung	Nov-18	Singapore	DF	GTT	4	Cameron LNG/Various
Marvel Hawk	174,000	NYK-Mitsui	Samsung	Dec-18	Singapore	DF	GTT	4	Cameron LNG/Various
Matthew	126,540	Suez LNG Shiping	Newport News	Jun-79	Bahamas	S	GTT	6	Atlantic LNG
Megara	173,000	Teekay	Daewoo	Oct-18	Bahama	MEGI-DF	GTT	4	Various
Mekaines	266,000	Naklilat	Samsung	Mar-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Meridian Spirit	165,500	Teekay LNG	Samsung	Jan-10	Denmark	DFDE	GTT	4	Various
Mesaimeer	210,100	Naklilat	Hyundai	Mar-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Methane Alison Victoria	145,000	GasLog	Samsung	Aug-07	Bermuda	S	GTT	4	Eq.Guinea LNG
Methane Becki Anne	170,000	GasLog	Samsung	Sep-10	Bermuda	TFDE	GTT	4	Various
Methane Heather Sally	145,000	GasLog	Samsung	Jul-07	Bermuda	S	GTT	4	Eq.Guinea LNG
Methane Jane Elizabeth	145,000	GasLog	Samsung	Jun-06	Bermuda	TFDE	GTT	4	Engas
Methane Julia Louise	170,000	GasLog	Samsung	Dec-09	Bermuda	TFDE	GTT	4	Various
Methane Kari Elin	138,200	Shell	Samsung	Jun-04	Bermuda	S	GTT	4	Various
Methane Lake Charles	145,000	Shell	Samsung	Feb-07	Bermuda	S	GTT	4	Marathon Oil
Methane Lydon Volney	145,000	Shell	Samsung	Aug-06	Bermuda	S	GTT	4	Engas
Methane Mickie Harper	170,000	Shell-GasLog	Samsung	Nov-10	Bermuda	TFDE	GTT	4	Various
Methane Nile Eagle	145,000	Shell-GasLog	Samsung	Dec-07	Bermuda	S	GTT	4	Engas
Methane Patricia Camila	170,000	Shell-GasLog	Samsung	Oct-10	Bermuda	TFDE	GTT	4	Various
Methane Princess	138,159	Golar LNG	Daewoo	2003	UK	S	GTT	4	Spot BG
Methane Rita Andre	145,000	GasLog	Samsung	Mar-06	Bermuda	S	GTT	4	Engas
Methane Shirley Elizabeth	145,000	GasLog	Samsung	Apr-07	Bermuda	S	GTT	4	Marathon Oil
Methane Sprit	165,000	Teekay LNG	Samsung	Mar-08	Singapore	DFDE	GTT	4	Various
Milaha Qatar	145,000	Milaha	Samsung	Apr-06	Denmark	S	GTT	4	Qatar
Milaha Ras Laffan	138,270	Milaha	Samsung	Mar-04	Denmark	S	GTT	4	RasGas II
Min Lu	147,000	China Ships	Hudong	Aug-09	China	S	GTT	4	Various
Min Rong	147,000	China LNG Ships	Hudong	Feb-09	Hong Kong	S	GTT	4	Australia-China

Mourad Didouche	126,130	Hyproc Shipping	Atlantique	Jul-80	Algeria	S	GTT	5	Sonatrach
Mozah	266,000	QGTC	Samsung	Aug-08	Qatar	DRL	GTT	5	Qatargas II
Mraweh	137,000	National Gas Shipping	Kvaerner-Masa	Jun-96	Liberia	S	Moss	4	ADGAS
Mubaraz	137,000	National Gas Shipping	Kvaerner-Masa	Jan-96	Liberia	S	Moss	4	Various
Muraq	210,100	J5-K Line	Daewoo	May-08	Marshall Is.	DRL	GTT	4	Qatar-Atlantic Basin
Murex	173,400	Teekay	Daewoo	Oct-17	Bahamas	DFDE	GTT	4	Various
Murwab	210,100	J5 Consortium	Daewoo	May-08	Marshall Is.	DRL	GTT	4	Qatargas
Muscat LNG	149,170	Oman Gas/MOL	Kawasaki Sakaide	Mar-04	Japan	S	Moss	4	Oman Gas
Myrina	173,000	Teekay	Daewoo	Sept-18	Bahamas	MEGI-DF	GTT	4	Various
Neo Energy	149,700	Tsakos	Hyundai	Feb-07	Liberia	S	GTT	4	Various
Neptune	145,000	Hoegh LNG/MOL	Samsung	Dec-09	Liberia	DFDE	GTT	4	Various
Nikolay Yevgenov	172,600	Teekay	Daewoo	Oct-18	Bahamas	MEGI-DF	GTT	4	Various
Nikolay Zubkov	172,600	Dynagas	Daewoo	Nov-18	Cyprus	DFDE	GTT	4	Yamal LNG
Nizwah LNG	145,000	Oryx LNG Carriers	Kawasaki Sakaide	Dec-05	Japan	S	Moss	4	Oman Gas
Northwest Sanderling	127,525	Australia LNG	Mitsubishi Nagasaki	Jun-89	Australia	S	Moss	4	NWS
Northwest Sandpiper	127,500	Australia LNG	Mitsui Chiba	Feb-93	Australia	S	Moss	4	NWS
Northwest Seaeagle	127,450	Australia LNG	Mitsubishi Nagasaki	Nov-92	Bermuda	S	Moss	4	NWS
Northwest Shearwater	127,500	Australia LNG	Kawasaki Sakaide	Sep-91	Bermuda	S	Moss	4	NWS
Northwest Snipe	127,747	Australia LNG	Mitsui Chiba	Sep-90	Australia	S	Moss	4	NWS
Northwest Stormpetrel	127,600	Australia LNG	Mitsubishi Nagasaki	Dec-94	Australia	S	Moss	4	NWS
Northwest Swallow	127,708	J3 Consortium	Mitsui Chiba	Nov-89	Japan	S	Moss	4	NWS
Northwest Swan	138,000	Australia LNG	Daewoo	Mar-04	Australia	S	GTT	4	NWS
Northwest Swift	127,590	J3 Consortium	Mitsubishi Nagasaki	Sep-89	Japan	S	Moss	4	NWS
Noshu Maru	180,000	MOL-Jera	MHI-Nagasaki	Feb-19	Japan	S-gas	Moss	4	US-Japan
Oak Spirit	173,400	Teekay	Daewoo	Jan-16	Bahamas	MEGI-DF	GTT	4	Cheniere
Ob River	150,000	Lance Shipping	Hyundai	Oct-07	Marshall Is.	S	GTT	4	Various
Oceanic Breeze	155,300	K-Line	Mitsubishi-Nagasaki	June-18	Japan	S	Moss	4	Darwin-Japan
Onaiza	210,100	Nakilat	Daewoo	Apr-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Ougarta	171,866	Hyproc Shipping	Hyundai	Mar-17	Algeria	DFDE	GTT	4	Sonatrach
Pacific Arcadia	147,200	NYK Line	MHI	Oct-14	Bahamas	S	KM	4	Various
Pacific Breeze	182,000	K Line	Kawasaki	Mar-18	Marshall Is.	DFDE	Moss	4	Ichthys LNG
Pacific Enlighten	145,000	LNG MT	Mitsubishi	Mar-09	Japan	S	Moss	4	Various
Pacific Eurus	137,000	LNG Marine Transport	Mitsubishi Nagasaki	Mar-06	Bahamas	S	Moss	4	Darwin
Pacific Mimosa	155,300	NYK Line	MHI	Nov-17	Bahamas	S	Moss	4	Australia-Japan
Pacific Notus	137,006	Pacific LNG Shipping	Mitsubishi Nagasaki	Sep-03	Bahamas	S	Moss	5	Darwin
Palu LNG	160,106	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GTT	4	Various
Pan Americas	174,000	Teekay	Hudong	Mar-18	Hong Kong	TFDE	GTT	4	US-Asia
Pan Asia	174,000	Teekay	Hudong-Zhonghua	July-17	Bahamas	TFDE	GTT	4	Cheniere
Pan Europe	174,000	Teekay	Hudong	Sept-18	Hong Kong	TFDE	GTT	4	US-global
Papua	171,800	MOL-China	Hudong	Jan-15	Hong Kong	DFDE	SSD	4	PNG LNG
Patris	173,400	K-Line	Daewoo	Feb-18	Liberia	MEGI-DF	GTT	4	Various
Polar Eagle	89,880	Polar LNG	IHI Chita	Jun-93	Liberia	S	IHI SPB	4	ConocoPhillips/Marathon
Prachi	173,000	NYK-SCI	Hyundai	Nov-16	Singapore	TFDE	GTT	4	Petronet
Provalys	153,500	Gaz de France	Chantiers	Nov-06	France	DFDE	CS1	4	ELNG
Pskov	170,200	SovComFlot	STX	Mar-14	Liberia	DFDE	GTT	4	Various
Puteri Delima	130,400	MISC	Atlantique	Jan-95	Malaysia	S	GTT	4	Petronas
Puteri Delima Satu	137,100	MISC	Mitsui Chiba	Apr-02	Malaysia	S	GTT	4	Petronas
Puteri Firuz	130,400	MISC	Atlantique	May-97	Malaysia	S	GTT	4	Petronas
Puteri Firuz Satu	137,100	MISC	Mitsubishi Nagasaki	Sep-04	Malaysia	S	GTT	4	Petronas
Puteri Intan	130,400	MISC	Atlantique	Aug-94	Malaysia	S	GTT	4	Petronas
Puteri Intan Satu	137,100	MISC	Mitsubishi Nagasaki	Dec-01	Malaysia	S	GTT	4	Petronas
Puteri Mutiera Satu	137,100	MISC	Mitsui Chiba	Apr-05	Malaysia	S	GTT	4	Petronas
Puteri Nilam	130,400	MISC	Atlantique	Jun-95	Malaysia	S	GTT	4	Petronas
Puteri Nilam Satu	137,100	MISC	Mitsubishi Nagasaki	Sep-03	Malaysia	S	GTT	4	Petronas
Puteri Zamrud	130,400	MISC	Atlantique	May-96	Malaysia	S	GTT	4	Petronas
Puteri Zamrud Satu	137,100	MISC	Mitsui Chiba	Apr-87	Malaysia	S	GTT	4	Atlantic LNG
Raahi	136,000	Petronet LNG Ltd	Daewoo	Dec-04	Malta	S	GTT	4	Qatargas
Ramdane Abane	126,130	Hyproc Shipping	Atlantique	Jul-81	Algeria	S	GTT	5	Sonatrach
Rasheeda	266,000	QGTC	Samsung	Jun-10	Liberia	DRL	GTT		Various
Ribera del Duero Knutsen	173,400	Knutsen	Daewoo	Nov-10	Nor-NIS	DFDE	GTT	4	Various
Rioja Knutsen	176,300	Knutsen	Daewoo	Dec-16	Nor-NIS	DFDE	GTT	4	Various
Rudolf Samoylovich	172,652	Teekay-CLNG	Daewoo	Oct-18	Bahamas	MEGI-DF	GTT	4	Various
Salalah LNG	147,000	Oman Gas/MOL	Samsung	Dec-05	Japan	S	GTT	4	Oman
SCF Polar	71,500	Sovcomflot	Kockums	Aug-69	Liberia	S	GTT	6	Sonatrach
Sean Spirit	174,000	Teekay	Hyundai Samho	Feb-19	Bahama	MEGI-DF	GTT	4	Various
Seishu Maru	162,000	K Line-Transpacific	Kawasaki Sakaide	Jan-15	Panama	S	Moss	4	Australia-Japan
Seri Alam	138,000	MISC	Samsung	Oct-05	Malaysia	S	GTT	4	Yemen LNG
Seri Amanah	145,000	MISC	Samsung	Mar-06	Malaysia	S	GTT	4	Yemen LNG
Seri Anggun	145,000	MISC	Samsung	Nov-06	Malaysia	S	GTT	4	Yemen LNG
Seri Angkasa	145,000	MISC	Samsung	Feb-07	Malaysia	S	GTT	4	Petronas
Seri Ayu	145,000	MISC	Samsung	Oct-07	Malaysia	S	GTT	4	Various
Seri Bakti	152,300	MISC	Mitsubishi	Mar-07	Malaysia	S	GTT	4	Petronas
Seri Balhaf	152,000	MISC	Mitsubishi	Sep-08	Malaysia	S	GTT	4	Various
Seri Balquis	152,000	MISC	Mitsubishi	Dec-08	Malaysia	S	GTT	4	Various

Seri Begawan	152,300	MISC	Mitsubishi	Dec-07	Malaysia	S	GTT	4	Various
Seri Bijaksana	152,300	MISC	Mitsubishi	Feb-08	Malaysia	S	GTT	4	Petronas
Seri Camar	150,200	MISC	Hyundai	Feb-18	Malaysia	S	Moss	4	Petronas
Seri Camellia	150,000	MISC	Hyundai	Nov-16	Malaysia	S	Moss	4	Petronas
Seri Cemara	150,200	MISC	Hyundai	Apr-18	Malaysia	S	Moss	4	Petronas
Seri Cempak	150,200	MISC	Hyundai	Feb-18	Malaysia	S	Moss	4	Petronas
Seri Cenderawasih	150,000	MISC	Hyundai	Jan-17	Malaysia	S	Moss	4	Petronas
Sestao Knutsen	138,000	Knutsen	IZAR Sestao	Jan-07	Spain	S	GTT	4	Atlantic LNG
Sevilla Knutsen	173,400	Knutsen	Daewoo	Jun-10	N.I.S.	DFDE	GTT	4	Various
Shahamah	135,500	National Gas Shipping	Kawasaki Sakaide	Oct-94	Liberia	S	Moss	5	ADGAS
Shangra	266,000	QGTC	Samsung	Nov-09	Liberia	DRL	GTT	5	Qatargas IV
Shen Hai	147,100	China LNG	Hudong Zhonghua	Sep-12	China	AB/CC Steam	GTT	4	Various
Simaisma	147,700	Maran Gas Maritime	Daewoo	Jul-06	Greece	S	GTT	4	Qatar
SK Audace	180,000	SK-Marubeni	Samsung	Jul-17	Panama	DFDE	GTT	4	Various
SK Splendor	138,375	SK Shipping	Samsung	Mar-00	Panama	S	GTT	4	Oman Gas
SK Stellar	138,375	SK Shipping	Samsung	Dec-00	Panama	S	GTT	4	RasGas
SK Summit	138,000	SK Shipping	Daewoo	Aug-99	Panama	S	GTT	4	RasGas
SK Sunrise	138,306	I. S. Carriers	Samsung	Sep-03	Panama	S	GTT	4	RasGas
SK Supreme	138,200	SK Shipping	Samsung	Jan-00	Panama	S	GTT	4	RasGas
Sohar LNG	137,250	Oman Gas/ MOL	Mitsubishi Nagasaki	Oct-01	Malta	S	Moss	5	Oman Gas
Solaris	155,000	GasLog	Samsung	Jul-14	Bermuda	TFDE	GTT	4	Various
Sonangol Benguela	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GTT	4	Angola LNG
Sonangol Etosha	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GTT	4	Angola LNG
Sonangol Sambizanga	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GTT	4	Angola LNG
Southern Cross	172,000	MOL	Hudong	May-15	Hong Kong	DRL	GTT	4	Various
Soyo	160,400	Mitsui/NYK/Teekay	Samsung	May-11	Bahamas	DFDE	GTT	4	Various
Spirit of Hela	177,000	MOL	Hyundai	Oct-09	Panama	DFDE	GTT	4	Various
Stena Blue Sky	145,700	Stena	Daewoo	Jan-06	Panama	S	GTT	4	Various
Stena Clear Sky	171,800	Stena	Daewoo	Sep-10	Panama	DFDE	GTT	4	Various
Stena Crystal Sky	171,800	Stena	Daewoo	Jul-10	Panama	DFDE	GTT	4	Various
STX Kolt	145,700	STX Panocean	Korea Hanjin	Nov-08	Panama	DFDE	GTT	4	Various
Suez Point Fortin	154,200	Trinity LNG	Koyo Japan	Nov-09	Panama	S	GTT	4	Yemen LNG
Taitar No. 1	145,000	NYK Line	Mitsubishi	Oct-09	Liberia	S	Moss	4	Various
Taitar No. 3	145,000	NYK Line	Mitsubishi	Jan-10	Liberia	S	Moss	4	Various
Taitar No. 4	145,000	NYK	Mitsubishi	Jan-10	Liberia	S	Moss	4	Various
Tangguh Batur	145,700	Sovcomflot/NYK	Daewoo	Dec-08	Cyprus	S	GTT		Tangguh
Tangguh Foja	155,000	K Line	Samsung	Jul-08	Panama	DFDE	GTT	4	Tangguh LNG
Tangguh Hiri	155,000	Teekay LNG	Hyundai	Nov-08	IOM	DFDE	GTT	4	Tangguh
Tangguh Jaya	145,700	K Line	Samsung	Nov-08	Panama	DFDE	GTT	4	Tangguh
Tangguh Palung	155,000	K Line	Samsung	Mar-09	Panama	DFDE	GTT	4	Tangguh
Tangguh Sago	155,000	Teekay LNG	Hyundai	Mar-09	IOM	DFDE	GTT	4	Tangguh LNG
Tangguh Towuti	145,700	Sovcomflot/NYK	Daewoo	Oct-08	Cyprus	S	GTT	4	Tangguh
Tembek	216,200	OSG/Nakilat	Samsung	Sep-07	Marshall Is.	DRL	GTT	4	Qatargas II
Tenaga Satu	130,000	MISC	Dunkerque	Sep-82	Malaysia	S	GTT	5	Petronas
Tessala	171,866	Hyproc Shipping	Hyundai	Dec-16	Algeria	DFDE	GTT	4	Sonatrach
Torben Spirit	173,000	Teekay	Daewoo	Feb-17	Bahama	MEGI-DF	GTT	4	Various
Trinity Arrow	154,900	K Line	Imabari Shipbuilding	Mar-08	Panama	S	GTT	4	Various
Umm Al Amad	210,100	J5	Daewoo	Aug-08	Marshall Is.	DRL	GTT	4	Ras Gas III
Umm Al Ashtan	137,000	National Gas Shipping	Kvaerner- Masa	May-97	Liberia	S	Moss	4	ADGAS
Umm Bab	145,000	Kristen Navigation	Daewoo	Nov-05	Bermuda	S	GTT	4	Qatargas
Umm Slaal	266,000	QGTC	Samsung	Nov-08	Qatar	DRL	GTT	5	Qatargas
Valencia Knutsen	173,400	Knutsen	Daewoo	Sep-10	Nor-NIS	DFDE	GTT	4	Various
Velikiy Novgorod	170,200	SovComFlot	STX	Feb-14	Liberia	DFDE	GTT	4	Various
Vladimir Rusanov	172,000	MOL-China Shipping	Daewoo	Mar-18	Hong Kong	DFDE	GTT	4	Yamal
Vladimir Viz	172,000	MOL-China Shipping	Daewoo	Sept-18	Hong Kong	DFDE	GTT	4	Yamal
Vladimir Voronin	172,600	Teekay	Daewoo	Jun-19	Bahamas	MEGI-DF	GTT	4	Various
Wakaba Maru	125,000	J3 Consortium	Mitsui Chiba	Apr-85	Japan	S	Moss	5	Pertamina
WilForce	156,000	Teekay LNG	Daewoo	Aug-13	NIS	DFDE	GTT	4	Various
WilPride	156,000	Teekay	Daewoo	June-13	NIS	DFDE	GTT	4	Various
Woodside Cheney	174,000	Maran	Hyundai Samho	Mar-16	Greece	DFDE	GTT	4	Various
Woodside Donaldson	165,500	Teekay LNG	Samsung	Dec-09	Singapore	DFDE	GTT	4	Various
Woodside Goode	159,800	Maran	Daewoo	Jul-14	Greece	DFDE	GTT	4	Various
Woodside Reeswithers	173,400	Maran	Daewoo	Nov-16	Greece	DFDE	GTT	4	Various
Woodside Rogers	155,900	Maran Gas	DSME	Jul-13	Greece	DFDE	GTT	4	Various
Yamal Spirit	174,000	Teekay	Hyundai Samho	Jan-19	Bahama	MEGI-DF	GTT	4	Various
Yari LNG	159,983	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GTT	4	Various
Yenisei River	155,000	Dynagas	Hyundai	Jul-13	Marshall Is.	DFDE	GTT	4	Various
YK Sovereign	127,125	SK Shipping	Hyundai	Dec-94	Panama	S	Moss	4	Pertamina
Zarga	266,000	QGTC	Samsung	Dec-09	Liberia	DRL	GTT	5	Qatar-Atlantic
Zekreet	135,420	J4 Consortium	Mitsui Chiba	Dec-98	Japan	S	Moss	5	Qatargas

Any observations, additions or suggested revisions to the LNG journal World LNG Carrier Fleet list should be sent to editor@lngjournal.com

LNG Import Terminals

Explanatory Notes

- The tables do not include the following types of LNG facilities :
  - Small marine satellite terminals receiving LNG from liquefaction plants in their own country (such as exist in Norway) or which receive LNG transhipped from nearby reception terminals in their own country (such as in Japan)
  - Satellite LNG storage facilities that receive LNG transported only by road or rail
- Expansions of LNG reception terminals are only shown if they involve new storage tanks
- Where there is a blank in the table the information is uncertain or unknown.

Any comments on the tables, and corrections / additional information from terminal shareholders and project developers would be most welcome, and should be sent to John McKay e-mail editor@lngjournal.com

Country	Location (Project)	Owners	Start up	Storage Tanks	Storage Capacity
Belgium	Zeebrugge	Fluxys	1987	4	380,000
Canada	Canaport Saint John	Irving Oil, Repsol	2009	3	480,000
Chile	Quintero	ENAP, Metrogas, Enagas	2009	3	334,000
	Mejillones	Engie, Codelco	2010	1	175,000
China	Beihai LNG, Guangxi	Sinopec	2015	4	640,000
	Dalian	PetroChina	2011	3	480,000
	Dapeng ND Guangdong	CNOOC	2018	4	640,000
	Dongguan, Guangdong	Jovo Group	2013	2	160 000
	Fujian LNG (Xiuyu)	CNOOC, Fujian I&D Corp.	2008	2	640,000
	Guangdong	CNOOC,BP	2006	3	480,000
	Haikou, Hainan LNG	CNOOC	2014	3	480,000
	Ningbo, Zheijang	CNOOC, Zhejiang Energy	2012	3	480,000
	Qidong, Jiangsu	Guanghui Energy	2018	1	60,000
	Qingdao, Shandong	Sinopec	2014	3	480,000
	Rudong	PetroChina	2011	3	530,000
	Shanghai	CNOOC, Shenergy Group	2009	3	495,000
	Shanghai, Mengtougou	Shanghai Gas	2008	3	120 000
	Shenzen, Diefu	CNOOC	2016	2	320,000
	Tangshan, Hebei	PetroChina	2013	3	480,000
	Tianjin North	Sinopec	2017	2	320,000
	Yuedong, Guangdong	CNOOC	2016	2	320,000
	Zhoushan Zhejiang	Enn Group	2018	2	320,000
	Zhuhai, Gaolan	CNOOC	2013	3	480,000
Dominican Republic	Punta Caucedo	AES Andres	2003	1	160 000
Finland	Pori	Gasum Skangas	2016	1	30,000
	Tornio	Gasum Skangas	2018	1	30,000
France	Fos Tonkin	Elengy	1972	3	150,000
	Montoir-de-Bretagne	Elengy	1980	3	360,000
	Fos Cavaou	Engie, Total	2010	3	330,000
	Dunkirk LNG	EDF, Fluxys, Total	2016	3	570,000
Gibraltar	Gasnor	Shell	2018	1	5,000
Greece	Revithoussa	DEPA	2000	3	225,000
India	Dabhol	GAIL, NTPC (Ratnagiri Gas & Power)	2009	3	480,000
	Dahej	Petronet LNG	2004	4	592,000
	Hazira	Shell India, Total	2005	2	320,000
	Kochi, Kerala	Petronet LNG	2013	2	320,000
	Mundra	Gujarat State Petroleum, Adani Group	2018	2	320,000
	Kamarajar (Ennore), Tamil Nadu	Indian Oil, DFC, ICICI Bank	2019	2	360,000
Indonesia	Arun	Pertamina	2015	5	507,000
Italy	Panigaglia	Snam	1969	2	100,000
	Porto Levante (offshore GBS)	ExxonMobil, Qatar Petroleum, Edison Gas	2009	2	250,000
Japan	Negishi	Tokyo Gas	1969	14	1,180,000
	Sodegaura	Tokyo Gas	1973	35	2,660,000
	Ohgishima	Tokyo Gas	1998	4	850,000
	Higashi-Ohgishima	Tokyo Electric	1984	9	540,000
	Futtsu	Tokyo Electric	1985	10	1,110,000
	Yokkaichi LNG	Chubu Electric	1988	4	320,000
	Kawagoe	Chubu Electric	1997	6	840,000
	Yokkaichi Works	Toho Gas	1991	2	160,000
	Chita LNG Joint	Toho Gas, Chubu Electric	1978	4	300,000
	Chita LNG	Toho Gas, Chubu Electric	1983	7	640,000
	Chita - Midorihama	Toho Gas	2001	3	600,000
	Senboku I	Osaka Gas	1972	4	180,000
	Senboku II	Osaka Gas	1977	18	1,585,000
	Himeji	Osaka Gas	1984	8	740,000
	Himeji LNG	Kansai Electric	1979	7	520,000
	Yanai	Chugoku Electric	1990	6	480,000
	Niigata	Nihonkai LNG, Tohoku Electric	1984	8	720,000
	Oita	Oita Gas, Kyushu Electric	1990	5	460,000
	Tobata	Kitakyushu LNG	1977	8	480,000
	Fukuoka	Saibu Gas	1993	2	70,000
	Sodeshi	Shizuoka Gas	1996	3	337,200
	Hatsukaichi	Hiroshima Gas	1996	2	170,000
	Kagoshima	Nippon Gas	1996	2	136,000
	Shin-Minato	Sendai City Gas	1997	1	80,000
	Nagasaki	Saibu Gas	2003	1	36,000
	Sakai	Kansai Electric, Cosmo Oil	2006	3	420,000

LNG Import Terminals (continued)

Country	Location (Project)	Owners	Start up	Storage Tanks	Storage Capacity
	Mizushima	Nippon Oil, Chugoku Electric	2006	2	320,000
	Sakaide	Shikoku Electric, Cosmo Oil	2011	1	180,000
Japan (continued)	Ishikari LNG	Hokkaido Gas, Hokkaido Electric	2012	2	380,000
	Okinawa	Okinawa Electric Power	2012	2	280,000
	Naoetsu	Inpex	2013	2	360,000
	Joetsu	Chubu	2011	3	540,000
	Hachinohe LNG	Nippon Oil	2015	2	280,000
	Hitachi LNG	Tokyo Gas	2015	1	230,000
	Soma Fukushima	Japan Petroleum Exploration	2017	1	225,000
Korea	Boryyeong	GS Energy, SK E&S	2017	3	200,000
	Incheon	Kogas	1996	20	2,880,000
	Kwangyang	POSCO	2005	4	530,000
	Pyeong-Taek	Kogas	1986	23	3,360,000
	Samcheok	Kogas	2014	3	600,000
	Tong-Yeong	Kogas	2002	17	2,620,000
Malaysia	Pengerang Johor	Petronas Gas	2017	2	400,000
Mexico	Altamira	Vopak, Enagas	2006	2	300,000
	Energia Costa Azul	Sempra LNG	2008	2	320,000
	Manzanillo	Samsung, Kogas, Mitsui	2012	2	300,000
Netherlands	Gate LNG	Gasunie, Royal Vopak	2011	3	540,000
Panama	Costa Norte	AES	2018	1	130,000
Phillipines	Pagbilao LNG	Energy World Corp.	2017	1	130,000
Poland	Swinoujscie	Baltic Gaz System	2015	2	320,000
Portugal	Sines	REN Atlantico	2004	3	390,000
Puerto Rico	Penuelas	EcoElectrica	2000	1	160,000
Singapore	Singapore	Singapore Energy Authority	2013	3	540,000
Spain	Barcelona	Enagas	1969	8	840,000
	Huelva	Enagas	1988	5	610,000
	Cartagena	Enagas	1989	5	587,000
	Bilbao	Enagas, EVE	2003	3	450,000
	Sagunto	GNF, Osaka Gas, Oman Oil	2006	4	600,000
	Mugardos, El Ferrol	Reganosa, Sonatrach, Sojitz Corp.	2006	2	300,000
	El Musel, Gijón,	Enagas	2013	2	300,000
Taiwan	Yung-An	CPC	1990	6	690,000
	Tai-Chung	CPC	2009	5	800,000
Thailand	Map Ta Phut	PTT LNG	2011	2	320,000
Turkey	Marmara Ereglisi	Botas	1994	3	255,000
	Izmir	EgeGaz	2006	2	280,000
USA	Everett	Suez LNG NA	1971	2	155,000
	Lake Charles	Shell, ETE	1982	4	425,000
	Freeport	Freeport LNG Development	2008	2	320,000
	Golden Pass, TX	Qatar Petroleum, ExxonMobil	2010	5	775,000
	Pascagoula, MS	Gulf LNG, Kinder	2012	2	320,000
UK	Isle of Grain	National Grid	2005	8	1,000,000
	South Hook	ExxonMobil, Qatar Petroleum,Total	2009	5	775,000
	Dragon LNG, Milford Haven	Shell, Petronas	2009	2	310,000

LNG Import Terminal Projects

Country	Location/Project	Owners/Project Developers	Start up	Storage Tanks	Storage Capacity
China	Shenzhen	CNPC Yudean Power	2021	2	120,000
	Yangjiang	CNPC Yudean Power	2023	2	120,000
	Zhangzhou Fujian	CNOOC	2022	2	160,000
India	FSRU Andhra Pradesh	Andhra Pradesh Gas	2019	1	135,000
	Pipovav LNG (FSRU), Gujarat	Swan Energy	2019	2	320,000
	Andhra Pradesh	Hindustan LNG, Andhra Pradesh	studies	1	135,000

LNG FSRU Import Facilities

Country	Location (Project)	Owners	Start up
Argentina	Bahia Blanca GasPort	Excelerate/YPF Repsol	2008
	Escobar GasPort	Excelerate/Enarsa	2011
Bangladesh	Moheshkhali	Excelerate, PetroBangla	2018
Brazil	Pecem, FSRU	Petrobras	2009
	Guanabara Bay FSRU	Petrobras	2009
	Salvador, Bahia FSRU	Petrobras	2013
China	Tianjin FSRU	CNOOC, Hoegh, various	2013
Colombia	Cartagena FSRU	Promigas, Sociedad Portuaria El Cayao	2016
Egypt	Ain Sokhna, Suez	EGAS, Hoegh	2015
	Ain Sokhna, Suez	EGAS, BW Gas	2015
Indonesia	Lampung	Hoegh LNG, PGN LNG	2014
	Nusantara (Jakarta Bay)	Golar LNG, Pertimana	2012
Italy	Livorno	OLT Offshore LNG Toscana	2013
Jordan	Aqaba, Jordan	Golar LNG	2015
Kuwait	Mina Al-Ahmadi	KPC	2009
Lithuania	Klaipeda	Klaipedos Nafta Hoegh LNG	2014
Malaysia	Malacca FSRU	Petronas	2012
Malta	FSU Armada Mediterrana	ElectroGas	2016
Pakistan	Port Qasim	Excelerate, Engro Corp	2015
	Port Qasim	BW-Mitsui, PGP Consortium	2017
Turkey	Aliaga FSRU, Neptune	Etki LNG	2016
	Dortyol FSRU Challenger	Botas	2018
UAE	Ruwais, Abu Dhabi	Gasco (UAE)	2016
	Jebel Ali Port, Dubai	DSA (UAE)	2010
UK	Teesside GasPort	Excelerate	2007

LNG Export Projects

Country	Location/Project	Project Developers	Planned Start Up	Number of Trains	Capacity In MTPA
AUSTRALIA	Pluto LNG expansion	Woodside	2021+	2	10.0
CANADA	Bear Head LNG, Nova Scotia	LNG Ltd.	2024	4	8.0
	Goldboro LNG, Nova Scotia	Pieridae Energy	2024	2	10.0
	Kitimat LNG, BC	Woodside, Chevron	2024	2	10.0
	LNG Canada, BC	Shell, Mitsubishi, Kogas, PetroChina, Petronas	2024	2	12.0
	Kwispaa FLNG, Vancouver	Steelhead LNG	2024	4	12.0
	Vancouver Tilbury	WesPac Midstream	2021	1	3.25
	Woodfibre LNG, Squamish	Pacific Oil & Gas Co	2020	2	2.1
EQ.GUINEA	Equatorial Guinea Fortuna FLNG	Ophir, Golar LNG, GEPetrol	2020+	1	2.0
INDONESIA	Sengkang LNG	Energy World Corp.	2019	4	2.0
MALAYSIA	Rotan FLNG (Sabah)	Petronas, Murphy Oil	2021	1	1.5
MOZAMBIQUE	Area 1 Onshore	Anadarko Petroleum and partners	2023+	2	10.0
	Area 4 Onshore	Eni and partners	2023+	2	10.0
	Area 4 FLNG	Eni and partners	2020	1	2.5
NIGERIA	NLNG Train 7	NNPC, Shell, Eni, Total	2022+	1	7.0
PAPUA NEW GUINEA	Elk-Antelope LNG	Total, ExxonMobil Oil Search, Petromin	Studies		
RUSSIA	Sakhalin II expansion	Gazprom, Shell, Mitsui, Mitsubishi	2021	studies	
	Vladisvostok LNG	Gazprom, Itochu, various	2023+	2	10.0
	Arctic LNG II Siberia	Novatek, Total	2023	3	19.8
USA	Alaska LNG Nikiski	Alaska Gasline Development Corp.	2023+	3	20.0
	Annova LNG, Brownsville	Exelon Corp.	2023+	6	6.0
	Commonwealth LNG, Louisiana	Commonwealth LNG LLP	2022	8	9.0
	Corpus Christi Liquefaction, Texas	Cheniere	2019	2	9.0
	Delfin LNG, Louisiana	Delfin, Hoegh	2021	3	9.0
	Driftwood LNG, Louisiana	Tellurian Investments	2022	6	26.0
	Freeport LNG, Texas	Freeport LNG	2019	4	20.4
	Galveston Bay LNG	NextDecade	2023+	6	27.0
	Golden Pass, Texas	Qatar Petroleum, ExxonMobil	2021	3	15.6
	Jordan Cove, Coos Bay	Pembina Corp.	2024	2	7.8
	Lake Charles, Louisiana	Shell, ETE	2024	3	15.0
	Magnolia LNG	Louisiana LNG Ltd.	2023+	4	8.0
	Port Arthur LNG	Sempra	2023+	2	10.0
	Rio Grande LNG	NextDecade	2023+	6	27.0
	Sabine Pass LNG, Louisiana	Cheniere	2018-19	2	9.0
	Texas LNG Brownsville	Chandra, Meyer, Samsung, others	2023+	2	4.0
	VG LNG (Cameron Parish)	Venture Global	2021	5	10.0
	VG LNG (Plaquemines)	Venture Global	2021	10	20.0

LNG Exporters

Country	Location/Project	Shareholders	Start up	Liquefaction		Storage	
				Trains	capacity (nominal) mtpa	No. of tanks	Total capacity m^3
ABU DHABI (UAE)	Das Island (Adgas)	ADNOC, Mitsui, BP, Total	1977	2	3.2	3	240,000
			1994	1	2.5		
ALGERIA	Arzew	Sonatrach GL4Z	1964	3	1.1	3	35,000
	Arzew	Sonatrach GL1Z	1978	6	7.8	3	300,000
	Arzew	Sonatrach GL2Z	1980	6	8.0	3	300,000
	Arzew	Sonatrach	2014	1	4.7		
	Skikda	Sonatrach GL1K II	1980	3	3.0	5	308,000
	Skikda	Sonatrach (rebuild)	2013	1	4.5		
ANGOLA	Soyo	Sonangol, Chevron, BP, ENI, Total	2012	1	5.2	2	370,000
ARGENTINA	FLNG Tango	Bahia Blanca	2019	1	0.5	1	16,100
AUSTRALIA	Karratha	NWS Woodside, Shell, BHP	1989	2	5.0	4	260,000
		(BP, Chevron	1992	1	2.5	1	130,000
		(Mistubishi/Mitsui)	2004	1	4.4	1	130,000
		NWS partners	2008	1	4.4	1	130,000
	Darwin	Darwin (Bayu Undan) ConocoPhillips, Santos, Eni, Inpex, TEPCO, Tokyo Gas	2006	1	3.5	1	188,000
	Australia Pacific LNG	ConocoPhillips, Origin Energy, Sinopec	2016	2	7.5	2	320,000
	Gladstone LNG	Santos, Petronas, Total, Kogas	2015	2	7.8	2	280,000
	Gorgon LNG	Chevron, Shell, ExxonMobil	2016	3	15.6	2	360,000
	Pluto LNG	Woodside, Tokyo Gas, Kansei	2012	1	4.8	2	240,000
	QCLNG	Shell, CNOOC	2014	2	8.0	2	280,000
	Wheatstone LNG	Chevron, Woodside, Kuwait (KUFPEC), Jera, Kyushu	2017	2	8.9	2	300,000
	Ichthys LNG	Inpex Corp., Total	2018	2	8.9	2	330,000
	Prelude FLNG	Shell, Inpex, Kogas CPC	2019	1	3.5		
BRUNEI	Lumut	Brunei/Shell/Mitsubishi/Total	1972-74	5	7.2	3	176,000
CAMEROON	Hilli Episeyo FLNG	Kribi Perenco	2018	1	1.2	1	125,000
EGYPT	Damietta	Union Fenosa, EGPC, EGAS	2004	1	5.0	2	300,000
	Idku	EGPC, EGAS, Shell, Total, Petronas	2005	2	7.2	2	280,000
EQ.GUINEA	Bioko Island	Marathon, Sonagas, Mitsui, Marubeni	2007	1	3.4	2	272,000
INDONESIA	Bontang I	Pertamina, VICO, JILCO, Total	1977	2	5.2	5	635,000
	Bontang II		1983	2	5.2		
	Bontang III		1989	1	2.8		
	Bontang IV		1993	1	2.8		
	Bontang V		1997	1	2.8		
	Bontang VI		1999	1	3.0		
	Sulawesi LNG	Medco Energi, Pertamina, Mitsubishi	2015	1	2.0	1	170,000
	Tangguh	BP, MI Berau, CNOOC, Nippon, LNG Japan	2008	2	7.6	2	340,000
MALAYSIA	Bintulu (MLNG Satu)	Petronas, Sarawak, Mitsubishi	1983	3	8.1	4	260,000
	Bintulu (MLNG Dua)	Petronas, Shell, Sarawak, Mitsubishi	1995	3	7.8	1	65,000
	Bintulu (MLNG Tiga)	Petronas, Shell, Sarawak, Mitsubishi, Nippon Oil	2003	2	6.8	1	120,000
	Bintulu Train 9	Petronas	2016	1	3.6		
	Kanowit FLNG	Petronas	2016	1	1.2		
NIGERIA	Bonny Island	NNPC, Shell, Total, Eni	1999	2	6.4	2	168,400
		Nigeria LNG (formed by above)	2002	1	3.2	1	84,200
		Nigeria LNG	2006	2	8.2		
		Nigeria LNG	2008	1	4.1	1	84,200
NORWAY	Snøhvit/Melkoya	Equinor, Total, Petoro	2007	1	4.2	2	280,000
OMAN	Oman LNG	Oman Govt., Shell, Total, Korea LNG Mitsubishi, Mitsui, Partex and Itochu	2000	2	7.1	2	240,000
		Oman Govt.,Oman LNG Union Fenosa, Osaka Gas, & Itochu	2006	1	3.7	2	240,000
PAPUA NEW GUINEA	PNG LNG	ExxonMobil, Oil Search, Santos, JX Nippon Oil	2014	2	6.9	2	320,000
PERU	Peru LNG	Hunt Oil, Shell, Marubeni, SK Group	2010	1	4.4	2	260,000
QATAR	Qatargas 1-T1&2	QP, ExxonMobil, Total, Marubeni, Mitsui	1997	2	6.4	4	340,000
	Qatargas 1-T3	QP, ExxonMobil, Total, Marubeni, Mitsui	1999	1	3.1		
	Qatargas II-T1	QP, ExxonMobil	2009	1	7.8		
	Qatargas II-T2	QP, ExxonMobil, Total	2009	1	7.8	8	1,160,000
	Qatargas III-T1	QP, ConocoPhillips, Mitsui	2010	1	7.8		
	Qatargas IV-TI	QP, Shell	2010	1	7.8		
	RasGas I- T1&2	QP, ExxonMobil, Kogas, Itochu, LNG Japan	1999	2	6.6		
	RasGas II- T3	QP, ExxonMobil	2004	1	4.7		
	RasGas II- T4	QP, ExxonMobil	2005	1	4.7	6	840,000
	RasGas II- T5	QP, ExxonMobil	2007	1	4.7		
	Rasgas III – T6	QP, ExxonMobil	2009	1	7.8		
	Rasgas III – T7	QP, ExxonMobil	2010	1	7.8		
RUSSIA	Sakhalin Island	(Sakhalin Energy) Gazprom, Shell, Mitsui, Mitsubishi	2009	2	9.6	2	200,000
	Yamal LNG Siberia	Novatek, Total, CNPC, Silk Fund	2017	3	16.5	4	640,000
TRINIDAD & TOBAGO	Point Fortin Train 1	BP, Shell, CIC, NGC	1999	1	3.0	2	204,000
	Train 2	BP, Shell	2002	1	3.3	1	160,000
	Train 3	BP, Shell	2003	1	3.3	1	160,000
	Train 4	BP, Shell, NGC	2005	1	5.2	1	160,000
USA	Cheniere Sabine Pass	Cheniere Energy	2016	5	22.5	5	800,000
	Cove Point LNG	Dominion Energy	2017	1	5.3	7	695,000
	Cheniere Corpus Christi	Texas Cheniere	2018	1	4.5	3	480,000
	Cameron Hackberry	Sempra, Total, Mitsui, Mitsubishi	2019	1	4.9	3	480,000
	Elba Island Georgia	Kinder Morgan, EIG Energy	2019	10	2.5	5	535,000
YEMEN	Bal-Haf	Yemen LNG, Total, Yemen Gas, Hunt Oil, SK Group, Hyundai	2009	2	6.7	2	320,000

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