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LNG and market hub plans in Asia-Pacific region must adhere to key industry metrics

China, Japan and Singapore all have their own index proposals to change the way natural gas is sold

The United States is on the verge of becoming a major exporter of liquefied natural gas. Markets for these exports will include Europe, South America, and Asia.

At the same time the large LNG-consuming nations of the Asia-Pacific region are seeking to change the way the fuel is sold.

While in the United States and to some degree in Europe, gas market centres (called hubs) provide pricing transparency and an indication of market balances, the situation in the Asia Pacific region is less clear.

Review

The US Energy Information Administration has undertaken a review of the developments in these export markets to get a better understanding of how and when LNG hub-based prices and market transparency may evolve.

LNG in the Asia Pacific region is traded primarily under long-term, full-commitment contracts between buyers in the region and sellers from around the world. Prices are often linked to the price of crude oil through formulas negotiated privately between the parties.

The dominant crude oil linkage is with the Japan customs-cleared crude (JCC) price.

LNG contracts typically include restrictions on where the LNG can be delivered, referred to as destination clauses.

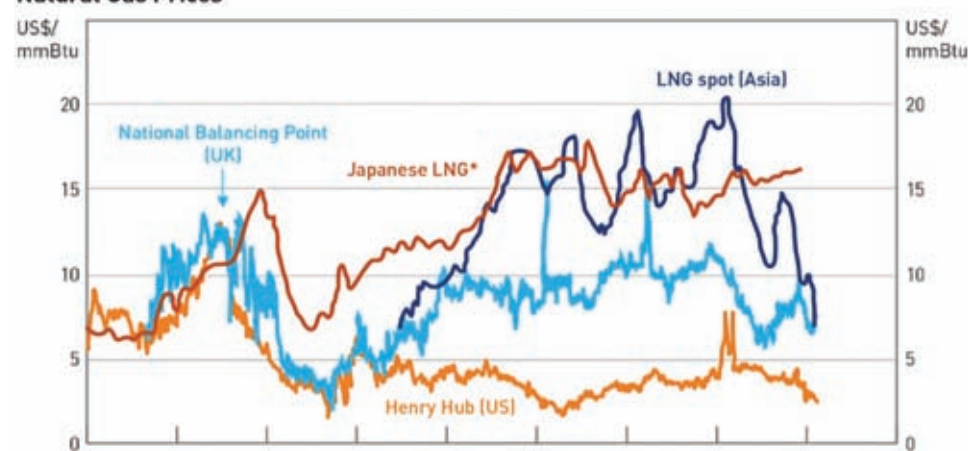
They also have "take-or-pay" provisions that require buyers to pay for LNG even when it is not needed.

In combinations, these contract terms offer buyers little flexibility in managing supply.

Value

At the same time, the value of LNG and natural gas is often distorted in that it

Natural Gas Prices



*Japanese LNG import price from Australia

Asian LNG prices and UK and US hub benchmarks from 2007-2016

largely follows oil prices and does not reflect market supply and demand dynamics. This contract structure has existed to ensure the revenue stream that supports the large capital investments in LNG liquefaction, shipping, and regasification facilities.

The linkage to widely traded oil also provides a way to manage price risk through hedging strategies.

The global LNG market is undergoing significant changes. Australia is adding large volumes of new liquefaction capacity.

Mixed

In the US, the shale revolution in gas supply has ended US imports of LNG and has spurred the construction of export-oriented liquefaction plants. New supplies may also come online in east Africa in the next 10 years.

While markets for LNG in Asia are expected to expand in the long term, with growing demand in China, India, Pakistan, Thailand, Malaysia, Indonesia, and Singapore, and new upcoming markets in Vietnam, Philippines, and Bangladesh, demand for LNG has softened considerably at present.

With these developments, LNG contracts in Asia Pacific are coming under

pressure, particularly with respect to the oil price linkages and the delivery restrictions in LNG contract destination clauses.

Spot trading has increased. Japan, Singapore, and China are seeking a more transparent LNG pricing that represents the interplay of supply and demand. Several organizations in Asia have announced their intentions to develop natural gas market hubs.

Natural gas market hubs have been a key feature of competitive gas markets in the US, the United Kingdom, and Europe.

These hubs provide physical locations for trading gas and ultimately for price discovery of natural gas sold in the hub. The most important hubs have publicly reported price indexes that are benchmarks for the value of gas in the larger market. These price indexes in turn form the basis for futures contracts and for managing price risk.

Liberalization

With the Asia-Pacific region as the world's largest consumer, governments there have sought to liberalize their domestic markets to promote competitive LNG trading that can provide price discovery for LNG.

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This report compiled for the US Government examines the development of gas market hubs in North America and Europe to evaluate whether such hubs are likely to develop in the Asia-Pacific region.

“The history of gas market hubs indicates that there are certain prerequisites necessary for market hubs to develop. A robust natural gas infrastructure is presumed. Gas market deregulation allowing prices to reflect supply and demand and third-party access (TPA) to transport facilities is also necessary,” the report said.

“Fully mature gas market hubs have many independent buyers and sellers, open access to transport facilities, trading liquidity, and clear and transparent price and volume reporting by price reporting entities (PREs).

“The reported prices can become indexes of market conditions at the hubs and attract non-physical traders who increase the market liquidity.

Successful

“The most successful hubs are liquid trading centers with many buyers and sellers buying and selling gas. These hubs can become the locus of financial futures contracts and ultimately a liquid forward price curve that allows for price discovery months and years into the future.

“The first natural gas hubs emerged in the United States in the 1990s. Market reforms initiated by the Federal Energy Regulatory Commission (FERC) promoted competitive gas markets and specifically encouraged the development of market centers,” the report explained.

“The United Kingdom and the European Union subsequently began market reforms that also led to the development of gas market hubs. Henry Hub in the United States is the most successful gas market hub with a large, liquid futures market linked to the price index at the hub, which serves as a benchmark indicator of the value of gas in the United States.

“Benchmark pricing is also provided in the United Kingdom at the National Balancing Point (NBP) and the Netherlands at the Title Transfer Facility (TTF), although neither has a forward price curve as liquid as Henry Hub,” it noted.

These gas market hubs in the US and in Europe are connected with natural gas pipeline systems that provide for continuous supply and trading as gas flows through the system.

The Asia Pacific presents unique problems for hub development, given its geography, its reliance on LNG, and the relatively large ship-size volumes typical of LNG contracts and deliveries to regasification terminals.

None of the major Asia Pacific LNG importing countries has a robust domestic market with fully deregulated gas prices and TPA.

The traditional LNG contract structures contain long-term commitments, LNG prices linked to oil prices, and re-delivery restrictions that limit the buyer’s option to sell unneeded LNG to other markets.

LNG markets are undergoing significant changes as a consequence of softening demand in Asia Pacific, a growing LNG supply, and lower oil prices.

These conditions have encouraged the growth in spot LNG trading, shorter-term contracts, and pressure to modify destination clauses in LNG contracts.

“The governments of Japan, China, and Singapore have recognized the importance of creating gas market hubs for the purpose of price discovery and are each taking steps to promote such LNG market hubs,” the report said.

Japan’s Ministry of Economy, Trade and Industry has announced a strategy to promote the liberalization of the domestic gas market, which is tied to the development of a Japanese LNG market hub.

Various hubs

The government of Japan will follow policies to encourage private sector parties to develop a trading hub. The Japanese strategy provides a coherent way forward to create the conditions for an LNG market hub.

China has encouraged the development of a gas trading hub centered on Shanghai and private entities have begun reporting prices there. Chinese gas prices are heavily regulated and the outlook for a successful gas hub developing there in the near future is dim.

Singapore has developed infrastructure to accommodate LNG delivery and storage and has a fully deregulated gas market. However, efforts to create a hub at Singapore must address the fact that it is a small market.

A number of pricing companies (Platts, Argus Media, ICIS Heren, and others) have begun reporting spot LNG prices in the Asia-Pacific and have developed their own price indexes.

Several exchanges also offer LNG futures contracts (although, there has been limited trading activity to-date).

Noteworthy

“What is noteworthy is that the reported indexes are not founded on specific gas market hubs, but rather, on general LNG market trading across the Asia Pacific region,” it said.

“The price indexes rely on voluntary reporting by market participants for which pricing companies have established protocols for ensuring the consistency and reliability of reported prices.

“With the exception of the Platts Japan Korea Market (JKM) index, there appear to be few trades tied to these indexes. Nevertheless, these LNG indexes are likely to remain the most reliable indicator of natural gas market value in Asia Pacific,” the report stated.

Key metrics of market hubs as they apply to countries in Asia Pacific are summarized below.

Successful Gas Market Hubs are Highly Liquid: Fully developed gas market hubs have many independent buyers and sellers, open access to transport facilities, significant trading volume, and clear and transparent price and volume reporting - all of which allow for high liquidity.

A market hub can be a specific location, like Henry Hub, or a notional hub that reflects a trades over a defined network. Examples of notional hubs are Canada’s AECO-C in Alberta, the National Balancing Point (NBP) in the United Kingdom, or the Title Transfer Facility (TTF) in the Netherlands. Other hubs can exist which serve many of the same functions of market hubs but do not have the liquidity to create pricing information adequate for indexation. The presence of an active futures market tied to a price index provides confirmation for the pricing reliability of the market hub and its index.

Liquidity

Besides Henry Hub in Louisiana, the North American market has a number of other hubs with high liquidity, index pricing, and futures contracting. The regulatory reforms in the U.S. market that helped create the conditions for the emergence of gas market hubs included de-regulation of gas commodity prices, the unbundling of sales versus transport services, and open third party access to transportation. Preceding these reforms



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The distinguishing feature in Asia Pacific is the LNG trade, which is the major component of gas supply

market upheaval, including excess supply that resulted in pressures on traditional ways of doing business (not unlike the events in Asia Pacific today).

Regulatory Reforms and Sufficient Physical Infrastructure are Critical Enablers of Hub Development: Market hubs in Europe grew out of regulatory reforms in the United Kingdom and later directives from the European Union to encourage competition in gas markets.

The full development of gas market hubs in Europe has been slower than in the United States due to varying regulations and industry organization across the countries of the European Union.

The expansion of large, transnational pipeline systems has progressed relatively recently, allowing regionally-interconnected networks to create opportunities for custody transfers of gas that facilitate the balancing of European gas markets and the propagation of price information. With price discovery occurring at key hubs like the NBP and the TTF, futures contracts have been developed and are traded in those locales.

Pipeline-based

Although both North America and Europe have markets that are pipeline based, pipelines in Asia Pacific are limited to the countries themselves, the exception being Southeast Asia where transnational pipelines connect several countries and China with interconnections to other parts of continental Asia.

The distinguishing feature in Asia Pacific is the LNG trade, which is the major component of gas supply.

Three countries are vying to become the LNG hub for Asia Pacific - Japan, Singapore, and China (Shanghai). Efforts are underway in each of these countries

to create the conditions whereby markets through the interactions of many buyers and sellers determine gas prices.

LNG Price Discovery Exhibits Unique Challenges in Addition to those Surrounding

Trading Hub Development: LNG price discovery presents a number of challenges to the pipeline-based model of market hub and price index

development. This model relies on more or less continuous flows of gas, daily scheduling of receipts and deliveries, homogeneity of product, uniform transportation and contracting rules, and diligent regulatory oversight. In contrast, LNG shipments are large and lumpy; there can be significant time between contracting and delivery; cargoes can differ in LNG specifications; LNG import terminals have limited interconnectivity, and bi-lateral contracts set the operating rules, not government regulation.

Terms

Nevertheless, this study has found that the contracting regime for Asia Pacific LNG trading is rapidly changing in important ways.

Long-term contracts are becoming shorter; there are more medium and short term deals, the latter defined as less than two years. There is more interest in breaking the destination clause restrictions thus allowing more contracted supply to be diverted to other terminals in response to market needs.

There is some spot market contracting, but it appears to still be a small part of the market. Pricing terms are also changing with the addition of hybrid pricing terms: some deals are linked to spot indexes, such as Henry Hub, or sometimes to local price indexes, in addition to traditional linkages to various oil indexes, or a combination of all of these.

There are also two publically available spot LNG indexes developed by Japan's Ministry of Economy, Trade, and Industry and a free-of-charge index published by Singapore Exchange (SGX) reflecting a Singapore FOB price for LNG.

All of these reported index prices are derived from actual trades that are adjusted in some fashion to create more

transparent and consistent price index. In some cases, the indexes may also contain bid and ask offers or hypothetical trades based on known origin prices and transportation costs between the origin and destination points.

LNG traders may use one or more of these price indexes to price gas by formula. Other than anecdotes, there is no solid information on which of these indexes is being used by traders.

Used for deals

The JKM index was most frequently mentioned during interviews as being one that is used by traders to price deals.

Nevertheless, oil-based contracting dominates, which is understandable given the liquidity of the oil markets and the ability to hedge on the oil indexes.

No Location in Asia Pacific has a Sufficiently Developed Physical or Regulatory System to Promote the Imminent Creation of a Trading Hub: The research undertaken for this report suggests the market pre-conditions do not currently exist to allow Japan, China (Shanghai), or Singapore to be fully liberalized markets where natural gas prices are efficiently and transparently determined by supply and demand.

Japan is just now moving towards liberalizing its internal gas market and has a limited network connectivity for internal trading of gas.

China's pricing regime has different price determinations for pipeline and LNG supply and limited communication between the two systems.

Small

Singapore, as noted before, is a small market and the surrounding countries markets still operate under price controls. Therefore, we do not see an Asian market hub evolving in the near-term with a liquid market capable of producing a reliable price index that can be used for Asia-wide or regional transactions.

However, spot and short-term Asian LNG trade does appear to be liquid enough to provide adequate price discovery and indexation, but with caveats.

It is a large market operating over a transportation network of LNG tankers, under conditions akin to "open access" rules, where bi-lateral negotiations set prices parties will pay on fixed price basis or with formulas linked to oil or gas indexes. And there are a variety of entities reporting prices and trading activity.

On the other hand, Asia Pacific is vast, with the major markets operating under

very different legal and economic conditions. Access to regasification terminals are not open to third parties for the most part. Transport costs within the region, though transparent are significant.

This requires indexes at multiple locations or corrections to put a single index into a common locational basis.

Japan's National Policy Directives May Outline a Way Forward in Asia: The outlook for a Japan trading hub is uncertain, yet market liberalization and price index formation have set the country on a track toward the development of a larger, more liquid trading hub. Japan's Ministry of Economy, Trade and Industry (METI) has summarized the essential problem well in its 2016 Strategy for LNG Market Development.

Robust

For a market hub to be developed, there needs to be a much more robust trade in physical LNG on a spot market. A more robust trade depends on greater flexibility in LNG commercial operations.

At the same time, a spot market must have some way of identifying a market price in order to develop. The Government of Japan seems intent on promoting a Japanese market index for LNG and is encouraging private sector activities for the development of a market hub upon which such an index could be developed and led by the private sector.

While the ideal achievement of a large, liquid hub with low transaction costs may still be a decade or more away, steps may be taken today to facilitate greater market development.

These include establishing a standard for gas quality (heat content), expanding regional gas transport infrastructure so as to facilitate greater intra-national trade, and establishing forms of market oversight and cost recovery that allow for consistent third-party access both to infrastructure and to markets.

Several barriers to hub development remain in Japan, including a status quo of legacy, long-term contracts that would need to be replaced with spot trading. Other barriers include the physical need for greater LNG transportation and storage capacity within Japan, as well as resistance from market players who fear losing their investments in the existing market structure, were a major gas market liberalization to be accomplished.

LNG Indexes are Likely to Remain the Most Reliable Indicator of Gas Value in Asia: Applying the U.S. and European

concept of a trading hub to natural gas and LNG price discovery in Asia Pacific may not be appropriate in that no single location will have the proper characteristics in the near term.

Rather, given the ongoing activity in developing spot and short-term LNG price indexes, it is more likely that index pricing using those LNG indexes will continue to grow so as to reflect a value(s) of LNG in different markets across the Asian trading landscape.

Physical volumes

Liquid physical trading hubs may eventually develop in Japan, Singapore, Shanghai and other areas, yet both publically-driven and privately-driven initiatives to increase trade volumes and price transparency will be critical steps in the maturation of these markets and the evolution of reliable hub-based price indexes.

Such hub-based price indexes would reflect the monthly and half-month Asian LNG price indexes and, presumably, would expand to include hub-specific daily price discovery as well.

As existing LNG price surveys continue to improve in accuracy and increase their significance as indicators of the market price for LNG and reliable hub-based price indexes emerge, indexes will be more reliably used not only to set the pricing for sales and purchase contracts, but also to serve as the basis for greater volumes of futures and derivatives trading.

Key metrics to watch for in the development of reliable LNG price indexation include:

- The expiration of long-term LNG contracts, accompanied by

indicators of their replacement by shorter-term contracts (i.e., 4 years or less)

- More spot LNG cargoes

- Progress in Japan's gas market liberalization
- More short-term trades tied to indexes rather than negotiated fixed prices ■

The article is based on extracts from the 60-page report entitled "Perspectives on the Development of LNG Market Hubs in the Asia-Pacific Region" prepared under contract by ICF of Fairfax, Virginia, for the US Department of Energy.



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Cheniere considers possibility of more Trains at Louisiana and Texas liquefaction plants

Houston-based company reveals plans to dominate US LNG sector for years to come

Cheniere Energy has revealed plans to dominate the US LNG export market for years to come and is examining proposals to possibly double its number of production Trains at the Sabine Pass plant in Louisiana and at the Corpus Christi facility under construction in Texas.

The Houston-based company is ideally positioned to capitalize on a tightening LNG market by constructing more liquefaction Trains, refining its contracts offered to buyers and taking full advantage of its huge capacity on the US pipeline network to export the shale-gas surplus.

Market

"The global LNG market is expected to need new competitive supplies to fill an approaching supply-demand gap and the LNG projects under construction are not expected to be sufficient to satisfy demand," said Chief Executive Jack Fusco.

"The insufficient final investment decisions present a risk to LNG buyers and an opportunity for Cheniere," said the CEO.

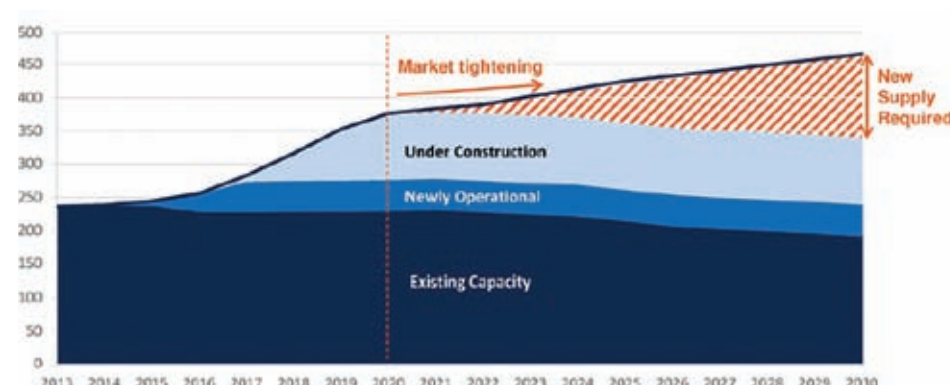
"With significant fully-permitted LNG capacity backed by construction and operating credibility, Cheniere is positioned to provide incremental low-cost supply of LNG," he added.

Fusco was speaking at an annual presentation to analysts, attended by the whole Cheniere executive team including Chief Financial Officer Michael Wortley.

Cheniere said it had sufficient land at its two sites in Louisiana and Texas to build even more processing Trains and was contemplating mid-scale ventures with multiple smaller Trains.

Land available

At Sabine Pass, where three Trains with capacity of 4.5 million tonnes per annum out of six in the initial plan have been



Houston-based company and others forecast tighter market from 2021

completed, Cheniere told the analysts it had rights to an additional 524 acres of land east of the Sabine Pass site to accommodate even more liquefaction capacity than the 27 MTPA currently approved by regulators.

"The existing footprint allows for a third LNG berth and the space could enable an approximate doubling of existing capacity," said CEO Fusco in reference to Sabine Pass.

At Corpus Christi in Texas, the property allows for a major expansion in addition to the three Trains fully permitted and partially commercialized.

Cheniere said a further two Trains, known as Trains 4 and 5, are now in the permitting process with the Federal Energy Regulatory Commission.

"As regards the potential expansion, we recently acquired rights to an additional 404 acres of upland and waterfront property adjacent to the Corpus Christi site and have space to approximately double existing capacity," he added.

Cash flow

"Contracted cash flows, strong balance sheet and liquidity, and Sabine Pass Liquefaction's investment grade ratings provide optionality and lower costs for future financing needs," said Cheniere, which has already secured \$30 billion in financing for its two LNG projects.

Cheniere also revealed that its financial and commercial teams were working together to offer "innovative and competitive contract structures" to customers.

"We are ready to deliver now on either FOB or DES terms, which allows greater flexibility and creativity," said Fusco.

"We have the ability to offer contracts on a range of terms, quantities, and

tenors and the willingness and ability to invest strategically along the LNG value chain to enhance and support core LNG platforms," he added.

Cheniere said it can now make "Full Service LNG Offerings" to underwrite new liquefaction capacity by giving customers US gas supply management, liquefaction, marketing and shipping.

Ambitions

The company said its LNG ambitions were supported by its existing network to supply incremental gas to feed additional Trains.

"We have made significant investment in infrastructure and are one of the largest pipeline transportation capacity holders in the US with more than 5 billion cubic feet per day of firm capacity on eight pipeline systems," stated the CEO.

As regards its mid-scale Train plans, the company said it began project evaluations in early 2016 and reviewed 18 proposals from potential contractors.

"A KBR-Siemens-Chart consortium was approved to continue with full front-end engineering and engineering, procurement and construction proposals to be completed by September 2017," Fusco added.

"The initial capital cost estimates are competitive with Corpus Christi Train 3 and a full lifecycle cost analysis is in the process of being completed," he said.

Cheniere CFO Wortley noted in his presentation that liquefaction and export plants have a longer life than and 20-year terms signed by buyers for traditional Sale and Purchase Agreements (SPAs).

Contracts

The Sabine Pass SPA holders are Royal Dutch Shell, Spain's Gas Natural

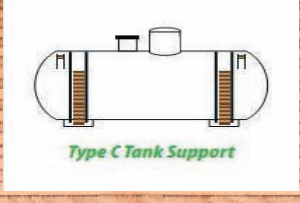


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Among Cheniere's plans is a possible venture with 7 mid-sized LNG Trains

Fenosa, Korea Gas Corp., Gas Authority of India, France's Total and Centrica of the UK.

SPA counterparties for the Corpus Christi plant are Indonesian energy company Pertamina, Gas Natural Fenosa, Spanish utilities Endesa and Iberdrola, Australia LNG player Woodside Petroleum and France-based European utility EDF.

The Cheniere CFO said the balance

sheet was underpinned by strong counterparty credits.

"All 20-year 'take or pay' style SPAs are with investment grade counterparties," said Wortley.

"Also, 100 percent of \$4.3 billion of annual fixed fees comes from counterparties rated investment grade by at least two of the three major agencies (Standard & Poor, Moody's and Fitch)," he noted.

Only two LNG plants have ever been decommissioned after starting up, Algeria's Arzew plant and Libya's Marsa El Brega facility.

Both ran for more than 40 years and were brought offline because of upstream resource and political problems, not plant performance.

Indonesia's Arun LNG plant was turned into an import terminal to help satisfy growing domestic demand in the Asian nation after exporting cargoes for 36 years.

First mover

"Cheniere's first mover advantage and successful financial and operational execution have the company well placed for the next wave of new LNG build," analysts were told.

"There are no more debt maturities until 2020 and the first three Trains are online at Sabine Pass ahead of schedule and the remaining Trains are on time and on budget.

"These are two world-class LNG sites with room to grow," Wortley said.

"The long-term balance sheet strategy

creates a 7-10 year run-way to reinvest cash flow to grow and de-lever the business," he added. "New Trains financed with operating cash flow can de-lever balance sheet and push out amortization requirements," the analysts heard.

"Robust cash flow generation will enable Cheniere to both fund growth and return capital to shareholders", said Wortley.

"Cheniere will generate significant free cash flow amounting to \$4.0 billion of cash available over the next five years," he said.

"Opportunities may also arise over time to reduce the complexity of the corporate structure

"Cheniere's significant operational and commercial advantages along with its brownfield siting and financial flexibility enable it to add substantial LNG capacity over the next five years," the CFO stated.

Also on the Cheniere presentation panel were Anatol Feygin, Executive Vice President and Chief Commercial Officer, Andrew Walker, Senior Vice President for LNG Strategy and Corey Grindal, Senior VP in charge of gas supply. ■

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For the Record

ABS, the American Bureau of Shipping, said it had published new comprehensive guidance for the construction and classing of liquefied natural gas regasification vessels. The ABS guide outlines what path to follow for shipowners from choosing a builder to the classing of the newbuild vessel. The society explained that regasification plants are installed to vaporize the liquid gas onboard a vessel and this may include self-propelled LNG carriers or Non-Self-Propelled LNG barges. “The gas may be delivered to the shore side facility via various arrangements, such as turret system with delivery through an offshore buoy piping system or vessel manifold system to a facility on a platform, quay or similar,” the society added. “This Guide is to be used in conjunction with other ABS Rules and International Maritime Organization Regulations,” the ABS said. This Guide is for the use of designers, builders, owners and operators of LNG carriers/tank barges and specifies the ABS requirements for obtaining the optional classification notation (LNG) R. “ABS has developed this industry-leading guidance based on extensive experience with the classification of LNG carriers,” said ABS Chairman, President and Chief Executive Christopher J. Wiernicki. “As the world moves toward cleaner fuels and becomes more dependent on gas, ABS will continue to play a key role in advising industry on the development of a safer and more sustainable fleet,” added Wiernicki. A floating LNG regasification ship is commonly referred to as a Floating Storage and Regasification Unit (FSRU) and it offers a flexible and efficient way to deliver LNG to new and expanding markets. This ABS Guide covers both purpose-built LNG regasification vessels and existing LNG carriers that are converted to operate with regasification plants onboard. Whereas the latest update of the IGC (The International Code of the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk) provides high-level requirements for ships with regasification plants, the ABS publication for FSRUs presents clear

guidance to designers and shipyards developing these types of ships. Recognizing the unique operational characteristics of LNG FSRUs, the US class society has included in this guide provisions that allow “Underwater Inspection in Lieu of Drydocking” for extended periods of time. “As the LNG supply chain expands, industry is considering its options for getting gas to demanding markets,” said the ABS Vice President for Global Gas Solutions Patrick Janssens. “This Guide provides best-in-class guidance and promotes safety in the expanding LNG market,” stated Janssens. Recognizing the changing landscape and increased industry focus on gas, ABS launched its Global Gas Solutions team back in 2013 to support industry in developing gas-related projects. “A pioneer in classification for the safe transport and handling of gas, ABS classed the world’s first LPG carrier conversion, the first LNG carrier conversion, the ‘Methane Pioneer’, in 1959, as well as the first newbuild LNG carrier, ‘Methane Princess’, in 1964, and has extensive experience with the full scope of gas-related assets,” it pointed out.

ALASKA LNG officials have hosted some high-profile visitors. The Administration of President Donald Trump is taking an interest in the project with US Vice-President Mike Pence meeting Alaska Governor Bill Walker and officials during a stop-over when it was discussed, while the venture itself formally applied on April 17 to receive its regulatory permits. Vice-President Spence also spoke during the Anchorage stop-over to Keith Meyer, the President of Alaska Gasline Development Corp. (AGDC), as well as Governor Walker. “Our meeting was a perfect precursor to the Vice-President’s trip to Asia,” said Meyer, of the state’s AGDC which took over management of the project from the three oil majors controlling the gas assets, ExxonMobil, BP of the UK and ConocoPhillips. The AGDC said the talks with Spence were followed by it formally applying to obtain all necessary permits from the Federal Energy Regulatory Commission and other agencies for Alaska LNG. The LNG project has three major components: a gas treatment plant located at Prudhoe Bay where the huge feed-gas resources are located, an 800-mile pipeline to southcentral Alaska with up to five

offtake points for in-state use and a natural gas liquefaction plant in Nikiski to produce and export the LNG. The AGDC President pointed out that Pence was scheduled to meet with leaders in key Asian LNG purchasing nations who were close allies. “We had an excellent briefing and discussion with Vice-President Pence about the Alaska LNG project,” said Meyer. “The project will be the United States’ largest energy export project and will help fortify the nation’s ability to export LNG to the Asia-Pacific region,” stated Meyer. Meyer said Pence was the latest of several senior officials to take on interest in the project. Chinese President Xi Jinping, returning to Beijing after meeting with President Trump, visited Anchorage on April 7 where he met with Walker and Meyer. “The three leaders discussed the project and how Alaska and China are well positioned for a long-term LNG trading relationship,” the AGDC said. The Trump Administration and nations such as China are taking an interest in the US state’s LNG venture as it aims to develop the largest US concentration of proven and conventional natural gas and will add to shale-gas as an export earner. After the FERC application just filed the regulator will eventually authorize the siting, construction and operation of the liquefaction and export venture. “It will lead to the National Environmental Protection Act (NEPA) review process and the FERC will prepare an environmental impact statement (EIS) for the project as well as coordinate permit applications with other federal agencies,” said AGDC. “Advancing the project through the federal environmental process will reduce the permitting risk and provide surety to project investors, financiers, and customers,” added AGDC. “FERC will soon publish a schedule for the NEPA process in the federal register that outlines the time to develop a draft EIS (likely 12 months) and a final EIS (another six months),” the project developer stated. “The FERC filing marks a major milestone in moving the Alaska LNG project forward,” said Meyer. “This is the culmination of over one million man hours invested in project engineering and design, more than 193,000 acres mapped, over 300 streams surveyed, thousands of boreholes drilled along the proposed route, and approximately 50,000 pages of material submitted to FERC,” said Meyer. He explained that development of the project “liberates 35 trillion cubic feet of proven

natural gas resources stranded on the North Slope”, the area in the Prudhoe Bay region where the resources have been discovered, though which have yet to find a way to market.

AUSTRALIA said liquefied natural gas export volumes, which grew by nearly 50 percent in 2015-2016, are forecast to double in the next three years as new production capacity comes fully on stream and will be valued at A\$42 billion (US\$32Bln) by 2022. “LNG contract prices, under which most Australian LNG is sold, are forecast to increase in line with oil prices,” said the “Resources and Energy Report” from the Australian Department of Industry. In just over a year, Australia with LNG plants concentrated in Western Australia and the East Coast state of Queensland will overtake the Gulf state of Qatar as the world’s largest producer of the fuel with 10 plants in operation. Australia currently has seven plants on stream. The total will rise to nine when the Chevron-led Wheatstone venture in Western Australia and the Ichthys plant in the Northern Territory, owned by Japan’s Inpex and France’s Total, are scheduled to come on stream before the end of 2017. Then in 2018 the total will reach 10 when the Shell floating LNG project offshore northwest Australia is expected to be deployed. “The addition of 21 million tonnes of export capacity by mid-2018 will underpin strong growth in export volumes and bring total export capacity to 87 million tonnes,” said the government report. The Australians noted that LNG will overtake metallurgical coal, used for steel production in countries such as China, as Australia’s second-largest resource and export by 2018. Iron ore remains the largest resource and export commodity. However, the report noted that the outlook for Australian LNG exports is not without risks. “Production is ramping up just as competition in global LNG markets is set to intensify and the capacity utilisation of Australian LNG projects is expected to decline. The extent of the decline remains uncertain, however, and will depend on the price competitiveness of Australian producers and their contractual arrangements with buyers,” it added. The government said the nation’s LNG prices were forecast to rise, driven by rising contract prices after they had fallen in 2016 for shipments delivered into North East Asia. “Most Australian LNG is sold to Asia on

contracts linked to the price of Japanese Customs-cleared Crude (JCC) oil by a time lag of three to four months. The average price for Australian LNG delivered into Japan, Australia's largest market and the world's largest importer, reached as low as US\$5.50 a gigajoule (US\$5.20 per million British thermal units) in the middle of 2016, before recovering to around US\$7.20 (US\$6.82 per MMBtu) in January 2017," it said. "The price of Brent crude, which the JCC price follows closely with about a one month lag, is expected to average US\$64 a barrel in 2022 (in 2017 dollar terms), up from around US\$45 a barrel in 2016. The average price of China's LNG imports from Australia is expected to increasingly follow movements in the JCC price, as trade based on oil-linked contracts swamps the level of trade based on older, fixed-price contracts," the report added. The Australians also explained that given the scale of gas use in LNG production, small changes in gas demand from LNG projects are likely to have a significant impact on domestic spot prices. "Prices are likely to be especially sensitive to LNG demand in winter when the market is seasonally tight," it said.

BP, the UK energy major, has started up an onshore compression project in

Trinidad to deliver an additional 200 million standard cubic feet of natural gas per day to the Caribbean nation's liquefied natural gas plant and other customers as part of the larger Juniper offshore venture. The compression project is expected to increase production from low-pressure wells in BP Trinidad's existing acreage in the Columbus Basin using an additional inlet compressor at the Atlantic LNG plant located at Point Fortin in Trinidad. BP said the project would benefit both Atlantic LNG, the liquefaction plant with capacity to produce 14.8 million tonnes per annum of LNG from four trains, as well as Trinidad and Tobago's petrochemical industry. Because of a lack of feed-gas, the Atlantic LNG plant last year produced just 10.46 million tonnes of LNG, more than 4MT below capacity. The nation's biggest volumes were directed at South America last year to where 7.37MT were delivered. The largest customer was Chile with 2.38MT. A further 1.19MT was shipped to the Middle East, with the main customers being Egypt and Jordan. The largest European importer of Trinidad's LNG last year was Turkey with 490,000 tonnes of deliveries from a total of 950,000 tonnes shipped to Europe. Trinidad also shipped 960,000 tonnes to Asian customers. Bernard Looney, Chief Executive of BP's

upstream business, said: "Delivered on-time and on-budget, this major infrastructure project is part of BP's plan to bring 500,000 barrels a day of new production capacity online by the end of 2017 and paves the way for Juniper, our other major project start-up in Trinidad and Tobago this year." The Juniper venture comprises a platform weighing nearly 10,000 tonnes in the Caribbean Sea and other infrastructure as part of a \$2-billion subsea project to bring around 590 mmcf/d of additional natural gas to Atlantic LNG and other customers. The regional president of BP in Trinidad and Tobago, Norman Christie, said the mechanical completion of the venture was due to hard work by the government, contractors, partners and other stakeholders. "Though start-up will be phased, we anticipate an improvement in gas production in 2017 as a result of the project and the planned start-up of Juniper later this year," said Christie. The compression plant is 100-percent funded and owned by BP in Trinidad. Atlantic LNG Co. will serve as the operator. The project was sanctioned in July 2016 following agreements between Atlantic shareholders, the National Gas Company of Trinidad and Tobago and other upstream operators. BP operates in 904,000 acres off Trinidad's east coast and

has 13 offshore platforms and two onshore processing facilities. The Juniper facility will take gas from the Corallita and Lantana fields located 50 miles off the southeast coast of Trinidad in water-depth of around 360 feet. Drilling of the five subsea Juniper wells by a semi-submersible rig commenced in May 2015 and first gas is expected in the months ahead. Feed-gas from Juniper will flow to the Mahogany B hub via a new 10 kilometre in-field flowline which was installed in 2016.

DOMINION Cove Point LNG, the export venture located on Chesapeake Bay in Maryland and with plans to ship cargoes to Japan and India, is more than 85 percent complete and there are currently more than 3,200 construction workers on site to bring the plant on stream before the end of 2017. The plant developer Dominion Energy has also just asked for permission from the Federal Energy Regulatory Commission to introduce fuel gas at the plant, a signal that the commissioning process is on track. "All of the major equipment has been set in place and now the focus is on completing the installation of piping, cable trays, cables and cable terminations," said Dominion, whose headquarters are in Arlington, Virginia. The company, which

had 2,500 workers building the facilities in January, has now brought about 700 more workers onto the site as construction accelerates. "All barge loads have been received and all heavy haul deliveries have been transported and one of the five tower cranes that has been used to transfer equipment onsite is scheduled to be taken down," added the company. The Cove Point plant will ship around 5.25 million tonnes per annum of LNG to Asia and elsewhere when it starts up. Dominion has fully subscribed the capacity of the project with 20-year service agreements with a Japanese joint venture comprising Sumitomo Corp., one of the world's leading trading companies, and the utility Tokyo Gas Co. Another company which will have liquefaction capacity is Gas

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DUBAI Supply Authority (Dusup), whose floating facility at Jebel Ali Port has imported LNG to the United Arab Emirates since 2010, has signed an LNG cooperation agreement with the biggest Japanese buyer, Jera Co. Inc. The terms of the deal, signed in Tokyo at the end of the four-day Gastech 2017 conference, will focus on potential joint procurement and shipping and storage opportunities. Jera is a joint venture comprising Japan's two largest LNG buyers, Tokyo Electric Power Co. and Chubu Electric Power Co. who agreed to form a joint venture two years ago for cargo procurement at lower prices. Dusup is Dubai's main natural gas utility company and the UAE has been net importer of gas, for more than 10 years. "The emirate of Dubai is a major business hub in the Middle East with further economic growth expected in the build up to hosting Expo 2020 in Dubai," said Jera. Dusup operates Dubai's largest gas field at Margham and also imports and distributes Qatari gas imported on the Dolphin pipeline. The Dubai company in September 2016 upgraded its LNG capability with a new, larger Floating Storage and Regasification Unit at Jebel Ali Port chartered from Excelebrate Energy. Excelebrate also in 2016 chartered to Abu Dhabi its first floating storage unit based at the refinery town of Ruwais in the western region of the UEA. The Dubai LNG price is now formally recorded by Tullett Prebon, one of the world's leading interdealer brokers, in its new spot

pricing index for Middle East and Indian shipments. The UK-based broker and the Singapore Exchange now publish a price twice a week for LNG cargoes delivered

ex-ship (DES) under flexible terms to key ports in Dubai, Kuwait and India and called the DKI index. The new index seeks to enhance price discovery and risk

management in the region. The destinations for the LNG cargoes include Jebel Ali Port in Dubai and Ruwais in Abu Dhabi, Kuwait's Mina Al-Ahmadi

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port-side floating terminal and the onshore LNG terminals in the Indian ports of Dahej, Dabhol and Hazira, all near Mumbai.

EAGLE LNG Partners and Crowley Maritime Corp. have received a delivery of two large liquefied natural gas storage tanks built in Europe for the first US

East Coast LNG bunkering station being constructed at the Talleyrand Marine Terminal in the Port of Jacksonville. The LNG bunkering facility in Jacksonville

will be a fueling station to serve Crowley's new Commitment Class, LNG-powered, combination container and roll-on roll-off ships for trading between the Florida and

the US territory of Puerto Rico. The Crowley vessels, the "El Coqui" and the "Taino", are expected to begin service in the second half of 2017 and first half of 2018. Eagle LNG is the supply company for the bunkering facility. Crowley's Vice President for LNG Matt Jackson explained how the project was part of the shipping line's overall expansion and modernization plans for its Puerto Rico service, with the Florida terminal serving as the permanent fueling station for the Crowley LNG-powered ships. Leading LNG equipment maker Chart Industries, based in Cleveland, Ohio, arranged for the manufacture of the two cryogenic tanks. "With an outer diameter of 19 feet, each tank features an inner shell to hold the product and an outer shell that is insulated and kept under vacuum to keep the LNG cold," Crowley explained. "The tanks have a rating of negative-320 degrees Fahrenheit and each can hold 1,000 cubic metres (approximately 265,000 gallons) of LNG," the company added. The LNG bunkering facility is among the first of its kind in the US and will fuel Crowley's two new vessels for their trading activities between Florida and the Puerto Rican port of San Juan. The 260-ton tanks, which are 170 feet long, were manufactured in the Czech Republic by the Chart affiliate Chart Ferox. "Crowley's logistics group managed the transport of the tanks, first via river barge to Hamburg, Germany, and then via a specialized heavy-lift ship that sailed more than 4,000

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OLT Offshore LNG Toscana S.p.A, which shares are divided among two important operators in the energy sector, Uniper Global Commodities (formerly E.ON Global Commodities) and Iren, is the company which manages the floating storage and regasification unit "FSRU Toscana". The Terminal is technologically innovative and well-advanced. It guarantees the maximum standards in terms of environmental sustainability and safety. "FSRU Toscana" is permanently moored off the Italian coast - between Livorno and Pisa - in the heart of the Mediterranean Sea. The Terminal has a regasification capacity of 3.75 billion cubic meters per year and an LNG storage capacity of 137,500 cubic meters. The operational flexibility and the design of the Terminal allow future LNG bunkering activities.

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nautical miles to arrive in Jacksonville on March 26 for offloading,” explained Crowley. “It further demonstrates we are firmly in the era of LNG fueling,” said Sean Lalani, President of Eagle LNG. The design of the fuel depot was developed jointly by Eagle and Crowley’s LNG engineers in consultation with the port, the US Coast Guard and the Jacksonville Fire and Rescue Department. “The new bunkering terminal utilizes state-of-the-art technology to allow safe and efficient transfer operations in a working cargo terminal while minimizing the overall terminal footprint,” the companies said.

EVERGAS, the Denmark-based operator of a 26-vessel multigas fleet including new small-scale LNG carriers, has taken delivery of the sixth of eight of its 27,500 cubic metres capacity Dragon-Class vessels built in China. The latest addition to its fleet was named “JS Ineos Intuition” at a ceremony in the Sinopacific Offshore & Engineering shipyard in the Chinese port of Shanghai. The vessels will work the Atlantic route from the US to

Europe carrying ethane, a derivative of US shale gas and used for chemical production. The “JS Ineos Intuition” and its five sister ships will regularly load at Marcus Hook in Pennsylvania and Morgan’s Point near Galveston, Texas, and deliver their cargoes for the UK-Swiss chemicals and refining company Ineos. The Evergas fleet has already moved significant amounts of ethane between the US and the Ineos manufacturing facilities at Grangemouth in Scotland and Rafnes in Norway. “The vessels are of a unique design and purpose built to provide seaborne transportation of Ethane gas across the Atlantic from the USA to Europe,” Evergas said. “The Dragon-class vessels have quattro-fuel propulsion flexibility including ethane, LNG, HFO or MDO and this, combined with an optimized ECO hull design and ballast water treatment system, will significantly reduce CO2 emissions and protect the marine environment,” the company added. “To document the green vessel profile, the vessels have received Clean ship notation, Green Passport and Tier III compliance,

and the first five Dragon vessels are now in full compliance with US Coast Guard regulations which has enabled them to burn ethane in the main engines,” Evergas said. Evergas, based in Copenhagen is a subsidiary of Jaccar, part of the Groupe Bourbon, which has a combined fleet of several hundred vessels and has principal Far East offices in Singapore and Shanghai. Many of the ships serve the offshore oil and gas industry.

GAZTRANSPORT and Technigaz (GTT), the French maritime storage tank specialist, said first-quarter revenues fell almost 3 percent to 56.8 million euros (\$62.4M) as new orders were gained for four floating storage and regasification unit (FSRU) vessels and one conventional LNG carrier. GTT said revenues related to royalties stood at 53.5M euros, down 3.4 percent. Royalties related to LNG carriers and ethane carriers decreased by 6.6 percent to 46.7M euros. As sector leader in LNG storage for ships, GTT is able to sell licensing agreements around the world for up to \$10M per licence to

install its membrane technology in vessels, mostly built at South Korean shipyards. The Euronext-listed company also recently launched the No. 96 Max, an optimized version of the No. 96 system used in more than 120 LNG carriers to date. GTT continually advances its research and development work and has successfully marketed its very latest Mark V membrane technology. At the end of March 2017, the GTT order book stood at 87 units comprising 72 LNG and ethane carriers; 10 FSRUs, two FLNG hulls, two onshore storage tanks and one LNG bunker barge. GTT confirmed its previous revenue target for all of 2017 in a range between 225M euros and 240M euros, with a net margin ratio above 50 percent. “The first quarter of 2017 saw GTT win four new FSRU orders, reflecting the entry of new importing countries into the LNG market, which confirms the long term growth perspectives on this market,” said Philippe Berterottière, Chairman and Chief Executive of GTT. “We are pleased to have positioned ourselves at the right



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time on this activity segment, a real complement to the LNG carrier segment. At the financial level, our revenues in the first three months of the year are in line with our expectations and we are carefully monitoring our cost base in order to safeguard our competitiveness,” the CEO added.

GLOBAL LNG Services (GLS) of Norway, a developer of floating liquefaction hulls, said it planned to work with Siemens of Germany and Sembcorp Marine of Singapore on projects, including one on the US Gulf Coast. GLS said its vessels are on track to be used for the proposed Main Pass Energy Hub, offshore Louisiana. The Main Pass venture will make use of two GLS vessels with combined LNG production capacity of 24 million tonnes per annum.

The project holds a permit from the US Department of Energy allowing the export of LNG to countries having a free trade agreement with the US. “With the Main Pass Energy Hub LNG export project, GLS will be able to offer LNG buyers liquefaction, storage and offloading (of LNG) for a tolling fee down to US\$1.75 per million British thermal units,” the Norwegian company said. Our intention is to work with Siemens and Sembcorp Marine to develop our low-cost FLNG solution,” added GLS, established in 2013. “The standardized Liqui-Max vessels require minimum customization and enable developers of LNG export projects in remote locations without infrastructure to achieve low costs and high cost control,” GLS explained. Siemens and GLS are in discussions regarding a memorandum of understanding which is expected to be signed over the next few weeks. GLS is also in discussions with Sembcorp Marine regarding a similar agreement. GLS said Sembcorp would provide innovative and experienced engineering support from its Tuas Boulevard shipyard in Singapore. The Norwegian company said its protected technology enables large-scale, commercially attractive production of LNG worldwide. The Liqui-Max vessel at 380 metres in length will produce 12 MTPA. “The budget quotes for the 12 MTPA vessel are less than \$3.5 billion, or less than \$300 per tonne of LNG per annum (TPA),” it added. The liquefaction vessels would use only field-proven components, with pre-processing of the gas being done off the vessel on a nearby platform. “The global market for Liqui-Max vessels is estimated at 20-40 vessels producing 6-12 MTPA based on projects

currently considered for development,” stated GLS. “Sembcorp Marine is very pleased to collaborate with GLS on the development of the Liqui-Max vessel,” said Sembcorp Marine Head of Rigs & Floaters William Gu. “We believe this floating liquefaction solution can contribute to making LNG more globally accessible as a greener fuel alternative,” added Gu.

INDIAN liquefied natural gas imports rose by 6 percent in March, the second successive month of increases after two months of declines as shipments came from the spot market as well as Australia and Qatar and Nigeria. LNG import for the month of March amounted to 1.53 million tonnes compared with 1.44MT in the same three months of 2016. The energy import data from the Ministry of Petroleum and Natural Gas showed cumulative LNG imports for the full fiscal year to date of 12 months from April 2016 to March 2017 were 15.5 percent higher at 18.20MT compared with the previous fiscal year when they were 15.76MT. The imports had rebounded in February after two months of declines to rise to 1.57MT compared with 1.32MT in the same month of 2016. For the calendar year of 2016 imports had risen 30 percent to 18.99MT from 14.60MT in 2015, led by Qatar with 11.37MT and countries such as Nigeria with 2.63MT, Equatorial Guinea with 1.33MT and Australia with 1.11MT. During March 2017 cargoes arrived in India for its three main regasification terminals on the West Coast near Mumbai mostly from Qatar, though also from Australia and Nigeria. For example, the 148,300 cubic metres capacity carrier “LNG Imo” delivered a late March cargo to the Dahej terminal, operated by Petronet, from the Bonny Island plant in Nigeria. Earlier in the month, the 155,000 cubic metres capacity “Gaslog Saratoga” delivered a Nigerian shipment for Gas Authority of India to the Dabhol terminal near Mumbai. Also in early March the 170,000 cubic metres capacity “Methane Julia Louise” unloaded a cargo at the Dahej from the Queensland Curtis plant in the Australian port of Gladstone. India’s gross domestic production of natural gas for March amounted to 2.75 billion cubic metres, a rise of 8.5 percent compared with the 2.54 Bcm logged in March 2016. The Ministry said that production of natural gas for all of fiscal 2016-2017 was 31.89 Bcm, a fall of 1.1 percent compared with the previous year and was the lowest production in the last

four years. India is coming to terms with the fall of domestic natural gas production, meaning that LNG imports are certain to rise once more regasification infrastructure is in place. The country has plans to double its nationwide import terminal capacity to around 50MT per annum by 2022. However, this would require significant developments in LNG import capacity to take place before 2020. India’s East and Northeast regions are not connected to LNG terminals, though about half a dozen projects are being planned, including the use of floating storage and regasification units in eastern states such as Andhra Pradesh. There is also now a new pricing index for Indian spot LNG cargoes. Tullett Prebon, one of the world’s leading interdealer brokers, has launched a spot pricing index for the Middle East and India in collaboration with the Singapore Exchange. The new index provides a reference price for LNG Delivered Ex-Ship under flexible terms to key ports in Dubai in the United Arab Emirates, in Kuwait and India (DKI). The new index seeks to enhance price discovery and risk management in the region. The DKI Index applies to spot shipments for the UAE’s Jebel Ali Port in Dubai and Ruwais in Abu Dhabi, Kuwait’s Mina Al-Ahmadi port-side floating terminal and the onshore LNG terminals in the Indian ports of Dahej, Dabhol and Hazira.

INEOS, one of the largest participants in the UK shale-gas sector and the importer of the first US shale-gas cargo to Britain, has concluded a \$250 million deal with BP to purchase the British major’s Forties field offshore North Sea pipelines and associated onshore infrastructure. Ineos will make a cash payment of \$125M on completion and pay down the \$125M balance over seven years. The Forties pipeline is part of UK North Sea history and has been owned and operated by BP after opening in 1975 to transport oil from the Forties field, which was then Britain’s first major offshore oil field. “While the Forties pipeline had great significance in BP’s history, our business here is now centred around our major offshore interests west of Shetland and in the Central North Sea,” said BP Chief Executive Bob Dudley. “The pipeline has long been an important feedstock supplier to Ineos at Grangemouth (Scotland),” BP said. The Forties system currently carries liquids produced from 85 fields in the central and northern North Sea and several Norwegian fields on behalf of

around 40 companies. “We believe that through also owning FPS, Ineos will be able to realize greater integration benefits and help secure a competitive long-term future for this important piece of UK oil and gas infrastructure,” added the statement on the transaction. BP sold its interests in the Forties field to Apache Corp. of the US in 2003 and sold its Grangemouth refinery and chemical plants to Ineos in 2005. Ineos, in addition to being one of the largest global chemical companies and the importer of US shale-gas in the form of ethane, is also broadening its presence in British shale-gas exploration to lessen its future reliance on imports. The first shipment of US ethane, derived from shale gas, was unloaded at Grangemouth in September 2016 to be used as chemical plant feedstock. The 27,500 cubic metres capacity Evergas LNG-LPG tanker “JS Ineos Insight” brought the shipment to the Grangemouth facility located on the banks of the River Forth from a plant at the Marcus Hook port in Pennsylvania. Buying the pipeline from BP has coincided with Ineos recently broadening its UK shale-gas interests by acquiring more licences to take ethane and other derivatives from its own shale-gas production. Ineos said its shale gas subsidiary plans to drill two coring tests in the UK where it has expanded its holdings to more than 1.2 million acres by acquiring all onshore exploration and development licence interests held by French energy and utility company Engie. Ineos’s shale unit said that transaction involved minority interests in 15 licences, seven of which Ineos holds an existing interest in. The remaining eight complement the company’s existing licence interests in Yorkshire, Cheshire and the East Midlands. Three of the licences are operated by Ineos, eight by IGas Energy and four by Cuadrilla. Ineos, whose main offices are in the UK and Switzerland, has said it requires shale gas to secure a supply of competitively priced energy and feedstock for its UK and European petrochemicals businesses. Over the past few years as the North Sea’s supply of ethane has dwindled Ineos has been forced to run its plant at Grangemouth at half capacity with limited supply of the raw materials necessary to produce its products. With an abundant supply of ethane emerging from the US from shale gas, Ineos has now invested in new import terminals at its sites in the UK and Norway to import US ethane from shale gas.

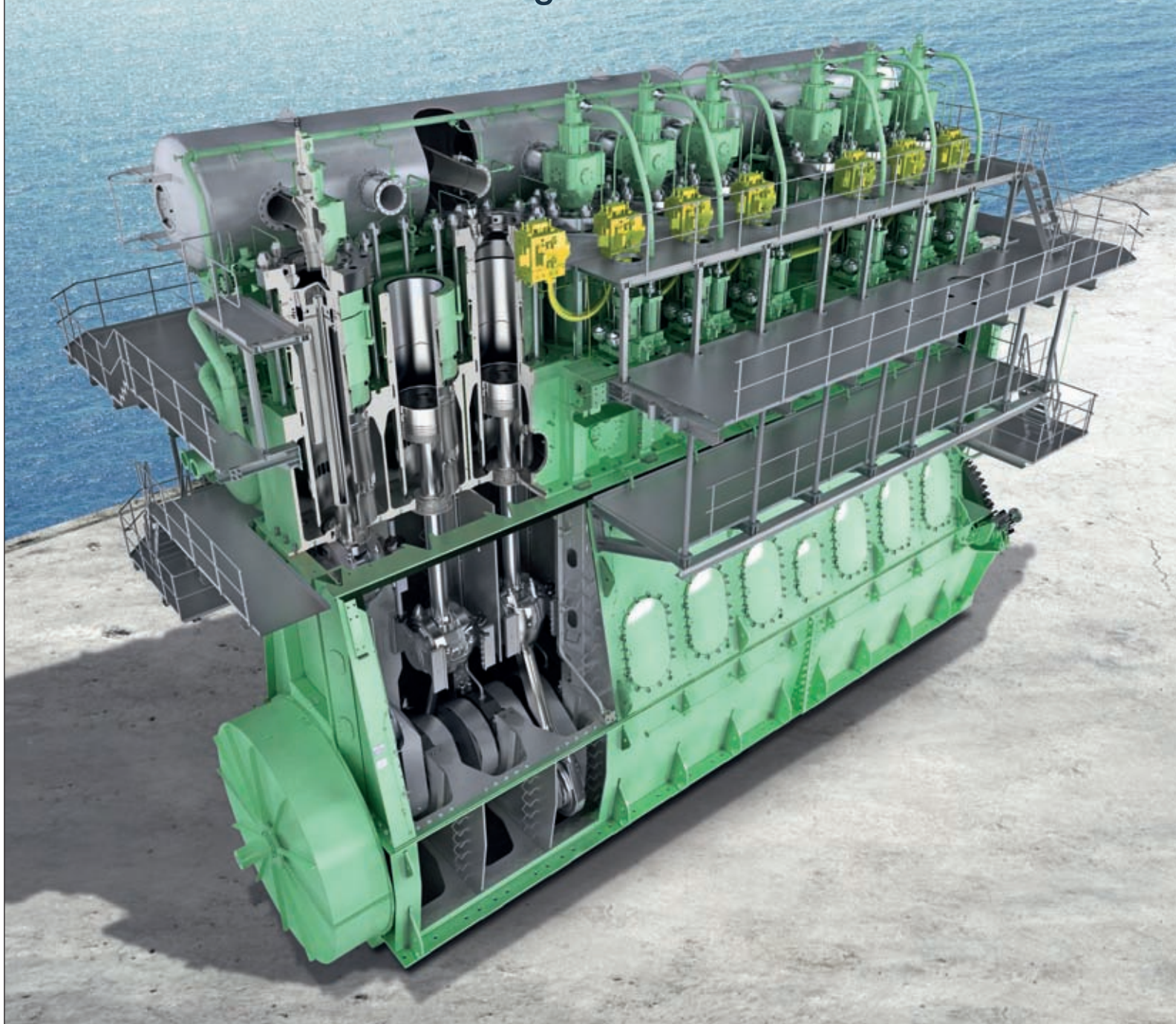
JAPANESE liquefied natural gas imports stayed in the high end at more than 8 million tonnes for March, in line with the volumes purchased in the same month a year ago as prices rose and power generation companies opted to buy more thermal coal. Latest imports of LNG amounted to 8.14MT for the month, the same as in March 2016. The shipments were underpinned by Australian shipments and spot and short-term contract volumes. While year-on-year LNG cargo volumes were unchanged, imports of thermal coal for power generation, a competitor to LNG, rose 5.6 percent to 9.64 million tonnes. Japan's LNG imports had amounted to 7.79MT in February compared with 7.43MT in February 2016. The March 2017 LNG imports cost Japan 367.85 billion yen (\$3.37Bln), a price rise of 6.5 percent compared with the 345.49Bln yen paid in March 2016. The February 2017 imports costs were 359.16Bln yen (\$3.21Bln), a rise of 1.6 percent versus February 2016. The imports for all of 2016 amounted to 83.34MT, a decline of 2 percent on the previous year. Those shipments cost the equivalent of \$28.94Bln, a drop of 40.4 percent compared with 2015. The Finance Ministry data showed that Asian imports from nations such as Malaysia and Indonesia, Papua New Guinea and Brunei were little changed from a year ago at 2.50MT. Imports from the Middle East region fell by 14.2 percent compared with March 2016. The shipments from countries like Qatar, the United Arab Emirates and Oman totalled 1.83MT. The figures showed that 140,000 tonnes of LNG arrived last month from the US. Monthly Russian shipments, mostly from the

Sakhalin Island plant in the Far East, dropped 8.5 percent in March to 717,000 tonnes. The balance of March LNG imports from other nations in the

preliminary figures surged to 2.96MT, covering shipments from countries such as Australia and Nigeria, as well as from the spot market.

KINDER MORGAN, one of the largest US pipeline companies, and Colorado-based DCP Midstream have signed a letter of intent for DCP to

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participate in the development of the proposed Gulf Coast Express Pipeline Project to ship Permian Basin natural gas to the Texas Gulf Coast and its LNG projects. The Gulf Coast Express Pipeline is designed to transport natural gas through a 430-mile, 42-inch pipeline from near Fort Stockton in northwest Texas to Agua Dulce on the southwest coast, just north of Brownsville where several LNG export projects are planned. The system will also facilitate exports of pipeline gas to Mexico. Kinder said the pipeline is expected to be in service in the second half of 2019, subject to shipper commitments, and will bring ample natural gas from the Permian Basin area. The Permian is described as the engine of America's energy resurgence with prolific oil and natural gas and natural gas liquids (NGL) resources. It is about 250 miles wide and 300 miles long and spans areas of both West Texas and southeast New Mexico. It encompasses several sub-basins, including the Delaware Basin and the Midland Basin. “We are excited to be partnering with one of the larger natural gas marketers in the Permian Basin area, with DCP Midstream currently marketing approximately 600 million cubic feet per day of natural gas in that region,” said Kinder Morgan Natural Gas Midstream President Duane Kokinda. “We believe DCP’s strong Permian position, when combined with the downstream market connectivity of Kinder Morgan’s Texas Intrastate network, creates a valuable project for both producers and markets,” added Kokinda. A non-binding open season for firm natural gas transportation is currently in process. It is anticipated that DCP will be a partner and shipper on the proposed pipeline to be built and operated by Kinder. DCP is the largest natural gas liquids producer and also a natural gas player in the Permian. “This opportunity presents a welcome competitive alternative that adds diversity to the market,” said Wouter van Kempen, DCP Chairman, President and CEO. “DCP has a premier portfolio of integrated assets in the Permian offering a full range of services and solutions to our customers.” Kinder’s Kokinda added, “In addition to DCP’s role as partner and shipper on the Gulf Coast Express pipeline, we are pleased with the tremendous level of interest in our project during this open season. It is anticipated that natural gas supply will be sourced into the project from multiple locations, including existing receipt points along Kinder and

El Paso Natural Gas pipeline systems in the Permian Basin, a proposed interconnection with the Trans-Pecos Pipeline, and additional interconnections to both intrastate and interstate pipeline systems in the Waha area,” the companies said. Deliveries of natural gas into the Agua Dulce area will include points in Kinder’s existing Gulf Coast network and its intrastate affiliates, KM Tejas and KM Border and the NET Mexico header as well as several other key systems.

NEXTDECADE, developer of the US Rio Grande LNG project development company in Texas run by former Royal Dutch Shell senior executive Kathleen Eisbrenner, has signed a definitive agreement to become a listed company on the Nasdaq global exchange through a reverse takeover. Eisbrenner’s company used the services of a specialized firm called Harmony Merger Corp. to achieve the transaction. The Rio Grande export venture, which is advancing through the Federal Energy Regulatory Commission permitting process to build a plant to produce 27 million tonnes per annum of LNG, will be able after the listing of NextDecade to raise funds easier from stock issues and other market transactions. Tellurian Inc., another development company controlled by former Cheniere Energy Chief Executive Charif Souki, recently completed a reverse takeover of a small oil and gas exploration outfit to give Tellurian a listing on the Nasdaq to help funding for its Driftwood LNG project in Louisiana. Cheniere itself was the vanguard company of the new wave of US LNG developers on the Gulf Coast. It now has three production Trains on stream and is valued at more than \$11 billion, according to its latest share price on the New York Stock Exchange. Completion of the Nasdaq listing transaction for NextDecade is expected to close late in the second quarter of 2017. “We believe a transaction with Harmony will strengthen our ability to bring competitively priced, US-produced LNG to the world market,” said Eisbrenner. “Our choice of proven technology and our strategic South Texas project location combined with our experienced management team and strong industry relationships are some of the many reasons that both potential customers and investors have demonstrated interest in NextDecade,” she added. Eisbrenner had said that after conducting an extensive review regarding development

financing it was decided to move forward with the reverse merger. The Eisbrenner company in January 2017 signed land agreements with state and municipal authorities for a site of around 1,000 acres at Shoal Point as it considers building a second LNG plant in addition to Rio Grande LNG at Brownsville. The land at Shoal Point, near to Texas City, has deep water access to the Gulf of Mexico at the port of Brownsville.

Eisbrenner's role at Shell before founding NextDecade was as Executive Vice President for Global LNG Development. She also worked in senior management in the US with El Paso Energy Corp. and was one of the founders of Excelebrate Energy, the US floating LNG project developer. NextDecade’s current principal shareholders include equity funds managed by York Capital Management, Valinor Management and Halcyon Capital Management, who together own a majority interest in NextDecade. For the purposes of the merger transaction, NextDecade is being represented by law firm King & Spalding and Height Securities is acting as financial advisor.

OIL SEARCH, a stakeholder in the Papua New Guinea LNG plant, said the joint venture planning its expansion will start the engineering phase by the end of 2017 as current prices achieved for cargoes averaged US\$7.40 per million British thermal units. The Australian-listed company whose main interests are in PNG oil and natural gas assets said in its first-quarter earnings that a strong performance from the PNG LNG facility was partially offset by lower output from its mature oil fields in the Oceania nation. The results come as independent assessments increased the volume of additional feed-gas resources onshore PNG to underpin production at the liquefaction plant northwest of the capital, Port Moresby, and as plans advanced to build more processing Trains. The existing two Trains at PNG LNG produced at an annualized rate of 8.3 million tonnes per annum in the first quarter of 2017, on par with the record levels achieved in the previous three months, and well ahead of the nameplate capacity of 6.9 MTPA. Oil Search said its revenue for the first quarter declined by 1 percent to US\$343.7 million compared with the previous three months. “The average realised LNG and gas price was US\$7.40 per MMBtu, up 9 percent from fourth-quarter levels, while the average realised oil and condensate price

increased 11 percent to US\$55.17/barrel,” the company stated. Peter Botten, Oil Search Managing Director, praised operations at PNG LNG and outlined future plans for expansion. “The operator, ExxonMobil, achieved a very high level of facilities uptime over the quarter, which supported the strong throughput levels. ExxonMobil recently commenced marketing up to 1.3 MTPA from the project. The material increase in PNG LNG reserves also means that our other discovered resources can be committed entirely towards high value LNG expansion opportunities,” stated Botten. Oil Search said its booked proven (1P) and proven and probable (2P) PNG LNG project gas reserves increased by 50 percent and 12 percent respectively following an independent certification of PNG LNG gas fields. Following the completion of its acquisition of InterOil Corp. during the quarter, ExxonMobil became an equity partner in the Elk-Antelope gas field licence, known as PRL 15, along with French energy company Total and Oil Search. Discussions have now commenced between the three to develop the Elk-Antelope gas fields. “We expect talks regarding potential cooperation and integration of the next phase of LNG development to continue on an accelerated basis during 2017, leading to the delivery of binding commercial agreements before year-end,” said Botten. “The PRL 15 joint venture is targeting to enter front-end engineering and design in late 2017 or early 2018 and to take a Final Investment Decision in late 2018/early 2019, subject to reaching milestones in a timely manner. This is consistent with the PRL 15 licence extension terms, which require FEED to be undertaken within a two-year time frame,” Botten added.

ONTARIO Municipal Employees Retirement System (OMERS), one of the largest pension funds in Canada, has agreed to acquire more than a third of the shares in the main LNG import terminal in South America, the GNL Quintero facility in Chile. Borealis Infrastructure made the purchase as the infrastructure investment manager of the fund. The Canadian share purchase is in the third main stakeholder in the facility, a holding company called Terminal de Valparaíso, a joint venture between Spanish gas transmission and LNG terminal owner, Enagas Middle East energy group Oman Oil Co. and Empresa Nacional del Petróleo (ENAP), the Chilean state-owned energy

company. The remaining key shareholders after the Borealis Infrastructure purchase from Oman Oil are Enagas and ENAP. Enagas, which remains in control of the Chilean terminal, said the Canadian share transaction was valued at US\$341 million. As part of the transaction, Borealis has also agreed to grant Enagas a 12-month call option for 5 percent of its shares in the terminal. The Canadian deal comes as the largest terminal in the region prepares to upgrade its equipment to increase its capacity to 20 million cubic metres per day. The terminal is located 160 kilometres northwest of the Chilean capital Santiago and was the first land-based LNG regasification facility in the southern hemisphere when it came on line in 2009. It has three storage tanks with 334,000 cubic metres of capacity, four vaporizers and a four-bay truck-loading station. GNL Quintero is unique in the region in that it is land-based and expanding, while other South American terminals in nations such as Argentina and Brazil are Floating Storage and Regasification Units chartered from shipping companies. The Chilean terminal also has the capability to send natural gas volumes to neighbouring Argentina during the southern hemisphere winter months when demand is highest. "GNL Quintero is one of the most relevant terminals in the region, providing critical regasification and storage capacity to central Chile," said Ralph Berg, Executive Vice President & Global Head of Infrastructure for the Ontario pension fund. "GNLQ is a well-managed, world-class asset that aligns closely with our ongoing effort to diversify our global portfolio of core infrastructure holdings -

and pay pensions to our members. We look forward to working constructively with our fellow GNLQ shareholders, GNLQ management and all local stakeholders in

the years ahead," added Berg. Enagas also purchased 19.1 percent for the shares Oman Oil had acquired in Terminal of Valparaíso (TDV) holding company. The

convoluted ownership structure now shows ENAP with a 20 percent holding, TDV (100-percent owned by Enagas Chile) 40 percent, OMERS 29.6 percent and



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Bahia de Quintero SpA Terminal (51.9 percent Enagas Chile and 48.1 percent OMERS) 10.4 percent.

ORIGIN ENERGY, the Australian utility and stakeholder in the Australia Pacific LNG plant in Queensland, said its current head of its Integrated Gas division, David Baldwin, was stepping down to be replaced by former Shell executive Mark Schubert. Sydney-based Origin said Baldwin would hand over to Schubert at the end of April 2017. Schubert is currently General Manager of commercial activities and would take on that role at Integrated Gas from May 1. “David has had a distinguished career at Origin over the past 11 years,” said Origin Chief Executive Frank Calabria. “As CEO of our Integrated Gas business, his outstanding achievement was executing the Australia Pacific LNG project. With Australia Pacific LNG on track to complete its final milestones - and Origin’s decision to sell its conventional upstream business - David has decided that it is the right time for him to step down,” Calabria explained. Origin is the main upstream supplier for the APLNG plant, whose other shareholders are ConocoPhillips and China’s Sinopec. Origin has recently set in motion a process of divestment of its conventional upstream business that will allow the company to focus on its Energy Markets business and a simplified Integrated Gas unit. Prior to his current role, Baldwin headed Origin’s LNG business and successfully merged it with its conventional gas assets to form Integrated Gas. Before that, he was CEO and Managing Director of utility Contact Energy in New Zealand, where he led Contact’s strategic shift from thermal generation growth to renewables. “David has made a lasting impression at Origin, and we are grateful for his huge contribution. We wish David and his family the very best,” stated Calabria. In announcing Schubert’s appointment, Calabria said: “We are pleased to appoint Mark to lead Integrated Gas as it continues to transition from a project to operations with a focus on productivity and reducing unit costs.” Schubert joined Origin in May 2015 following an 18-year career with Shell. He has more than 10 years’ senior management experience in oil and gas operations spanning supply, logistics and major facility asset management. Origin has around 4.2 million utility customer accounts and 6,000 megawatts of electricity capacity,

owned and contracted, as well as being a natural gas producer and supplier.

SANTOS, the Australian energy company, said the Gladstone coal-seam-gas-to-LNG plant it operates in the eastern state of Queensland increased production to 1.4 million tonnes for the quarter, backed by strong CSG output from the Fairview and Roma fields in the Surat Basin in the southeast of the state. First-quarter LNG sales revenue amounted to US\$272 million, up from US\$216M in the 2016 quarter. Total Gladstone LNG sales revenue increased to \$167M. Santos said its average LNG price achieved during the quarter was \$7.09 per million British thermal units compared with \$6.19 per MMBtu in the same three months of 2016. Santos Managing Director and Chief Executive Kevin Gallagher said the first-quarter performance showed that the company’s turnaround strategy was delivering positive results. Adelaide-based Santos has the French company Total, Petronas of Malaysia and Korea Gas Corp. as its Gladstone LNG plant partners. Santos also has stakes in the ConocoPhillips-operated Darwin plant in the Northern Territory and the ExxonMobil-run Papua New Guinea LNG facility. During the quarter, PNG LNG operated at an annualised output rate of around 8.3 million tonnes per annum and 27 cargoes were delivered from the Oceania nation to Asia. “First quarter sales volumes and revenues were impacted by the timing of the delivery of three PNG LNG (delivered) cargoes shipped late March but still on water at the end of the month,” Santos said. “PNG plant maintenance is planned for May, which is expected to result in reduced LNG production rates for approximately three weeks,” the company added. Santos said 14 cargoes were also shipped from the Darwin LNG plant in the Northern Territory. The company noted that during the quarter it completed the sale of its remaining 50 percent interest in the Mereenie oil and gas assets in the Northern Territory to a subsidiary of Australian banking group Macquarie. “Our costs have again been reduced, we have improved our free cash flow position and our net debt has been lowered,” said CEO Gallagher. “Our 2017 forecast free cash flow breakeven now stands at US\$34 per barrel. This is a significant reduction from the \$47 per barrel mark at the beginning of 2016,” he added. The CEO said the company was

also striving to make progress towards reducing net debt by US\$1.5 billion by the end of 2019.

SANTOS has alleviated concerns about its finances by making an early US\$250 million repayment on a US\$1.2 billion export credit agency loan ahead of schedule and changing the terms of other credit facilities. Santos said the repayment would be made on April 18 and generate annual gross interest savings of around US\$5.5 million. “Following the repayment, the outstanding balance of the facility will be reduced to US\$950M,” the company said. Santos had posted an annual net loss of US\$1.04 billion last year, including a US\$1.1Bln asset write-down on the Gladstone coal-seam-gas-to-LNG plant it operates in the eastern state of Queensland. Adelaide-based Santos has the French company Total, Petronas of Malaysia and Korea Gas Corp. as its Gladstone LNG plant partners. Santos also has stakes in the ConocoPhillips-operated Darwin plant in the Northern Territory and the ExxonMobil-run Papua New Guinea LNG facility. In announcing the repayment, Santos also said it was extending the term of US\$810M of bilateral bank loans. “The facilities were due to mature in 2018 and have been extended to 2022 on favourable terms. The facilities are currently undrawn,” it said. Santos Chief Financial Officer Anthony Neilson said the export credit repayment and bilateral extension were consistent with the company’s focus on reducing debt, extending the debt maturity profile and reducing financing costs. “We will continue to review our debt maturities and target our stated goal of a US\$1.5Bln reduction in net debt by the end of 2019. We will continue to prioritise free cash flow for debt reduction,” said Neilson. “The successful extension of our bilateral loan facilities shows strong support from our lenders and enhances Santos’ liquidity profile and financial flexibility at attractive funding costs,” added the CFO. The Santos management had to take action last year to stabilise the business and restructure while cutting costs. Chief Executive Kevin Gallagher had explained that his strategy was one of transforming Santos into a low cost, reliable and high-performance business. At the heart of its strategy is portfolio simplification and focused growth across five core areas involving natural gas assets. These include the Cooper Basin in south-central Australia, GLNG and PNG LNG, as well as Northern Australia and

Western Australia gas operations. Santos will also focus on the exploration, development, production and sale of natural gas, which it says has a significant role to play in securing Australia and Asia’s energy future.

SEMPRA Energy, developer of the US Cameron LNG export project in Louisiana, said the venture would likely generate a “mountain of cash” for the company, amounting to at least \$11 billion, while it was also moving forward with a second plant in Texas. The forecast came during a presentation to analysts by Sempra’s President of Infrastructure, Joe Householder, in the presence of Chief Executive Debra Reed. The Cameron project is an existing import terminal in Hackberry on the Calcasieu Ship Channel currently being transformed into an export plant in partnership with two Japanese companies, Mitsui & Co. and Mitsubishi Corp., as well as French energy company and utility Engie. Sempra confirmed that the first Cameron liquefaction Train is still scheduled to come on stream in mid-2018, with Train 2 and Train 3 starting up at six-month intervals at the end of 2018 and in mid-2019. The total combined capacity of the three Trains would be just over 15 million tonnes per annum, while the company also has permission to add two additional Trains to take total output to near the 25 MTPA mark. Householder told analysts during the presentation that Sempra’s \$11Bln from Cameron LNG was a “conservative” estimate and would come from cash distributions after debt servicing and over the project’s first 20 years of operations. This equates at current prices to over \$500 million per annum in income for the California utility, which has other power and natural gas businesses in the state and the region. “We’re going to get a mountain of cash, \$11 billion in cash,” Householder said. “I personally believe our stock valuation is missing this point. This cash is coming. It’s coming soon.” The Cameron liquefaction project team is led by the engineering, construction and procurement contract joint venture comprising CB&I of the US and Chiyoda Corp. of Japan. Sempra’s other subsidiaries include San Diego Gas & Electric and SoCalGas in California as well as several South American utilities, including Luz del Sur in Peru and Chilquinta Energía in Chile. It also has a business in Mexico, including infrastructure such as pipelines and the LNG import terminal at Costa Azul on the

Pacific Coast. Semptra is planning a second LNG export plant in partnership with experienced Australian LNG producer Woodside Petroleum. The joint venture is proposed for Port Arthur in Texas. The Californian company in November 2016 formally sought authorization from the Federal Energy Regulatory Commission to site, construct and operate the liquefaction plant along the Sabine-Neches Waterway in southeast Texas. The FERC application for the proposed project includes two processing trains producing a total of 13.5 MTPA of LNG. Semptra and Woodside are also planning three LNG storage tanks, natural gas liquids and refrigerant storage, a feed-gas pre-treatment facility and an export terminal with two berths to load LNG carriers.

SEVAN MARINE, the Norwegian engineering services company, has entered into a cooperation agreement with US energy engineering company Fluor Corp. for global projects that use its floating regasification dock technology for liquefied natural gas. Sevan signed the deal through its subsidiary HiLoad LNG, which has the floating regas dock in its portfolio. "We are proud to announce the cooperation with Fluor," said Sevan's Chief Executive Reese McNeel. "This is a strong acknowledgement of the development work done by HiLoad LNG to introduce a cost-efficient technology for LNG regasification and LNG transfer applications," added McNeel. "The agreement will grow our businesses by complementing each company's strengths for unique customer solutions for floating LNG storage and regasification units. We

are excited to start working with Fluor and look forward to exploring the opportunities in the regasification market that this agreement creates," stated the

Seven CEO. Pierre Bechelany, senior vice president of pipelines and LNG for Fluor, said the agreement with Sevan gives the company the capability to evaluate and

deliver both marine and land-based LNG storage and regasification projects. "Our industry-leading global sourcing and fabrication yard capabilities, including our



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joint venture fabrication yard in China, allow us to uniquely deliver capital efficiency and schedule certainty to the LNG marketplace,” said Bechelany, referring to the facility run with the engineering subsidiary of China National Offshore Oil Corp. “With this agreement, we can better deliver those results to the floating LNG storage and regasification market,” he added. Sevan said the FRD technology provided “a competitive alternative to conventional units” and is applicable to floating LNG receiving, storage, trans-shipment and regasification terminals. “The FRD solution is applicable for facilities that deliver 50 to more than 400 million standard cubic feet-per-day of gas and allows for use of a conventional LNG carrier as the floating storage unit with a minimum of modifications and installation costs,” the Norwegian company said. “LNG regasification systems may be kept offshore, without the requirement for port facilities, while maintaining operation during challenging weather and ocean conditions,” it added. Sevan said in February 2017 that it had signed a long-term framework agreement with US major ExxonMobil for the provision of services and use of another of its technologies, the company’s floating LNG cylindrical hull technology. Sevan said it had worked with ExxonMobil since 2015, when the company was awarded a feasibility study to explore the use of the cylindrical hull for an FLNG development. It is currently working on a follow-up study focusing on the hull and marine aspects of the unique cylindrical design.

SINGAPORE has further developed its liquefied natural gas capability by starting up its first small-scale distribution and truck-to-ship LNG loading facilities at the import terminal on Jurong Island. Singapore LNG Corp., owner of the terminal which has been in operation since 2013, said the launch of truck-loading was overseen by SLNG’s Chief Executive John Ng and his counterpart from Maritime and Port Authority of Singapore (MPA) Andrew Tan. SLNG and MPA signed a memorandum of understanding to

collaborate on the construction of this facility in October 2016 and it is now a reality. “The single-bay facility allows small quantities of LNG to be transported overland to any location where it may be needed,” said SLNG. “Beyond the supply of LNG for bunkering, the facility also provides for the fuel to be transported to, for instance, gas-fuelled industrial plants that are not connected to the local gas pipeline network,” added SLNG. Singapore currently has one LNG import terminal consisting of two jetties that handle the largest carriers, three storage tanks of 180,000 cubic metres capacity and regasification equipment. The city state has previously looked at using additional floating LNG import facilities as it builds up its infrastructure as a regional LNG trading and bunkering hub with its own pricing formula. The Jurong Island terminal began operations in May 2013 and is scheduled to be expanded from the current capacity to import 6 million tonnes per annum to 11 MTPA by 2018. Plans for a second onshore terminal have also been examined, including a possible floating storage and regasification unit being berthed either at a quayside or offshore. SLNG CEO Ng said the truck-loading was a logical next step for the terminal. “While it is still too early to tell how fast or how far these businesses will grow, the prospects look good, particularly for LNG bunkering,” said Ng. “As the demand grows, and there is a viable business case, the SLNG terminal’s design masterplan provides for at least another four truck-loading bays to be built,” he added. Port Authority CEO Tan said Singapore, as the world’s leading bunkering hub, has to cater to the future needs for cleaner, alternative sources of marine fuel. “The completion of the truck-loading facility marks an important milestone as it will enable truck-to-ship LNG bunkering in Singapore,” he added. Tan said the Port Authority would work with stakeholders to put in place a framework to provide safe, efficient and reliable LNG bunkering in Singapore.

SKANGAS, the Norwegian liquefied natural gas supplier and facility operator,

has named Kimmo Rahkamo as its new chief executive in succession to Tor Morten Osmundsen. Skangas, a subsidiary of Finnish gas company Gasum, said Osmundsen would continue in his role until May 15 to ensure a smooth handover. The new CEO is aged 54 and has been a member of the Skangas board since 2014. He has also spent a major part of his career in leadership positions in the Nordic oil and gas industry. “He has held several senior positions at Finland’s Neste, including Executive Vice President at Neste Oil, and also served as Vice President for Supply and Oil Refining at Fortum,” Skangas said. Skangas has LNG production plants in Risavika, Norway and Porvoo, Finland, as well as LNG reception terminals at Pori in Finland, at Ora in Norway and Lysekil in Sweden. The Nordic company is also developing Finland’s second LNG import terminal at the port of Tornio to be operational in early 2018. Skangas and parent Gasum are also involved in widening LNG use for trucks and for small-scale distribution and bunkering in the Nordic and Baltic regions. “Kimmo Rahkamo is highly experienced and has an impressive track record in business management and in the oil and gas business,” said Johanna Lamminen, Skangas Chairwoman and CEO of Gasum. “As a member of the Skangas board he is very familiar with the company and has a clear vision about the future of Skangas. He is in an excellent position to lead Skangas and secure continued positive growth for the company,” added Lamminen. Rahkamo said that he saw LNG having a remarkable growth potential in the region. “Skangas is the leading player in the Nordic LNG market and I’m honoured to have been given the opportunity to lead this company and to respond to the needs of a growing market,” added Rahkamo. Skangas said Rahkamo’s predecessor Osmundsen had strengthened the company’s position in the LNG value chain and successfully constructed LNG infrastructure stretching throughout the entire Nordic region. “I would like to thank Tor Morten for his significant contribution on behalf of the entire Board,” said Lamminen.

SONATRACH, Algeria’s state energy company, and France’s Total have signed a comprehensive agreement and announced “the amicable settlement of outstanding differences” between the two companies as the Algerians seek to end

their underperformance in the liquefied natural gas sector and in pipeline gas as well. “The agreement enables Sonatrach and Total to expand their partnership by progressing new upstream projects,” said a statement. The accord with Total comes less than a month after the Algerian government appointed a new chief executive at Sonatrach. Renewal of the Total-Sonatrach relationship includes a new contractual framework for the Timimoun natural gas project. Algerian LNG exports have plummeted in the past year to 11.44 million tonnes from its nameplate capacity of 25.3MT. It is now on a par as an exporter of LNG with Trinidad and its one Atlantic Basin plant in the Caribbean. Algeria remains a substantial pipeline exporter of natural gas to Europe, though it also has room for much improvement to boost capacity and production with more investment in its ample resources. France was the largest recipient of Algerian LNG last year when 4.48 million tonnes were delivered as Sonatrach continued to experience feed-gas shortages and under-performance at its two liquefaction plants at Arzew and Skikda. Behind France came Turkey with 3.09MT of Algerian cargoes and Spain, Europe’s biggest importer, was in third place with 2.14MT. Total itself has no long-term LNG supply agreements with Sonatrach. The importer of Algerian LNG to France is the utility Engie, whose subsidiary owns two terminals near Marseille and another on the French West Coast. However, Total is a shareholder in the fourth and newest French import terminal at the Channel port of Dunkirk. The Algerian Timimoun natural gas project mentioned in the agreement is located between the towns of Timimoun and Adrar in the south-western part of Algeria. Timimoun field development was approved by the Algerian government in 2009 and operations were expected to start in 2017. It is expected to produce 1.6 billion cubic metres of natural gas per annum. The field is owned by a joint venture comprising Sonatrach, Total and Spanish company Compania Espanola de Petroleos, known as Cepsa. Classified as a tight gas reservoir, Timimoun is among several large natural gas projects in the south-west and south-east regions of Algeria that have suffered from a lack of investment as the nation has also come under threat and attacks from terrorists. Other key Algerian ventures include Touat, Ahnet, In Saleh and Reggane North. Timimoun was explored and appraised from 2003 with the drilling of

Diary of events

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May 16-18, 2017
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Canada
www.Canadalngexport.com

**World LNG & Gas Series
15th Americas Summit**
June 20-23, 2017
The Houstonian Hotel,
Houston, Texas, USA
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six wells. A total of 40 production wells have been planned to tap eight structures across an area of 2,500 square kilometres. The Total-Sonatrach accord also agreed continued joint operations for the Tin Fouye Tabankort (TFT) natural gas field located about 1,200 kilometres from the capital Algiers in southeast Algeria. The partners also said they would jointly develop a new project there, though gave no details. The first TFT joint production sharing agreement was signed in January 1996 for a 20-year period. “The agreement underscores the willingness of Sonatrach and Total to continue to work together to further develop and strengthen their historic partnership,” both companies stated. The forging of the revived Total-Sonatrach friendship pact comes after the Algerian government announced changes at the top of its oil and gas company. It now has Abdelmoumen Ould Kadour as the CEO. He replaced Amine Mazouzi who had served in the role for two years. Algerian Minister of Energy Nouredine Boutarfa announced the change on March 20, 2017, after a Sonatrach board meeting, though gave no specific reason why Mazouzi was departing and Kadour taking his place. Boutarfa has since called on the new CEO of Sonatrach “to act responsibly and with full confidence to make quality changes allowing Sonatrach to evolve and flourish in a good business climate.” The new CEO’s career so far has been low profile and on the engineering side. He is described as holding a chemical engineering degree from the Massachusetts Institute of Technology.

TOTAL, the French energy company, signed an

accord with Pavilion Energy of Singapore to cooperate on offering liquefied natural gas fuel services for ships. The memorandum of understanding was

signed in Tokyo between Pavilion’s gas subsidiary and Total Marine Fuels Global Solutions, Total’s bunkering unit. Both companies will also explore cooperation in

logistics and other aspects of LNG. Pavilion Gas was awarded one of two LNG bunker supplier licences by the Maritime and Port Authority of Singapore in 2016



STORAGE



5,100 m³ LNG bunker vessel courtesy of Gas4Sea

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as part of efforts to make LNG an alternative marine fuel option for Asian shipping. The other licence was awarded to a joint venture between Keppel Offshore & Marine and BG Group, which is now part of Royal Dutch Shell. The global maritime industry is preparing to meet tighter regulations after the International Maritime Organization said it would implement a 0.5 percent global sulphur cap on marine fuels in 2020 compared with the 3.5 percent limit in force today. Pavilion Gas was also appointed as one of the new LNG importers for Singapore by the Energy Market Authority last October. “Developing a competitive worldwide LNG bunkering network will be key for the industry,” said Total Chairman and Chief Executive Patrick Pouyanne. “Securing access in the main hubs, such as Singapore, is part of our strategy,” added the French company’s CEO. Seah Moon Ming, CEO of Pavilion Energy and Pavilion Gas, commented: “The supply of LNG by Pavilion Gas as a bunker fuel supports Singapore’s position as a leading bunkering port and contributes towards establishing a global LNG bunkering ecosystem.”

TULLETT PREBON, one of the world’s leading interdealer brokers, has formally launched a spot pricing index for Middle East and Indian liquefied natural gas market shipments in collaboration with the Singapore Exchange. The new index provides a transparent reference price for LNG Delivered Ex-Ship under flexible terms to key ports in Dubai, Kuwait and India (DKI). The new index seeks to enhance price discovery and risk management in the region. The DKI Index now provides pricing for spot LNG delivered under flexible terms to key ports in the United Arab Emirates, Kuwait and India. The destinations for the LNG cargoes include the UAE’s Jebel Ali Port in Dubai and Ruwais in Abu Dhabi, Kuwait’s Mina Al-Ahmadi port-side floating terminal and the onshore LNG terminals in the Indian ports of Dahej, Dabhol and Hazira, all near Mumbai. Tullett Prebon believes the index provides an independent physical price marker as the industry moves away from oil-linked pricing and towards gas-on-gas pricing. The Singapore Exchange (SGX) subsidiary, Energy Market Company (EMC) is the index administrator and publishes what is now called the “DKI Sling Index” every Monday and Thursday. As the LNG market develops further and

new importers and exporters emerge the established market is attempting to underpin its role in relation to price discovery. “The industry still lacks transparency and credible price references. The Middle East and India region in particular has seen a boost in spot trade, but lacks an accepted price marker and market participants are often relying on tenders for price discovery,” the companies said. “Those hedging physical exposures have limited options, and are using Far East LNG and/or UK oil and gas benchmarks to manage risk. The new index aims to provide a credible, consistent and transparent pricing mechanism, as the volume of LNG trades in the region continues to rise. It could also serve as a first step towards standardizing LNG trade in the region,” they stated.

WOODFIBRE LNG, the Canadian LNG export project backed by Indonesian billionaire Sukanto Tanoto and his Pacific Oil and Gas company, has been granted an extended 40-year export licence to ship cargoes to Asia. Tanoto and his company are building their export plant through a privately-held venture firm at the site of an old pulp mill near the town of Squamish, north of Vancouver. The facility in 2016 became the first LNG export project in the province of British Columbia to receive its full environmental approval from the federal government in Ottawa and had previously held a 25-year export licence, now extended by 15 years. The export facility will produce 2.1 million tonnes per annum of LNG and early engineering work has already started. “We have determined that the quantity of natural gas proposed to be exported by Woodfibre, for a term of 40 years, is surplus to Canadian needs,” the NEB said. “The Board is satisfied that the natural gas resource base in Canada, as well as North America overall, is large and can accommodate reasonably foreseeable Canadian demand, including the exports proposed in this application, and a plausible potential increase in demand,” it added. Before the liquefaction project was approved Woodfibre managed to sign a contract to supply China’s Guangzhou Gas Group with 1 MTPA of LNG over 25 years, starting in 2020. The project is also cooperating with First Nation tribes, right down to letting them choose the technology for the plant. The Squamish First Nation Chiefs and the tribal council voted in October 2016 to select air cooling

as the technique the Woodfibre plant will use to cool its natural gas in the LNG production process. The choice of cooling technology is one of 13 conditions in the Squamish Nation’s environmental assessment agreement for the proposed Woodfibre project. The Pacific Oil and Gas parent company of which Tanoto is Chairman has offices in Singapore and Jakarta as well as three in China, located in Hong Kong, Nanjing and Beijing. His company’s embracing of First Nation decision-making has tempered the reactions of groups in Canada opposed to the hydrocarbon industry. It has also kept on side the Canadian federal government of Prime Minister Justin Trudeau, who is trying to build himself up as a global leader of environmental causes, including the reduction of greenhouse gases.

WOODSIDE PETROLEUM, the largest Australian liquefied natural gas plant operator, posted a drop in overall sales revenue in the first quarter of almost 9 percent as cyclone weather hit production and LNG prices ranged from an average \$5.50 million British thermal units at the North West Shelf plant to \$8.70 per MMBtu at Pluto LNG. Woodside’s quarterly sales revenue, mostly made up of LNG but also including volumes of oil, condensate and domestic gas dropped 8.8 percent to US\$895.4M from US\$982.4 in the same three months of 2016. At the North West Shelf plant located in Karratha in Western Australia, Woodside posted 13.4 percent lower LNG sales revenue from its one-sixth share of output, amounting to \$183.5M compared with \$211.4M in the same three months a year ago. “Production was lower due to adverse weather conditions impacting port operations and higher ambient temperatures,” said Woodside, mentioning Tropical Cyclone Blanche and three potential cyclones that led to a drop of almost 8 percent in output at both facilities. Average daily production rates dropped 7.8 percent at the NWS facility to 45,504 tonnes per day from 49,334 tonnes per day in the same three months of 2016. Realized LNG prices at the NWS plant were \$5.50 per MMBtu versus \$6.60 per MMBtu in the year-ago period.

Pluto LNG sales revenue also dropped to \$428.1M from \$516.1M in the same quarter of 2016. Production at the Pluto plant, located on Western Australia’s Burrup Peninsula, fell about 7.8 percent to 12,505 tonnes per day from 13,574 in the year-ago period. Average prices of

cargoes shipped from the Pluto plant were \$8.70 per MMBtu compared with \$8.90 in the 2016 quarter. The Pluto facility is scheduled for a four-day maintenance shutdown in May as plans continued to be examined for its expansion. “Pluto LNG expansion studies have commenced with an initial focus on developing and accelerating reserves within the Greater Pluto region,” Woodside said. “Contractors experienced in small to mid-scale LNG train technology have been engaged to develop concept options for consideration by mid-year,” the company added. In its marketing and shipping operations, Woodside said mid-term LNG sales and purchase agreements were executed for up to 16 cargoes which will be delivered between 2017-2019. Woodside said it was also continuing discussions with Indonesian energy company Pertamina to convert a preliminary supply accord into a firm sales agreement. The company said it was also continuing to expand its interest in the LNG fuel sector. “The 'Green Corridor' joint industry project to assess the feasibility of LNG-fuelled iron-ore bulk carriers on the trade routes between Australia and China was announced. Subsequently, Woodside signed a complementary agreement for a joint design program to explore the suitability of LNG-fuelled propulsion technologies for large ships such as ore carriers,” it added. It noted that an agreement was also signed recently with General Electric of the US to work together to support the use of LNG as a fuel for transport and power generation in Western Australia. Woodside said the Chevron-led Wheatstone LNG plant in the Pilbara region of Western Australia was still on track to come on stream in mid-2017. “Commissioning progress on both the offshore platform and on Train 1 continues to support expected first LNG in mid-2017, with first LNG from Train 2 six to eight months later,” Woodside said. “Permanent power has been established at all facilities and compressor mechanical runs have commenced for LNG Train 1,” it added. Woodside also mentioned some upstream progress on the Kitimat LNG export project in the Canadian province of British Columbia, where Chevron is also the main shareholder. A main well was drilled and completed in the first half of 2016 and intersected an excellent reservoir section. It said the well in northeast BC was currently being brought online for an extended production test . ■

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SHIPING 2017

International Gas Union calls for maritime use of LNG fuel to avoid pollution in largest ports

Marine fuel transition is complex in a sector subject to a complex regulatory environment with overlapping jurisdictions

Liquefied natural gas as a marine fuel offers substantial advantages over traditional marine petroleum fuels in emissions reduction, according to a new detailed report from the International Gas Union prepared for an energy working group set up by the Group of 20 largest economies.

“It meets the stricter pollution regulations by the International Maritime Organisation (IMO) and regional air quality controls,” the report said.

Reductions

“Using LNG will reduce harmful air pollutants significantly below all current and proposed emissions standards. A switch will immediately result in these reductions and persist for the life of the vessel,” it stated.

The case for using LNG fuel for shipping is “clear”, as it will provide significant quality of life improvement by addressing one of today’s most pressing environmental challenges - air pollution. It will also support climate change goals by reducing greenhouse gas (GHG).

“This situation is a key barrier facing LNG marine deployment globally, and governments must be encouraged to set clear regulatory guidelines that are essential in achieving broader and fleet-wide conversions.

“While marine transportation is the most carbon-efficient mode of transport, in terms of CO₂ emitted per unit of cargo, compared to road, air, or rail, the massive scale of shipping activities generates significant emissions, in absolute terms,” the report noted.

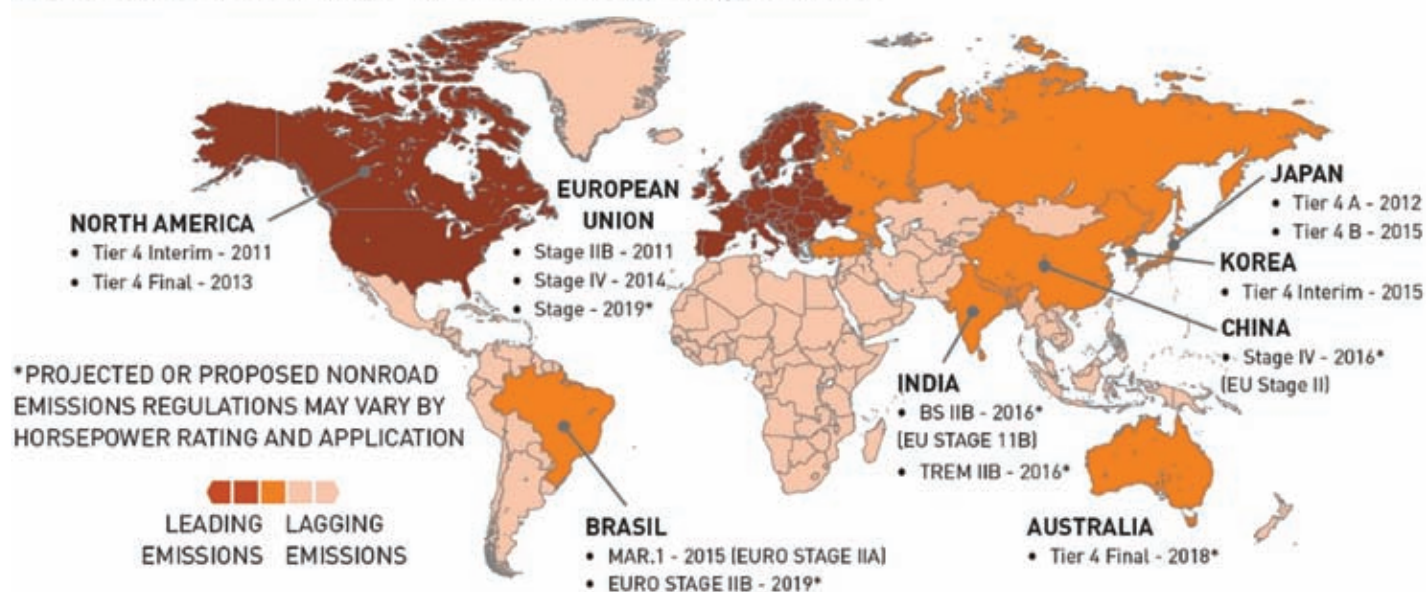
The main pollutants of concern listed were sulphur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), black carbon, particulate matter (PM), and CO₂.

Costs

Ship emissions have significant human health and environmental costs. The majority (70 percent) of these emissions occur within 400km of coastal communities, mainly in the coastal East Asia, South Asia, and Europe.

“Approximately 230 million people are exposed directly to these harmful emissions in the world’s top 100 ports,” the report estimated.

Evolution of Global Non-Road Emissions Regulations



America and Northwest Europe Emission Control Areas lead way

Strong policy responses are needed, in order to reduce these costs and mitigate the toxic pollution impacts.

“Global regulations, such as the recently introduced 0.5 percent sulphur limits by the International Maritime Organisation (IMO), more emission control areas (ECAs) with stricter limits in coastal areas, or individual port initiatives are all good policy tools to achieve better environmental outcomes for the marine sector,” the IGU said.

Policy

Many barriers to the greater deployment of LNG as a marine transportation fuel exist, and their majority will be addressed by the market, as the industry continues to gain experience with the technology and its application.

Governments can assist this process by accelerating technology demonstrations and R&D funding, to improve marine LNG technologies and enhance operational learning.

The areas where policy action would be most valuable are in addressing the regulatory and commercial barriers, which are slowing the development and deployment of cleaner LNG marine technologies, even when the business case is strong.

Recommendation

1) Regulate Emissions : The G20 governments should aspire to harmonize marine emissions control regulations.

This sector has been significantly lagging behind land transport in emissions control, even though the marine pollution is no less harmful to human health and imposes major economic costs on port cities and surrounding areas.

Airborne pollution can travel tens of kilometres inland and it causes significant health issues in many port cities.

“In some cases, such as Hong Kong, ship traffic is responsible for half of the city’s total toxic pollutants, more than power generation and transportation sectors.

“While the developed world is largely moving to strengthen the regulatory regime for controlling marine emissions, developing countries are often lagging - and that is where pollution is costing the most,” the IGU said.

“The G20 is an ideal vehicle to expedite the harmonization of global emissions regulation, and it should place high priority on this issue because marine emissions are harmful to human health, the environment, and contribute to climate change,” the gas industry body added.

2) Identify and Eliminate Gaps : The G20 governments should review their domestic legislative and regulatory frameworks pertaining to LNG marine operations, and identify and eliminate gaps and/or conflicts.

“Practices from early adopters, such as Norway, can serve as useful guide, as well as, the latest developments in codes and standard guidelines from the IMO, classification societies, and the

international community,” the IGU said.

“Regional coordination would be highly useful as well, in that there are already existing inter-jurisdictional initiatives for standards development,” it added.

Some specific areas of government action that should be prioritized to develop efficient policy frameworks around LNG marine applications are:

- Facilitate domestic standards development, in line with international activity.
- Streamline domestic regulatory processes, ensuring there is a clear lead body responsible. Marine LNG facilities often face higher regulatory costs, due to the lack of clear regulatory and approval processes, which can discourage investment.

Commercial Facilities and Access to Financing: The initial investments in LNG vessels are more capital-intensive, than the conventional bunker fuelled ships. Difficulty accessing traditional financing, due to the debt issuers’ limited experience with the technology is a major barrier, despite the conversions to LNG being a relatively secure investment, with a positive business case and a reasonable payback period.

“The G20 governments should enable credit financing for marine LNG investments. Several mechanisms are available, and many governments have experience with such mechanisms for supporting alternative energy deployments.

EXAMPLES OF EMISSIONS COST ESTIMATES		
Port	Indicator	Estimate Cost
Bergen (Norway)	Emissions of Ships at Berth	EUR 10-22 million
13 Spanish ports	PM2.5, SO ₂ , NO _x	EUR 206 million
Piraeus (Greece)	External cost per cruise passenger	EUR 2.9-10.4 million
Kaosiung (Taipei)	Emissions of Ships at Berth	EUR 119.2 million

Source: OECD, 2014

How emission levels from vessels have potential costs for ports

“These mechanisms generally fall into two categories: governments can either issue credit directly, or act as guarantor for commercial lenders, provided a well-defined set of qualification criteria, with appropriate risk controls are in place. This recommendation also applies to supporting port bunkering infrastructure development,” the report said.

Technical Fund Technology Development and First-mover Deployments: Marine LNG is a commercial technology with a growing deployment rate.

“However, continuous improvement in LNG engine and ship design will help accelerate economic and environmental performance, further reducing marine emissions. LNG bunkering is another key

area where supporting first-movers is important.

“This is young industry, and a standardized one-size-fits-all solution does not exist. LNG bunkering can be done in a variety of ways, and each port must assess it on a case-by-case basis, to find the most cost-effective option for its unique operational and technical characteristics.

“Hence, the first mover challenge will persist for port bunkering investment for some time. G20 governments should provide de-risking funding for technology innovation and unique bunkering investments,” it said.

Drivers

“There are several powerful drivers for

robust policies to enable the deployment of LNG as a marine transportation fuel. Some jurisdictions, such as Europe and the US, have recognized them and moved to begin developing policy frameworks in support of LNG fleet deployment.

“However, more work remains to be undertaken globally to unlock the immediate and significant environmental, social, and economic benefits of transitioning to LNG marine fuel,” the report said.

The policy drivers, or the value proposition of LNG transport, can generally be classified into three categories:

- 1) Environmental - delivering significant public benefits by addressing pollution and climate change issues;
- 2) Economic - delivering value to the economy; and
- 3) Social - delivering improvement in public health and extending lives.

Barriers

There is a wide range of studies demonstrating a very strong business case for LNG-fuelled ships, especially in certain segments of the global fleet.

However, even when the economics are positive, operators remain hesitant to invest, due to a number of barriers, both real and perceived.

These barriers span four areas: regulatory, commercial, technical, and cultural.

Regulatory

- **Confusing landscape:** there are currently a patchwork of regulatory regimes enforced by different government bodies - ranging from international, to national, and subnational levels.

Some jurisdictions lack a regulatory regime for LNG-fuelled ship and bunkering completely, while others may

have restrictions in place, effectively banning LNG shipping activities, as an unintended consequence of a legacy regulation – e.g. classifying LNG as a hazardous substance.

LNG marine fuel is a fairly new application, and ensuring that there are clear domestic policy frameworks and regulations for LNG shipping, bunkering, and related infrastructure is of vital importance.

Convolved approval processes, or absent guidelines for deployment are a powerful barrier for investment.

This is often the case because many jurisdictions still do not have a lot of experience with the marine use of LNG.

However, there are also jurisdictions which are quite advanced - the early adopters - that can be used as models.

Norwegian regulations for example, comprehensively address ship design, operation, training, and bunkering.

- **Gaps in Emissions Control:** the world's busiest and fastest growing ports are today in the non-OECD world, where emissions controls are often lagging behind the international standards.

Emissions control is a major driver for choosing LNG, and the business case has a strong correlation with the amount of time spent in the ECA waters.

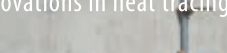
At the same time, pollution from ports is a major contributor to premature deaths and economic losses for the developing countries, and the international community can help address this issue by harmonizing international emissions regulations.

- **Regional inconsistencies:** a lion's share of the marine sector operates internationally, and it is important that regional policy and regulations are consistent and mutually-reinforcing.

Furthermore, efforts of pro-active local jurisdictions could be undermined, if their



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neighbours do not enforce similar regimes. For example, it is the flag states who enforce IMO regulations and also decide what technologies are in compliance

- **Future policy direction:** A ship's lifetime is over 25 years, and thus an investment decision on fuel technology conversion has long-term implications for the operators. Investors need to be certain that their assets will not be deemed obsolete, due to a future regulatory change.

Governments need to provide clear stable policy to ensure certainty for LNG conversion investments.

Commercial Barriers

- **Access to capital:** The traditional ship-building financiers are hesitant to provide investment capital, largely due to the limited experience and uncertainty about the ship resale value.

This is particularly challenging, since the initial investment for LNG conversions and new-build vessels is higher, than for conventionally fuelled ships. Governments can help significantly to remove this barrier by providing commercial tools that will ease access to

credit, or de-risk bank financing.

- **Diffuse Benefits:** is an interesting challenge, posed by the fact that the benefits of deploying LNG are not fully aligned with costs.

For example, in the case of cargo vessels, fuel savings benefit the charterer, who pays for fuel, not the operator, who pays for the ship, so the latter's incentive to invest in LNG is diminished.

This type of barrier is traditionally addressed by governments through providing incentives to the investors to close this gap, or by trying to better align costs with beneficiaries.

- **Resale value uncertainty:** is often cited as a barrier; however, if weighed against the alternative - the resale value of a diesel-fuelled ship in a regime of progressively stricter environmental regulations - the risk is likely exaggerated. Clear signals on future policy direction with regard to emissions regulation will help address this barrier.

- **Future fuel price uncertainty:** is as much a barrier, as it is a natural fact of life. Uncertainty in the cost of inputs, over long time horizons is a common business

reality. Furthermore, uncertainty over the future price of LNG is no greater than for petroleum fuels, especially the low-sulphur distillates. For example, diesel pump prices have been historically increasing and diesel bunker fuel saw significant volatility throughout the past decade, while the LNG commodity cost has dropped.

Technical Barriers

- **Bunkering availability:** is one of the most frequently cited barriers in relation to LNG conversions. LNG bunkering for marine fuel use is currently in the early stages, and thus it is not as widely available globally, as conventional bunkering.

There is a concern that this may impose additional costs on operators. This is the classical new technology 'chicken in the egg problem', where fleet operators are hesitant to switch because of lacking infrastructure, and ports are hesitant to invest because of uncertain demand.

This barrier is somewhat exaggerated, and there is already substantial bunkering capacity developing in the world. Europe has a requirement for all its major ports to have LNG bunkering by 2025.

Asia, North America, and Australia are also taking steps to develop LNG bunkering. Ports are also largely indicating the willingness to move quickly to support demand, once it begins to strengthen.

However, the first movers providing bunkering facilities will have to come up with the initial investment costs and accept the risk premium of uncertainty on the timing of demand.

The report then went on to present several case studies.

"Governments can help address barriers for both operators and ports," the report said.

"For the former through policy commitments, similar to the European Union, which will provide assurances that infrastructure will be available to meet the need, and for the latter through sharing the risk of initial investments to accelerate the move to a cleaner marine environment," it stated. ■

This article is based on extracts from the International Gas Union report entitled: "Enabling Clean Marine Transport - March 2017".

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Group of Liquefied Natural Gas Importers issues report on state of the industry going forward

President Jean-Marie Dauger notes oil prices continue to exert downward pressure on the contract values of LNG cargoes

The France-based International Group of Liquefied Natural Gas Importers (GIIGNL) said global LNG trade last year recorded a growth rate of around 7.5 percent, returning to a robust pace experienced before 2011.

“Primarily driven by new Australian volumes, additional supply was not as abundant as expected due to production delays, slower ramp-ups and lower exports from historical suppliers,” said GIIGNL President Jean-Marie Dauger.

Wave

“As a result, the expected ‘wave’ of LNG has not materialized yet, and some signs of market tightness have even been observed towards year-end due to colder weather than usual in Europe and North East Asia,” Dauger said in his overview of the GNL Annual report 2017.

On the import side the year was marked by soaring deliveries to the Middle East, confirming the region’s status as a rising star amongst importers.

The report found that after a moderate growth performance in 2015, China and India came back onto the front stage and confirmed their strong appetite for competitively priced LNG.

“Sluggish oil prices have continued to exert downward pressure on LNG contract prices,” Dauger noted in explaining the report.

Overhang

In the Pacific Basin, a combination of more than adequate supply and of slow demand growth also pushed spot prices to a seven-year low.

“This situation and the looming supply overhang are causing a slow-down in investment with several FIDs being cancelled or deferred,” the report said.

“Despite the addition of new supply sources in 2016 (APLNG, GLNG, Gorgon, Sabine Pass, Malaysia LNG train 9), import patterns remain largely regional,” Dauger added.

“We observed a slight shift in trade towards Asia Pacific, as additional volumes from Australia and Indonesia went into Asia and kept more Qatari LNG in the Middle East.

“Shipping costs have become a

determining factor of LNG trade. While the general consensus predicted that US exports would essentially end-up in Asia and transit through the newly-expanded Panama Canal, more than two thirds of the cargoes leaving Sabine Pass in 2016 eventually remained in the Atlantic Basin,” he stated.

“Looking at future years, with Australian projects ramping-up and new trains from the United States progressively coming online, the global LNG market could become oversupplied until the mid-2020s,” the report added.

Investment

“Given the scarce number of FIDs taken in recent months (only 1 in Indonesia and 1 in the US) a tightening of supplies in the long run can be expected, perhaps slowing down the emergence of a more flexible and liquid traded LNG market,” explained the GIIGNL President.

“In this context more than ever, cooperation along the value chain will be needed in order to reduce costs and develop new projects in due time.

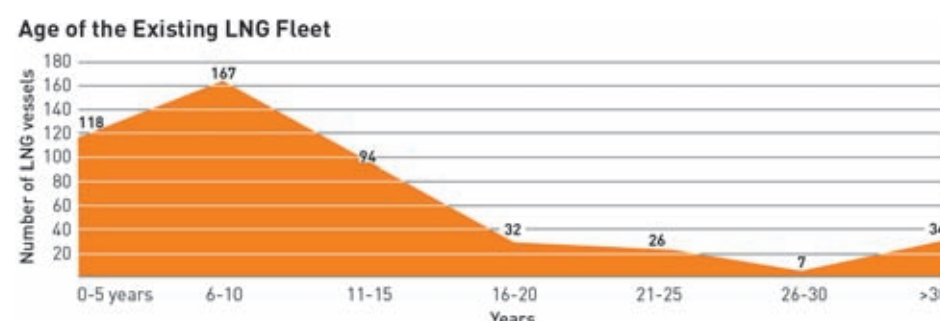
“In order to respond to market changes and cope with the uncertainty of future supply and demand, LNG contracting strategies have grown in importance,” added Dauger.

“In a well-supplied market and given the significant quantities under long-term contracts which are due to expire in the medium-term - particularly in Japan - the share of spot and short-term volumes could increase further in the coming years,” the report said.

FSRUs

“Facilitated by the development of floating storage and regasification unit solutions, LNG imports appear today as an expedient, efficient and safe solution to provide new markets with a clean and secure source of energy,” stated Dauger.

“Despite the addition of new supplies from Australia and the United States, the share of spot and short-term transactions (defined as transactions under contracts of 4 years or less) remained stable for the second consecutive year, at around 28 percent of total trade,” he added.



Building boom means modernization for large portion of LNG fleet

According to the report, international LNG flows remained largely intra-regional due to the large quantities having been contracted long-term with fixed destination and to relatively low price differentials between the different basins, which in turn held back cargo diversions during most of the year.

“Primarily driven by Australian volumes and by growing demand in China and India, intra-Pacific LNG trade still held the lion’s share (43 percent) of global LNG flows in 2016.

“As a result of the long-term contracts in force, the largest flows of 2016 included shipments from Australia to Japan (22.4 million tonnes) and China (12.7MT), from Malaysia to Japan (15.5MT), and from Qatar to Japan (12.1MT), South Korea (11.9) and India (11.4MT),” the report said.

Expectations

“Contrary to expectations, the much heralded new exports from the Gulf of Mexico (Sabine Pass Train 1 and 2) were primarily delivered to countries in Latin America (58 percent), followed by Asia (19 percent) and the Middle-East (14 percent). European countries only absorbed 9 percent,” the report said.

“On the supply side, Qatar was the main source of spot and short-term volumes to global markets (27 percent in 2016, vs 30 percent in 2015), followed by Australia (14 percent in 2016 thanks in part to the ramp-up cargoes from its new Trains, versus 9 percent in 2015). Nigeria did not supply as much spot and short-term LNG as in 2015 due to a lower overall output,” it added.

Total regasification capacity under construction at year end reached 86 MTPA, of which 70 percent or 60 MTPA located in Asia.

For regasification terminals and the expansion of imports, here are some of the main geographic highlights focused on by the GIIGNL report:

Argentina: the nominal regasification capacity of the GNL Escobar terminal has been increased from 5.1 Bcm/y to 6.1 Bcm/y.

At the beginning of 2017, state-owned company Enarsa was reportedly considering to build a new import terminal in Puerto Rosales near Bahia Blanca, south of Buenos Aires.

Bahrain: Owned by Bahrain’s National Oil and Gas Authority (30 percent), Teekay LNG Partners (30 percent), Gulf Investment Corp. (24 percent), and Samsung C&T (16 percent), the offshore Bahrain LNG project was reported to have started construction at the beginning of 2017. The terminal, which will have a receiving capacity of 6 MTPA should be completed in 2019.

Bangladesh: In 2016, Excelerate Energy signed terminal use and implementation agreements with PetroBangla and completed the geotechnical and geophysical studies for the implementation of the Moheshkhali Floating LNG terminal. Expected to close financing in 2017, the FSRU would have 138,000 cubic metres of LNG storage capacity and a base regasification capacity of 500 mmscf/d. It could start receiving LNG in early 2018.

Belgium: In Zeebrugge, a second jetty for unloading and loading ships has been commissioned in the fourth quarter of 2016. Fluxys is looking into the construction of a second truck loading station at the terminal in 2017.

Brazil: In the state of Sergipe, Golar Power took FID on the Porto de Sergipe Project, a 1,516 MW CCGT power plant in Brazil located near Aracaju, the state



One of the most modern carriers delivers US LNG from Louisiana

capital. The project will supplement hydropower during the summer season.

Finland: Skangas LNG commissioned the 0.1 MTPA Pori LNG terminal in July 2016. With a storage capacity of 30,000 cubic metres the terminal started commercial operations in September 2016.

France: In Dunkirk, commissioning was completed in 2016 and commercial operations started on 1st January 2017. Dunkerque LNG also took a Final Investment Decision to build a fast reloading facility with a loading rate of 8,800 cubic metres/h. Start-up date of the fast reloading service is planned around the end of 2018. Feed for the construction of a truck loading facility has been realized.

In Montoir, works are ongoing in order to upgrade LNG transshipment services (direct transfer of LNG between two vessels via the two existing berths) for completion end of 2017.

In Fos Tonkin, the FID has been taken for adapting the facility to be operated at very low flow rates.

The truck loading capacity has been increased by 50 percent at Montoir beginning of 2016 and doubled at Fos Tonkin in July 2016, and further expansions are under study.

Gibraltar: In August 2016, Shell signed a contract to develop a small-scale terminal designed to supply a power plant under construction. Imports were expected to start-up in the second half of 2017.

India: Petronet's Dahej capacity was recently expanded from 10 MTPA to 15 MTPA. Another expansion project is underway (Phase III B, +2.5 MTPA) which will bring the terminal's capacity to 17.5 MTPA. Three other Indian

terminals were under construction at the end of the year.

On the West Coast, GSPC LNG Limited is setting up a terminal in Mundra (state of Gujarat) with a capacity of 5 MTPA expandable to up to 10 MTPA.

On the East coast, two terminals were also under construction at the end of 2016. In Ennore, Indian Oil is developing a 5 MTPA onshore terminal which could commence operations in 2019. In Kakinada, Krishna Godavari LNG Terminal (a subsidiary of US-based VGS) is deploying a 3.6 MTPA floating solution using an FRU coupled with an FSU.

Jamaica: At Montego Bay, US firm New Fortress Energy chartered the Golar Arctic LNG tanker for two years. The vessel is used as an FSU to store and deliver LNG via small-scale vessels. The first cargo was delivered to Jamaica in October 2016 and commercial operations are reported to have started in November.

Malaysia: In addition to the Melaka offshore terminal, a new onshore terminal (Pengerang LNG, with a capacity of 3.5 MTPA) is under construction, as part of a larger refinery and petrochemical complex currently developed in the South of the country.

Malta: The FSU "Armada LNG Mediterranea" (converted from the 125,000 cubic metres capacity "Wakabu Maru" LNG carrier) arrived in October 2016 and received a commissioning cargo in January 2017. Designed to supply gas to power plants in Delimara, the terminal is reported to have a 0.4 MTPA regasification capacity.

Pakistan: In addition to the existing Engro LNG terminal, three new FSRUs are expected to be deployed over the next two years:

In June 2016 the government approved

the construction of a second import terminal at Port Qasim. In August 2016, BW signed a contract to provide a newbuild FSRU to Pakistan Gas Port Ltd. under a 15-year charter. The terminal is expected to be online by mid-2017.

At the beginning of 2017, Excelerate Energy signed a contract with a consortium of Shell, Engro and fertilizer company Fatima in order to install its second FSRU at Port Qasim. The terminal is expected to be online in 2018.

Also at Port Qasim, a fourth FSRU-based project is under development by private company Global Energy Infrastructure Limited (GEIL). The company signed a 1.3 MTPA SPA with Qatargas in June 2016 and it chartered an FSRU from Höegh LNG under a 20-year contract. Start-up is expected in 2018.

Panama: AES awarded a contract to BAM International and Iconsa in order to build an LNG jetty in Costa Norte, at the Caribbean entrance of the Panama Canal. Construction was reported to have begun in the first quarter of 2017, with expected completion in 2018. The Costa Norte LNG terminal will accommodate vessels ranging between 30,000 and 180,000 cubic metres capacity.

Philippines: Energy World corp. of Hong Kong announced the mechanical completion of the one-tank onshore import terminal to supply a new gas-fired power plant in Pagbilao. However, the project has been delayed several times and its progress is unclear. A 4 MTPA FSRU project has also been proposed by Shell in Batangas.

Poland: The construction and commissioning of the winouj cie LNG Receiving terminal was completed in May 2016. Commercial operations commenced in June 2016, with the first commercial cargo received from Qatar under the 1 MTPA long-term contract between Qatargas and PGNiG.

Puerto Rico Excelerate Energy and the Puerto Rico Electric Power Authority (PREPA) deferred construction of the offshore Aguirre Gasport, in part due to remaining environmental obstacles. The FSRU would deliver regasified LNG into the Central Aguirre Power Complex, through a subsea gas pipeline.

Russia Gazprom is planning to build a floating terminal in order to supply the Russian enclave of Kaliningrad with LNG. The company ordered a 170 000 m³ FSRU which should be delivered in 2017.

Singapore: The terminal is being further expanded with the addition of a

fourth storage tank of 260,000 cubic metres capacity, the increase of the regasification capacity to around 11 MTPA and the addition of nitrogen blending facilities to reduce calorific value of regasified LNG. The nitrogen blending facility should be available in 2017 and completion of the fourth tank is expected in early 2018.

During 2016, SLNG completed the construction of a pilot truck loading facility and the terminal has been able to offer truck/ISO-container loading services at the terminal since January 2017.

SLNG also completed FEED for making modifications to one of the large jetties so as to enable loading of small ships with cargo carrying capacity in the range of 2,000 to 10,000 cubic metres.

South Korea: The capacity of the Samcheok terminal was increased to around 11 MTPA. The 3 MTPA Boryeong terminal jointly developed by GS Energy and SK E&S received its first cargo in November 2016 and started commercial operations at the beginning of 2017.

Taiwan: Three new tanks and regasification facilities are under construction in the Taichung terminal. They will be completed at the end of 2018.

A third receiving terminal is under construction in northern Taiwan and is expected to commence operations in 2022.

Thailand: The Map-Ta-Phut terminal is being expanded from 5 MTPA to 10 MTPA. The works include construction of two additional 160,000 cubic metres capacity tanks and of a second large-scale jetty with target completion in 2017. PTT LNG is conducting a feasibility study to provide LNG bunkering as well as cooldown services from the terminal after the completion of the expansion.

PTT also got approval to build and operate a second terminal which will have a regasification capacity of approximately 5 MTPA to 7.5 MTPA. The second terminal will be built in Rayong province and it is expected to be completed by 2022.

Turkey: In December 2016, the Höegh-owned, Engie chartered "FSRU Neptune" (145,000 cubic metres capacity) took position near Aliaga, about 500km southwest of Istanbul, on the Aegean Sea. Developed by Turkish construction companies Kolin and Kalyon and named Etki LNG, the floating terminal includes a jetty and an onshore gas pipeline. It will supply up to 3.6 MTPA of LNG, complementing the existing Aliaga and Marmara Ereğlisi onshore terminals. ■

Significant moves to keep Northwest Europe at forefront of developing LNG bunkering market

Agreement to fuel world's first four Aframax crude oil tankers ordered by Russian shipping line Sovcomflot

Royal Dutch Shell moved to keep Northwest Europe at the forefront of the liquefied natural gas bunkering market by signing an agreement to fuel Russian-owned crude oil carriers from 2018.

The Shell Western LNG subsidiary signed the accord with Russian fleet owner Sovcomflot (SCF) for bunkering services for four Aframax crude oil tankers, the first in the world to be powered by LNG and with deliveries starting in the third quarter of next year.

Ice-classed

The Russian ice-classed, dual-fuel tankers will operate in the Baltic Sea and Northern Europe transporting oil and petroleum products and will be among the first in the region to use LNG.

As part of this agreement, Shell will refuel the vessels from a specialized LNG bunker vessel that will load at the Gate LNG import terminal in the Dutch port of Rotterdam and a second supply point in the Baltic area.

More ship owners and operators are choosing LNG fuel over traditional marine fuels to respond to sulphur and nitrogen oxide emissions regulations, including the recent decision by the International Maritime Organization to implement a global 0.5 percent sulphur cap in 2020.

"This is an important next step for gas as part of the energy mix," said Maarten Wetselaar, Integrated Gas and New Energies Director at Shell.

"We are proud to work with SCF Group to make these LNG-fueled Aframax crude oil tankers a reality.

"This is another marine segment

embracing the benefits of LNG fuel, making it clear that LNG will play a key role in helping the shipping industry meet new emissions regulations," added Wetselaar.

The Russian ships are being constructed at Hyundai Heavy Industries in South Korea.

"SCF Group and Shell have an extensive and successful track record of collaboration and technical innovation, and at the heart of our joint aspirations is the shared desire to play a major role in delivering a cleaner and safer maritime environment," said Sovcomflot President and Chief Executive Sergey Frank.

"This is why SCF Group and Shell decided to pilot this breakthrough initiative to switch the principal fuel of Aframax tankers, the workhorse of the global tanker industry, to LNG," added Frank.

The signing of this agreement marks the fulfilment of a memorandum of understanding signed between Shell and SCF in September 2015 to develop marine LNG fueling for large-capacity tankers.

Performance

The use of LNG fuel significantly improve vessels' environmental performance and meets the growing desire of customers to see their shipping requirements provided with minimal adverse impact on the environment.

Engines running on LNG release over 90 percent less sulphur oxide (SOx), over 80 percent less nitrogen oxide (NOx) and more than 15 percent less carbon dioxide into the atmosphere than engines



Shell and SCF Group executives celebrate signing of LNG accord

burning standard marine fuels. In addition to the benefits of LNG in dual-fuel mode, the selection by the Russians of the low pressure X-DF dual fuel engine for these tankers will minimize particulate matter emissions.

Further, the engines will be fitted with Selective Catalytic Reduction (SCR) technology to comply with Tier III regulations governing NOx emissions when in fuel mode.

The concept for these tankers was developed jointly by technical specialists from SCF Group and shipbuilders, including the Far Eastern Shipbuilding and Ship Repair Centre and Hyundai Heavy Industries (HHI), the technology partners of Zvezda shipbuilding complex in the Primorsky region of the Russian Far East.

Concept

The concept was developed as part of the preparation for the construction of such vessels at Zvezda. It is envisaged that by 2021 the construction of such large-capacity tankers will commence at Zvezda.

Shell, and Russian already cooperate in LNG from the share with Gazprom in the Russian Sakhalin Island liquefaction and export plant in the Far East.

Another shipping line, AET Tankers, a subsidiary of Malaysia International Shipping Corp., said it had chosen LNG as the dual-fuel propulsion option for up to four of its new Aframax tankers currently under construction with Samsung Heavy Industries (SHI) in South Korea.

The 113,000 deadweight vessels, due

for delivery from the third-quarter of 2018 onwards, will replace existing tonnage as part of an ongoing fleet renewal programme and will join AET's fleet of petroleum and chemical tankers.

AET, which has a fleet of around 100 tankers, anticipates that up to half of its Aframax vessels and other petroleum carrying assets, including Very Large Crude Carriers, could also adopt the LNG dual-fuel option over the next few years.

MISC

The MISC unit said the new ships would have global trading flexibility but their initial operations will focus on areas with LNG bunker availability.

"Fitted with twin LNG tanks, the vessels will have the ability to trade on LNG fuel for about a month before refueling and will likely operate in North America, Northwest Europe and Asia.

"The company is actively working with potential LNG suppliers to ensure reliability of the bunker supply chain globally," AET added.

AET said it was committed to further improving its environmental footprint through adopting responsible maritime practices.

"As an organization, operating in a responsible manner and improving our environmental stewardship is key to the way business is managed at MISC," said Yee Yang Chien, the Chairman, of AET and President and Group Chief Executive of MISC.

"We have complete confidence that LNG will play a significant part in the marine fuels mix in the coming years, and



Illustration of an Aframax crude tanker to be powered by LNG

we have been reviewing the feasibility of developing a dual-fuel LNG fleet since 2015.

"MISC is a leading global transporter of LNG, with unparalleled experience in handling LNG cargoes and a complete understanding of the entire supply chain," added Yee.

"We are utilizing this experience with the new AET ships which we believe sets us ahead of other operators with similar vessels,

"Our experience allows us to have confidence that the required infrastructure for LNG bunkering will develop at pace as we approach 2020 giving much more trading flexibility in the future," the MISC CEO stated.

"At AET we are fully committed to building a sustainable fleet and working to develop solutions that improve our environmental footprint," said Rajalingam Subramaniam, President and CEO of AET.

"This is further enhanced by a close working relationship with Samsung," added Subramaniam.

"Our customers and strategic partners have been very supportive and I would like to extend my thanks and appreciation to all our major customers and strategic partners with whom we have worked very closely to determine LNG supply availability and commercial viability of our vessels.

"Now we look forward to working with our entire customer base to lead the way in this sector," the CEO stated.

Alongside the dual-fuel LNG engines, the new Aframax vessels will be fitted with a range of eco-innovations to maximize fuel efficiency and minimize their emission impact.

They will also be fitted

with an IMO-compliant ballast water management system.

"These new vessels represent a milestone for AET, the tanker sector and

the commercial shipping industry as a whole," said SHI CEO Dae-Young Park.

"We are proud to be able to play our part in what is a truly innovative project.

By choosing the LNG option, AET has raised the bar and it will be only a matter of time before other operators follow," he added. ■

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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	TZ Mk. III	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	TZ Mk III	4	Nigeria LNG
Adam LNG	162,000	Oman LNG	Hyundai	Dec-14	Marshall Is.	DFDE	TZ Mk. III	4	Oman LNG
Al Aamriya	210,100	J5 Consortium	Daewoo	Feb-08	Marshall Is.	DRL	GT NO 96	4	Qatargas
Al Areesh	151,700	Teekay LNG	Daewoo	Jan-07	Qatar	S	GT NO 96	4	Ras Gas II
Al Bahiya	266,000	QGTC	Samsung	Oct-09	Liberia	DRL	TZ Mk. III	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	GT NO 96	4	RasGas II
Al Dafna	266,000	QGTC	Samsung	Oct-09	Marshall Is.	LR DRL	GT NO 96	4	Qatar-Atlantic
Al Deebel	145,000	Peninsular LNG	Samsung	Dec-05	Bahamas	S	TZ Mk. III	4	Qatargas
Al Gattara	216,200	OSG/Nakilat	Hyundai	Oct-07	Marshall Is.	DRL	TZ Mk. III	4	Qatargas II
Al Ghariya	210,100	ProNav	Daewoo	Feb-08	Bahamas	DRL	GT No. 96	4	Qatargas
Al Gharaffa	216,200	OSG/Nakilat	Hyundai	Jan-08	Marshall Is.	DRL	TZ Mk. III	4	Various
Al Ghashamiya	216,000	QGTC	Samsung	Mar-09	Liberia	DRL	TZ Mk. III	4	Qatar-Atlantic Basin
Al Ghuwairiya	261,700	QGTC	Daewoo	Aug-08	Marshall Is.	DRL	GT NO. 96	5	Qatar-Atl'c Basin
Al Hamla	216,000	OSG	Samsung	Feb-08	Marshall Is.	DRL	TZ Mk. III	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	TZ Mk. III	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	GT No 96	4	RasGas
Al Kharaitiyat	216,200	QGTC	Hyundai	May-09	Liberia	DRL	TZ Mk. III	4	Qatargas III
Al Kharaana	210,000	QGTC	Daewoo	Oct-09	Marshall Is.	DRL	GT NO 96	4	Qatargas IV
Al Kharsaah	217,000	Teekay	Samsung	May-08	Bahamas	DRL	TZ Mk. III	4	RasGas III
Al Khatiya	210,000	QGTC	DSME	Oct-09	Marshall Is.	DRL	GT No. 96	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	TZ Mk. III	4	RasGas
Al Mafyar	266,000	OSG/Nakilat	Hyundai	Oct-07	Marshall Is.	DRL	TZ Mk. III	4	Qatargas II
Al Marrouna	151,700	Teekay	Daewoo	Nov-07	Bahamas	S	GT NO 96		Ras Gas I
Al Mayeda	266,000	QGTC	Samsung	Jan-09	Liberia	DRL	TZ Mk. III	5	Qatar-US/Var.
Al Nuaman	210,000	QGTC	DSME	Dec-09	Marshall Is.	DRL	GT No. 96	4	Qatargas IV
Al Oraiq	210,000	J5 Consortium	Daewoo	Apr-08	Marshall Is.	DRL	GT No. 96	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	TZ Mk.III	4	Qatar-Atlantic
Al Ruwais	210,100	ProNav	Daewoo	Nov-07	Germany	DRL	GT NO 96	4	Qatargas II
Al Sadd	210,100	QGTC	Daewoo	Mar-09	Liberia	DRL	GT NO 96	4	Qatar-Atlantic Basin
Al Safliya	210,100	ProNav	Daewoo	Dec-07	Bahamas	DRL	GT NO 96	4	Qatargas II
Al Sahla	216,200	J5	Hyundai	Jun-08	Japan	DRL	TZ Mk. III	4	Ras Gas III
Al Samriya	261,700	QGTC	Daewoo	Sep-08	Marshall Is.	DRL	GT NO. 96	5	Qatargas II
Al Sheehaniya	210,100	QGTC	Daewoo	Feb-09	Liberia	DRL	GT NO 96	4	Qatar-Atlantic Basin
Al Shamal	217,000	Teekay LNG	Samsung	Jun-08	Qatar	DRL	TZ Mk. III	4	RasGas
Al Thakhira	145,000	Peninsular LNG	Samsung	Sep-05	Bahamas	S	TZ Mk. III	4	Qatargas
Al Thumama	216,000	J5 Consortium	Hyundai	Apr-08	Japan	DRL	TZ Mk. III	4	Rasgas
Al Utouriya	215,000	J5	Hyundai	Sep-08	Panama	DRL	TZ Mk. III	4	RasGas
Al Utourma	215,000	J5	Hyundai	Sep-08	Panama	DRL	TZ Mk. III	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	GT No. 96	4	Brunei LNG
AmanI	154,800	Brunei-Shell	Hyundai	Nov-14	Brunei	DFDE	TZ Mk. III	4	Brunei LNG
Aman Bintulu	18,928	Perbadanan / NYK Line	NKK Tsu	Oct-93	Malaysia	S	TZ Mk. III	3	Petronas
Aman Hakata	18,800	Perbadanan / NYK Line	NKK Tsu	Nov-98	Malaysia	S	TZ Mk. III	3	Petronas
Aman Sendai	18,928	Perbadanan / NYK Line	NKK Tsu	May-97	Malaysia	S	TZ Mk. III	3	Petronas
Arctic Aurora	160,000	Dynagas	Hyundai	Jul-13	Marshall Is.	DFDE	TZ Mk. III	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	GT. No. 96	4	Brunei LNG
Arwa Spirit	165,000	Teekay LNG	Samsung	Sep-08	Marshall Is.	DFDE	TZ Mk. III	4	Various
Aseem	154,850	K Line-Petronet	Samsung	Nov-09	Malta	S	GT No 96	4	Qatar-India
Asia Endeavour	160,000	Chevron	Samsung	Dec-14	Bahamas	DFDE	TZ Mk. III	4	Various
Asia Energy	160,000	Chevron	Samsung	Sept-14	Bahamas	DFDE	TZ Mk. III	4	Various
Asia Excellence	160,000	Chevron	Samsung	Sept-13	Bahamas	DFDE	TZ Mk. III	4	Various
Asia Vision	160,000	Chevron	Samsung	June-14	Bahamas	DFDE	TZ Mk. III	4	Various
Barcelona Knutsen	173,400	Knutsen	Daewoo	May-10	N.I.S.	DFDE	GT NO 96	4	Various
Bebatic	75,060	Brunei Shell Tankers	Atlantique	Oct-72	Brunei	S	TZ Mk. I	6	Brunei LNG
Beidou Star	172,000	MOL	Hudong	Oct-15	Hong Kong	DRL	GT NO. 96	4	Various
Berge Arzew	138,088	BW Gas	Daewoo	Jul-04	Norway	S	GT NO 96	4	Sonatrach
BW GDF-Suez Boston	138,059	BW Gas	Daewoo	Jan-03	Norway	S	GT NO 96	4	Suez LN
BW GDF Suez Everett	138,028	BW Gas	Daewoo	Jun-03	Norway	S	GT NO 96	4	Suez LNG
Bilbao Knutsen	138,000	Knutsen / Marpetrol	IZAR Sestao	Jan-04	Spain	S	GT NO 96	4	Atlantic LNG
Bilis	77,730	Brunei Shell Tankers	La Seyne	Mar-75	Brunei	S	GT NO 82	5	Brunei LNG
Bishu Maru	162,000	K Line-Transpacific	Kawasaki Sakaide	Dec-15	Panama	S	Moss	4	Australia-Japan
British Diamond	155,000	BP Shipping	Hyundai	Sep-08	IOM	DFDE	TZ Mk. II	4	Indonesia-Various
British Emerald	155,000	BP Shipping	Hyundai	Jun-07	UK	DFDE	TZ Mk. III	4	Tangguh LNG
British Innovator	138,200	BP Shipping	Samsung	Jul-03	Isle of Man	S	TZ Mk. III	4	Various
British Merchant	138,000	BP Shipping	Samsung	Apr-03	Isle of Man	S	TZ Mk. III	4	Various
British Ruby	155,000	BP Shipping	Hyundai	Jan-08	U.K.	DFDE	TZ Mk. III	4	Various
British Sapphire	155,000	BP Shipping	Hyundai	Sep-08	IOM	DFDE	TZ Mk. III	4	Tangguh

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British Trader	138,000	BP Shipping	Samsung	Dec-02	Isle of Man	S	TZ Mk. III	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	TZ Mk. III	5	Qatargas
BW Suez Paris	162,400	BW Gas	Daewoo	May-09	N.I.S.	DFDE	GT NO 96	4	Yemen-Atlantic
BW Suez Brussels	162,400	BW Gas	Daewoo	May-09	N.I.S.	DFDE	GT NO 96	4	Yemen-Atlantic
Cadiz Knutsen	138,826	Knutsen / Marpetrol	IZAR Puerto Real	Jun-04	Spain	S	GT NO 96	4	Engas
Castillo de Santisteban	173,600	Elcano	STX	Aug-10	Malta	S	GT NO. 96		Various
Castillo de Villalba	138,000	Elcano	IZAR	Nov-03	Spain	S	GT NO 96	4	Sonatrach
Catalunya Spirit	138,000	Teekay LNG Partners	IZAR Sestao	Mar-03	Liberia	S	GT NO 96	4	Atlantic LNG
Celestine River	145,000	KLNG	Kawasaki	Dec-07	Bahamas	S	Moss		Various
CESI Gladstone	174,100	MOL-China LNG	Hudong	Oct-16	Hong Kong	S	GT No 96	4	Australia-China
CESI Qingdao	174,100	MOL-China LNG	Hudong	Nov-16	Hong Kong	S	GT No 96	4	Australia-China
Cheikh Bouamama	75,500	Skikda LNG Transport	USC	Jul-08	Bahamas	S	TZ Mk. III	4	Sonatrach
Cheikh El Mokrani	75,500	Med LNG Corp	USC	Jun-07	Bahamas	S	TZ Mk. III	4	Sonatrach
Christophe de Margerie	172,600	SCF	Daewoo	Nov-16	Cyprus	DFDE	GT NO 96	4	Various
Clean Energy	150,000	Dynagas	Hyundai	Mar-07	Marshall Is.	S	TZ Mk. III	4	Various
Clean Force	150,000	Dynagas	Hyundai	Jan-08	Marshall Is.	S	TZ Mk. III	4	Various
Clean Ocean	155,900	Dynagas	Hyundai	Mar-14	Marshall Is.	DFDE	TZ Mk. III	4	Various
Clean Planet	155,900	Dynagas	Hyundai	Mar-14	Marshall Is.	DFDE	TZ Mk. III	4	Various
Clean Vision	160,000	Dynagas	Hyundai	Jun-15	Marshall Is.	DFDE	TZ Mk. III	4	Various
Cool Explorer	160,000	Thenamaris	Samsung	Oct-13	Bermuda	DFDE	TZ Mk. III	4	Various
Cool Runner	160,000	Thenamaris	Samsung	May-14	Bermuda	DFDE	TZ Mk. III	4	Various
Cool Voyager	160,000	Thenamaris	Samsung	Oct-13	Bermuda	DFDE	TZ Mk. III	4	Various
Corcovado LNG	160,106	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GT No 96	4	Various
Creole Spirit	174,000	Teekay	Daewoo	Jan-16	Bahamas	MEGI-DF	NO. 96 GW	4	Cheniere
Cubal	160,400	Mitsui/NYK/Teekay	Samsung	Jan-12	Bahamas	DFDE	TZ Mk. III	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	GT NO 96	4	Various
Dapeng Star	147,000	China Ships	Hudong	Nov-09	China	S	GT NO 96	4	Various
Dapeng Sun	147,000	China Ships	Hudong	Jul-07	China	S	GT NO 96	4	Woodside Energy
Disha	136,000	Petronet LNG Ltd.	Daewoo	Jan-04	Malta	S	GT NO 96	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	GT NO 96	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
Ejnan	145,000	4J	Samsung	Jan-07	Bahamas	S	TZ Mk. III		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	No. 96	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 Horizon	177,000	Tokyo LNG Tankers	Kawasaki	Jul-11	Japan	S	Moss	4	Pluto LNG
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
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	GT NO 96	4	Various
Excel	138,106	Exmar/ MOL	Daewoo	Sep-03	Belgium	S	GT NO 96	4	Various
Excelerate	138,000	Exmar/Excelerate	Daewoo	Oct-06	Belgium	S	GT NO 96	4	Various
Excellence	138,000	GKFF Ltd.	Daewoo	May-05	Belgium	S	GT NO 96	4	Excelerate Energy
Excelsior	138,000	Exmar	Daewoo	Jan-05	Belgium	S	GT NO 96	4	Various
Exemplar	150,900	Excelerate	Daewoo	Jun-10	Belgium	S	GT NO 96	4	Various
Expedient	151,000	Excelerate	Daewoo	Nov-09	Belgium	S	GT NO 96	4	Various
Experience RV	174,000	Exmar/Excelerate	Daewoo	Jul-14	Marshall Is.	DFDE	GT NO 96		Various
Explorer	150,900	Exmar/Excelerate	Daewoo	Mar-08	Belgium	S	GT NO 96	4	Excelerate
Express	151,000	Exmar/Excelerate	Daewoo	May-09	Belgium	S	GT NO 96	4	Various
Exquisite	150,900	Excelerate	Daewoo	Sep-09	Belgium	S	GT NO. 96	4	Various
Fraiha	210,100	J5 Consortium	Daewoo	Sep-08	Marshall Is.	DRL	GT NO 96	4	Qatargas
FSRU Independence	170,000	Hoegh	Hyundai	Feb-14	NIS	DFDE	TZ Mk. III	4	Various
FSRU Lampung	170,000	Hoegh	Hyundai	May-14	Indonesia	DFDE	TZ Mk. III	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	TZ Mk. III	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	GT NO 96	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	TZ Mk. III	4	Various
Gaslog Geneva	174,000	GasLog	Samsung	Sept-16	Bermuda	TFDE	TZ Mk. III	4	Shell charter
Gaslog Gibraltar	174,000	GasLog	Samsung	Oct-16	Bermuda	TFDE	TZ Mk. III	4	Shell charter
Gaslog Glasgow	174,000	GasLog	Samsung	Jun-16	Bermuda	TFDE	TZ Mk. III	4	Shell charter
Gaslog Greece	174,000	GasLog	Samsung	Mar-16	Bermuda	TFDE	TZ Mk. III	4	Shell charter
GasLog Salem	165,000	GasLog	Samsung	Apr-15	Liberia	TFDE	TZ Mk. III	4	various
GasLog Santiago	155,000	GasLog	Samsung	Mar-13	Liberia	TFDE	TZ Mk. III	4	Various
GasLog Saratoga	155,000	GasLog	Samsung	Dec-14	Bermuda	TFDE	TZ Mk. III	4	Various
Gaslog Savannah	155,000	GasLog	Samsung	May-10	Bermuda	DFDE	TZ Mk. III	4	Various
GasLog Seattle	155,000	GasLog	Samsung	Oct-13	Bermuda	TFDE	TZ Mk. III	4	Various
GasLog Shanghai	155,000	GasLog	Samsung	Jan-13	Liberia	TFDE	TZ Mk. III	4	Various
Gaslog Singapore	155,000	GasLog	Samsung	Jul-10	Bermuda	DFDE	TZ Mk. III	4	Various
Gaslog Skagen	155,000	GasLog	Samsung	Oct-13	Bermuda	DFDE	TZ Mk. III	4	Various
Gaslog Sydney	155,000	GasLog	Samsung	May-13	Bermuda	DFDE	TZ Mk. III	4	Various
GDF-Suez Global Energy	74,000	Gaz de France	Chantiers	Dec-06	France	DFDE	CS1	4	Sonatrach
GDF-Suez Cape Ann	145,000	Hoegh LNG/MOL	Samsung	May-10	Liberia	DFDE	TZ Mk. III	4	Various
GDF-Suez Neptune	145,000	Hoegh LNG/MOL	Samsung	Dec-09	Liberia	DFDE	TZ Mk. III	4	Various
GDF-Suez Point Fortin	154,200	LNG Japan	Imabari/Koyo	Feb-10	Panama	DFDE	TZ Mk. III	4	Various
Gemmata	138,100	Shell Shipping	Mitsubishi Nagasaki	Mar-04	Singapore	S	Moss	5	Shell
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	TZ Mk. III	4	Various
Golar Arctic	140,645	Golar LNG	Daewoo	Dec-03	Marshall Is.	S	GT NO 96	4	Shell Spot
Golar Bear	160,000	Golar	Samsung	Mar-14	Bermuda	DFDE	TZ Mk. III	4	Various

Golar Celsius	160,000	Golar LNG	Samsung	Sep-13	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Crystal	160,000	Golar LNG	Samsung	Oct-13	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Eskimo (FSRU)	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	TZ Mk. III	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	TZ Mk. III	4	Various
Golar Grand	145,880	Golar LNG	Daewoo	2006	IoM		GT NO 96	4	Various
Golar Ice	160,000	Golar LNG	Samsung	Feb-15	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Igloo (FSRU)	160,000	Golar LNG	Samsung	Oct-13	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Kelvin	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Maria	145,950	Golar LNG	Daewoo	2006	Marshall Is.		GT NO 96	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	TZ Mk. III	4	Various
Golar Seal	160,000	Golar LNG	Samsung	Aug-13	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Singapore (FSRU)	160,000	Golar LNG	Samsung	June-15	Bermuda	DFDE	TZ Mk. III	4	Various
Golar Snow	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	TZ Mk. III	4	various
Golar Tundra (FSRU)	160,000	Golar LNG	Samsung	Dec-15	Bermuda	DFDE	TZ Mk. III	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	GT NO 96	4	Petrobras
Grace Acacia	150,000	Algaet Shipping	Hyundai	Jan-07	Japan	S	TK MK III	4	Various
Grace Barleria	150,000	Swallowtail Ship	Hyundai	Oct-07	Japan	S	TZ Mk. III	4	Various
Grace Cosmos	150,000	AGH Shipping	Hyundai	Mar-08	Japan	S	TZ Mk. III	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	TZ Mk. III	4	Shell BG
Granatina	140,645	Shell Shipping	Daewoo	Dec-03	Singapore	S	GT NO 96	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	GT NO 96	4	Oman Gas
Hanjin Pyeong Taek	130,600	Hanjin Shipping	Hanjin	Sep-95	Panama	S	GT NO 96	4	Pertamina
Hanjin Ras Laffan	138,214	Hanjin Shipping	Hanjin	Jul-00	Panama	S	GT NO 96	4	QatarGas
Hanjin Sur	138,333	Hanjin Shipping	Hanjin	Jan-00	Panama	S	GT NO 96	4	Oman Gas
Hispania Spirit	140,500	Teekay LNG Partners	Daewoo	Sep-02	Spain	S	GT NO 96	4	Atlantic LNG
Hoegh Gallant FSRU	170,050	Hoegh LNG	Hoegh Hyundai	May-14	Marshall Is.	DFDE	TZ Mk. III	4	chartered
Hoegh Grace FSRU	170,050	Hoegh LNG	Hoegh LNG Hyundai	May-15	Marshall Is.	DFDE	TZ Mk. III	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	TZ Mk. III	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	TK Mk. III	4	Oman LNG
Ibri LNG	145,000	Oman Gas	Mitsubishi	Jul-06	Panama	S	TK Mk. III	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	GT NO 96	4	Oman Gas
K Freesia	135,256	Korea Line	Daewoo	Jun-00	Panama	S	GT NO 96	4	RasGas
K Jasmine	145,700	Korea Line	Daewoo	Mar-08	Panama	S	GT NO 96	4	Kogas offtake
K Mugungwha	152,000	K Line	Daewoo	Nov-08	Panama	S	GT NO 96	4	Various
Kita LNG	160,106	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GT No 96	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	GT NO. 96	4	PNG-Asia
Lala Fatma N'Soumer	145,000	Algeria Nippon Gas	Kawasaki Sakaide	Dec-04	Japan	S	Moss	4	Sonatrach
Larbi Ben M'Hidi	129,750	SNTM-Hyproc	La Seyne	Jun-77	Algeria	S	GT NO 85	5	Sonatrach
Lijmilya	261,700	QGTC	Daewoo	Sep-08	Marshall Is.	DRL	GT NO. 96	5	Various
LNG Abuja	126,530	Bonny Gas Transport	GD Quincy	Sep-80	Bahamas	S	Moss	5	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	GT NO 96	4	Nigeria LNG
LNG Bonny	177,000	Bonny Gas Transport	Hyundai	Oct-15	Bermuda	DFDE	TZ Mk III	4	Nigeria LNG
LNG Borno	149,600	NYK Line	Samsung	Aug-07	Japan	S	TZ Mk. III	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	GT NO 96	4	Nigeria LNG
LNG Fimina	175,000	Bonny Gas Transport	Samsung	Oct-15	Bermuda	DFDE	TZ Mk III	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	GT NO 96	4	Nigeria LNG
LNG Jamal	135,330	Osaka Gas/J3 Consortium	Mitsubishi Nagasaki	Oct-00	Japan	S	Moss	5	Oman Gas
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	GT No. 96	4	NLNG
LNG Lagos	177,000	Bonny Gas	Hyundai	Oct-15	Bermuda	DFDE	TZ Mk III	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	GT NO 96	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	GT No. 96	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	TZ Mk. III	4	Nigeria LNG
LNG Ondo	148,300	BW Gas	Daewoo	Sep-07	Bermuda	S	GT NO 96	4	Nigeria LNG
LNG Oyo	140,500	BW Gas	Daewoo	Dec-05	Bermuda	S	GT NO 96	4	Nigeria LNG
LNG Pioneer	138,000	MOL	Daewoo	Jul-05	Bahamas	S	GT No 96	4	Idku
LNG Port Harcourt	175,000	Bonny Gas	Samsung	Oct-15	Bermuda	DFDE	TZ Mk III	4	Nigeria LNG

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LNG Portovenere	65,000	Exmar	Italcantieri Sestri	Jun-96	Italy	S	GT No 96	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	GT No 96	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	TZ Mk. III	4	Various
Lusail	138,000	Peninsular LNG	Samsung	May-05	Bahamas	S	TZ Mk. III	4	Qatar
Madrid Spirit	138,000	Teekay LNG Partners	IZAR Puerto Real	Jan-05	Spain	S	GT No 96	4	Engas
Magellan Spirit	165,500	Teekay LNG Partners	Samsung	Sep-08	Denmark	DFDE	TZ Mk. III	4	Various
Malanje	160,400	Mitsui/NYK/Teekay	Samsung	Jul-11	Bahamas	DFDE	TZ Mk. III	4	Various
Maran Gas Achilles	174,000	Maran	Hyundai Samho	Feb-16	Greece	DFDE	GT No 96	4	Various
Maran Gas Agamemnon	174,000	Maran	Hyundai Samho	May-16	Greece	DFDE	GT No 96	4	Various
Maran Gas Alexandria	161,870	Maran	Hyundai Samho	Sep-15	Greece	DFDE	TZ Mk. III	4	Various
Maran Gas Amphipolis	173,400	Maran	Daewoo	Aug-16	Greece	DFDE	GT No 96	4	Various
Maran Gas Apollonia	161,870	Maran	Daewoo	Jan-14	Greece	DFDE	GT No 96	4	Various
Maran Gas Asclepius	145,000	Kristen Navigation	Daewoo	Jul-05	Bermuda	S	GT No 96	4	Qatar
Maran Gas Coronis	145,700	Maran	Daewoo	Sep-07	Greece	S	GT No 96	4	Rasgas II
Maran Gas Delphi	159,800	Maran	Daewoo	Feb-14	Greece	DFDE	GT No 96	4	Various
Maran Gas Efessos	159,800	Maran	Daewoo	Jun-14	Greece	DFDE	GT No 96	4	Various
Maran Gas Hector	174,000	Maran	Hyundai Samho	Nov-16	Greece	DFDE	GT No 96	4	Various
Maran Gas Lindos	159,800	Maran	Daewoo	Jun-15	Greece	DFDE	GT No. 96	4	Various
Maran Gas Mystras	155,900	Maran Gas	Daewoo	May-15	Greece	DFDE	GT No 96	4	various
Maran Gas Pericles	174,000	Maran	Hyundai Samho	June-16	Greece	DFDE	GT No 96	4	Various
Maran Gas Posidonia	161,870	Maran	Daewoo	May-14	Greece	DFDE	GT No 96	4	Various
Maran Gas Roxana	173,400	Maran	Daewoo	Jan-17	Greece	DFDE	GT No 96	4	Various
Maran Gas Sparta	161,870	Maran	Hyundai Samho	April-15	Greece	DFDE	G TZ Mk. III	4	Various
Maran Gas Troy	155,900	Maran Gas	Daewoo	May-15	Greece	DFDE	GT No 96	4	various
Maran Gas Ulysses	174,000	Maran	Hyundai Samho	Jan-17	Greece	DFDE	GT No 96	4	Various
Maria Energy	174,000	Tsakos	Hyundai	Mar-15	Marshall Is.	TFDE	GTT Mk II	4	Various
Marib Spirit	165,000	Teekay LNG	Samsung	May-08	Marshall Is.	DFDE	TZ Mk. III	4	Various
Matthew	126,540	Suez LNG Shipping	Newport News	Jun-79	Bahamas	S	TZ Mk. I	6	Atlantic LNG
Mekaines	266,000	Nakilat	Samsung	Mar-09	Liberia	DRL	GT No 96	4	Qatar-Atlantic Basin
Meridian Spirit	165,500	Teekay LNG	Samsung	Jan-10	Denmark	DFDE	TZ Mk. III	4	Various
Mesaimeer	210,100	Nakilat	Hyundai	Mar-09	Liberia	DRL	GT No 96	4	Qatar-Atlantic Basin
Methane Alison Victoria	145,000	GasLog	Samsung	Aug-07	Bermuda	S	TZ III	4	Eq.Guinea LNG
Methane Becki Anne	170,000	GasLog	Samsung	Sep-10	Bermuda	TFDE	TZ Mk. III	4	Various
Methane Heather Sally	145,000	GasLog	Samsung	Jul-07	Bermuda	S	Tz Mk. III	4	Eq.Guinea LNG
Methane Jane Elizabeth	145,000	GasLog	Samsung	Jun-06	Bermuda	TFDE	TZ Mk. III	4	Engas
Methane Julia Louise	170,000	GasLog	Samsung	Dec-09	Bermuda	TFDE	TZ Mk. III	4	Various
Methane Kari Elin	138,200	Shell	Samsung	Jun-04	Bermuda	S	TZ Mk. III	4	Various
Methane Lake Charles	145,000	Shell	Samsung	Feb-07	Bermuda	S	TZ Mk. III	4	Marathon Oil
Methane Lydon Volney	145,000	Shell	Samsung	Aug-06	Bermuda	S	TZ Mk. III	4	Engas
Methane Mickie Harper	170,000	Shell-GasLog	Samsung	Nov-10	Bermuda	TFDE	TZ Mk. III	4	Various
Methane Nile Eagle	145,000	Shell-GasLog	Samsung	Dec-07	Bermuda	S	TZ Mk. III	4	Engas
Methane Patricia Camila	170,000	Shell-GasLog	Samsung	Oct-10	Bermuda	TFDE	TZ Mk. III	4	Various
Methane Princess	138,159	Golar LNG	Daewoo	2003	UK	S	GT No 96	4	Spot BG
Methane Rita Andre	145,000	GasLog	Samsung	Mar-06	Bermuda	S	TZ Mk. III	4	Engas
Methane Shirley Elizabeth	145,000	GasLog	Samsung	Apr-07	Bermuda	S	TZ Mk. III	4	Marathon Oil
Methane Sprit	165,000	Teekay LNG	Samsung	Mar-08	Singapore	DFDE	TZ Mk. III	4	Various
Milaha Qatar	145,000	Milaha	Samsung	Apr-06	Denmark	S	TZ Mk. III	4	Qatar
Milaha Ras Laffan	138,270	Milaha	Samsung	Mar-04	Denmark	S	TZ Mk. III	4	RasGas II
Min Lu	147,000	China Ships	Hudong	Aug-09	China	S	GT No 96	4	Various
Min Rong	147,000	China LNG Ships	Hudong	Feb-09	Hong Kong	S	GT No 96	4	Australia-China
Mourad Didouche	126,130	SNTM-Hyproc	Atlantique	Jul-80	Algeria	S	GT No 85	5	Sonatrach
Mozah	266,000	QGTG	Samsung	Aug-08	Qatar	DRL	TZ Mk III	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	GT No 96	4	Qatar-Atl’c Basin
Murwab	210,100	J5 Consortium	Daewoo	May-08	Marshall Is.	DRL	GT No. 96	4	Qatargas
Muscat LNG	149,170	Oman Gas/MOL	Kawasaki Sakaide	Mar-04	Japan	S	Moss	4	Oman Gas
Neo Energy	149,700	Tsakos	Hyundai	Feb-07	Liberia	S	GTT Mk II	4	Various
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	GT NO 96	4	NWS
Northwest Swift	127,590	J3 Consortium	Mitsubishi Nagasaki	Sep-89	Japan	S	Moss	4	NWS
Oak Spirit	173,400	Teekay	Daewoo	Jan-16	Bahamas	MEGI-DF	NO. 96 GW	4	Cheniere
Ob River	150,000	Lance Shipping	Hyundai	Oct-07	Marshall Is.	S	TZ Mk. III	4	Various
Onaiza	210,100	Nakilat	Daewoo	Apr-09	Liberia	DRL	GT NO 96	4	Qatar-Atlantic Basin
Pacific Arcadia	147,200	NYK Line	MHI	Oct-14	Bahamas	S	KM		Various
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 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	GT No 96	4	Various
Papua	171,800	MOL-China	Hudong	Jan-15	Hong Kong	DFDE	SSD	4	PNG LNG
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	GT No 96	4	Petronet
Provalys	153,500	Gaz de France	Chantiers	Nov-06	France	DFDE	CS1	4	ELNG
Puteri Delima	130,400	MISC	Atlantique	Jan-95	Malaysia	S	GT NO 96	4	Petronas
Puteri Delima Satu	137,100	MISC	Mitsui Chiba	Apr-02	Malaysia	S	GT NO 96	4	Petronas

Puteri Firuz	130,400	MISC	Atlantique	May-97	Malaysia	S	GT NO 96	4	Petronas
Puteri Firuz Satu	137,100	MISC	Mitsubishi Nagasaki	Sep-04	Malaysia	S	GT NO 96	4	Petronas
Puteri Intan	130,400	MISC	Atlantique	Aug-94	Malaysia	S	GT NO 96	4	Petronas
Puteri Intan Satu	137,100	MISC	Mitsubishi Nagasaki	Dec-01	Malaysia	S	GT NO 96	4	Petronas
Puteri Mutiera Satu	137,100	MISC	Mitsui Chiba	Apr-05	Malaysia	S	GT NO 96	4	Petronas
Puteri Nilam	130,400	MISC	Atlantique	Jun-95	Malaysia	S	GT NO 96	4	Petronas
Puteri Nilam Satu	137,100	MISC	Mitsubishi Nagasaki	Sep-03	Malaysia	S	GT NO 96	4	Petronas
Puteri Zamrud	130,400	MISC	Atlantique	May-96	Malaysia	S	GT NO 96	4	Petronas
Puteri Zamrud Satu	137,100	MISC	Mitsui Chiba	Apr-87	Malaysia	S	GT NO 96	4	Atlantic LNG
Raahi	136,000	Petronet LNG Ltd	Daewoo	Dec-04	Malta	S	GT NO 96	4	Qatargas
Ramdane Abane	126,130	SNTM-Hyproc	Atlantique	Jul-81	Algeria	S	GT NO 85	5	Sonatrach
Rasheeda	266,000	QGTC	Samsung	Jun-10	Liberia	DRL	TZ Mk. III		Various
Ribera del Duero Knutsen	173,400	Knutsen	Daewoo	Nov-10	Nor-NIS	DFDE	GT NO. 96	4	Various
Rioja Knutsen	176,300	Knutsen	Daewoo	Dec-16	Nor-NIS	DFDE	TZ Mk III	4	Various
Salalah LNG	147,000	Oman Gas/MOL	Samsung	Dec-05	Japan	S	TZ Mk. III	4	Oman
SCF Polar	71,500	Sovcomflot	Kockums	Aug-69	Liberia	S	GT NO 82	6	Sonatrach
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	TZ Mk. III	4	Yemen LNG
Seri Amanah	145,000	MISC	Samsung	Mar-06	Malaysia	S	TZ Mk. III	4	Yemen LNG
Seri Anggun	145,000	MISC	Samsung	Nov-06	Malaysia	S	TZ Mk. III	4	Yemen LNG
Seri Angkasa	145,000	MISC	Samsung	Feb-07	Malaysia	S	TZ Mk. III	4	Petronas
Seri Ayu	145,000	MISC	Samsung	Oct-07	Malaysia	S	TZ Mk. III	4	Various
Seri Bakti	152,300	MISC	Mitsubishi	Mar-07	Malaysia	S	GT NO 96	4	Petronas
Seri Balhaf	152,000	MISC	Mitsubishi	Sep-08	Malaysia	S	GT NO 96	4	Various
Seri Balquis	152,000	MISC	Mitsubishi	Dec-08	Malaysia	S	GT NO 96	4	Various
Seri Begawan	152,300	MISC	Mitsubishi	Dec-07	Malaysia	S	GT NO 96	4	Various
Seri Bijaksana	152,300	MISC	Mitsubishi	Feb-08	Malaysia	S	GT NO 96	4	Petronas
Seri Camellia	150,000	MISC	Hyundai	Nov-16	Malaysia	S	Moss	5	Petronas
Seri Cenderawasih	150,000	MISC	Hyundai	Jan-17	Malaysia	S	Moss	5	Petronas
Sestao Knutsen	138,000	Knutsen	IZAR Sestao	Jan-07	Spain	S	GT NO 96	4	Atlantic LNG
Sevilla Knutsen	173,400	Knutsen	Daewoo	Jun-10	N.I.S.	DFDE	GT NO 96	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	TZ Mk. III	5	Qatargas IV
Shen Hai	147,100	China LNG	Hudong Zhonghua	Sep-12	China	AB/CC Steam	GT NO 96	4	Various
Simaisma	147,700	Maran Gas Maritime	Daewoo	Jul-06	Greece	S	GT No 96	4	Qatar
SK Splendor	138,375	SK Shipping	Samsung	Mar-00	Panama	S	TZ Mk. III	4	Oman Gas
SK Stellar	138,375	SK Shipping	Samsung	Dec-00	Panama	S	TZ Mk. III	4	RasGas
SK Summit	138,000	SK Shipping	Daewoo	Aug-99	Panama	S	GT NO 96	4	RasGas
SK Sunrise	138,306	I. S. Carriers	Samsung	Sep-03	Panama	S	TZ Mk. III	4	RasGas
SK Supreme	138,200	SK Shipping	Samsung	Jan-00	Panama	S	TZ Mk. III	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	TZ Mk. III	4	Various
Sonangol Benguela	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GT No. 96	4	Angola LNG
Sonangol Etosha	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GT No. 96	4	Angola LNG
Sonangol Sambizanga	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GT No. 96	4	Angola LNG
Southern Cross	172,000	MOL	Hudong	May-15	Hong Kong	DRL	GT NO. 96	4	Various
Soyo	160,400	Mitsui/NYK/Teekay	Samsung	May-11	Bahamas	DFDE	TZ Mk. III	4	Various
Spirit of Hela	177,000	MOL	Hyundai	Oct-09	Panama	DFDE	TZ Mk. III	4	Various
Stena Blue Sky	145,700	Stena	Daewoo	Jan-06	Panama	S	GT No 96	4	Various
Stena Clear Sky	171,800	Stena	Daewoo	Sep-10	Panama	DFDE	GT NO 96	4	Various
Stena Crystal Sky	171,800	Stena	Daewoo	Jul-10	Panama	DFDE	GT NO 96	4	Various
STX Kolt	145,700	STX Panocean	Korea Hanjin	Nov-08	Panama	DFDE	TZ Mk. III	4	Various
Suez Point Fortin	154,200	Trinity LNG	Koyo Japan	Nov-09	Panama	S	TZ Mk. III	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	GT NO 96		Tangguh
Tangguh Foja	155,000	K Line	Samsung	Jul-08	Panama	DFDE	TZ Mk. III	4	Tangguh LNG
Tangguh Hiri	155,000	Teekay LNG	Hyundai	Nov-08	IOM	DFDE	TZ Mk. III	4	Tangguh
Tangguh Jaya	145,700	K Line	Samsung	Nov-08	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Palung	155,000	K Line	Samsung	Mar-09	Panama	DFDE	TZ Mk. III	4	Tangguh
Tangguh Sago	155,000	Teekay LNG	Hyundai	Mar-09	IOM	DFDE	TZ Mk. III	4	Tangguh LNG
Tangguh Towuti	145,700	Sovcomflot/NYK	Daewoo	Oct-08	Cyprus	S	GT NO 96	4	Tangguh
Tembek	216,200	OSG/Nakilat	Samsung	Sep-07	Marshall Is.	DRL	TZ Mk. III	4	Qatargas II
Tenaga Satu	130,000	MISC	Dunkerque	Sep-82	Malaysia	S	GT NO 88	5	Petronas
Trinity Arrow	154,900	K Line	Imabari Shipbuilding	Mar-08	Panama	S	TZ Mk. III	4	Various
Umm Al Amad	210,100	J5	Daewoo	Aug-08	Marshall Is.	DRL	GT NO 96	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	GT NO 96	4	Qatargas
Umm Slaal	266,000	QGTC	Samsung	Nov-08	Qatar	DRL	TZ Mk. III	5	Qatargas
Valencia Knutsen	173,400	Knutsen	Daewoo	Sep-10	Nor-NIS	DFDE	GT NO. 96	4	Various
Velikiy Novgorod	170,200	SovComFlot	STX	Feb-14	Liberia	DFDE	GT No. 96	4	Various
Wakaba Maru	125,000	J3 Consortium	Mitsui Chiba	Apr-85	Japan	S	Moss	5	Pertamina
WilEnergy	125,500	Awilco LNG	Mitsubishi	Oct-83	NIS	S	Moss	5	Various
WilForce	156,000	Teekay LNG	Daewoo	Aug-13	NIS	DFDE	GT NO 96	4	Various
WilGas	125,500	Awilco LNG	Mitsubishi	Jul-84	NIS	S	Moss	5	Various
WilPower	125,500	Awilco LNG	Mitsubishi	Jul-84	NIS	S	Moss	5	Various
Woodside Cheney	174,000	Maran	Hyundai Samho	March-16	Greece	DFDE	GT No 96	4	Various
Woodside Donaldson	165,500	Teekay LNG	Samsung	Dec-09	Singapore	DFDE	TZ Mk. III	4	Various
Woodside Goode	159,800	Maran	Daewoo	Jul-14	Greece	DFDE	GT No. 96	4	Various
Woodside Reeswithers	173,400	Maran	Daewoo	Nov-16	Greece	DFDE	GT No 96	4	Various
Woodside Rogers	155,900	Maran Gas	DSME	Jul-13	Greece	DFDE	GT NO 96	4	Various
Yari LNG	159,983	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GT No 96	4	Various
Yenisei River	155,000	Dynagas	Hyundai	Jul-13	Marshall Is.	DFDE	TZ Mk. III	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	TZ Mk. III	5	Qatar-Atlantic
Zekreet	135,420	J4 Consortium	Mitsui Chiba	Dec-98	Japan	S	Moss	5	Qatargas

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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](mailto:John.McKay@lngjournal.com) e-mail editor@lngjournal.com

Country	Location (Project)	Owners	Start up	Storage	
				Tanks	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
	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, Zhejiang	CNOOC, Zhejiang Energy	2012	3	480,000
	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 FSRU	CNOOC	2014	1	60,000
	Yuedong, Guangdong	CNOOC	2016	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
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
Greece	Revithoussa	DEPA	2000	2	130,000
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
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
	Mizushima	Nippon Oil, Chugoku Electric	2006	2	320,000
	Sakaide	Shikoku Electric, Cosmo Oil	2011	1	180,000
	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
Korea	Boryeong	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
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
Poland	Swinoujscie	Baltic Gaz System	2015	2	320,000

LNG Import Terminals (continued)

Country	Location (Project)	Owners	Start up	Storage	
				Tanks	Capacity
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
	Reganosa, Ferrol	Galicia, Sonatrach, Tojeiro	2006	2	300,000
	El Musel, Gijón,	Enagas	2013	2	300,000
Taiwan	Yung-An	CPC	1990	6	690,000
	Tai-chung	CPC	2009	3	480,000
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
	Elba Island	Kinder	2001	5	535,000
	Cove Point	Dominion	2003	5	530,000
	Freeport	Freeport LNG Development	2008	2	320,000
	Cameron	Sempra LNG	2009	3	480,000
	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	Capacity
China	Tianjin North	Sinopec	2017	2	320,000
	Zhoushan Zhejiang	Enn Group	2018	2	320,000
Finland	Tornio	Gasum Skanga	2018	1	30,000
Gibraltar	Gasnor	Shell	2017	1	5,000
India	Ennore	Indian Oil Corp	2018	2	320,000
	Mundra	Gujarat State Petroleum, Adani Group	2018	2	320,000
	FSRU Andhra Pradesh	Engie, Andhra Pradesh Gas	2018	1	135,000
	Pipovav LNG (FSRU), Gujarat	Swan Energy	2018	2	320,000
	Andhra Pradesh	Hindustan LNG, Andhra Pradesh	studies	1	135,000
Indonesia	Labuhan Maringgai	Perusahaan Gas Negara	2018	1	135,000
Japan	Soma, Fukushima	Japan Petroleum	2018	1	230,000
Malaysia	Lahad Datu LNG, Sabah	Petronas	2018	studies	
	Pengerang Johor	Petronas	2019	2	320,000
Panama	Costa Norte	AES	2018	1	130,000
Philippines	Pagbilao LNG	Energy World Corp.	2017	1	130,000
UK	Port Meridian, Barrow-in-Furness	Port Meridian Energy Ltd.	2018	1	150,000
Uruguay FSRU	Montevideo	Gas Sayago, Mitsui Osk Lines	2018	1	230,000

LNG FSRU Import Facilities

Country	Location (Project)	Owners	Start up
Argentina	Bahia Blanca GasPort	Excelerate/YPF Repsol	2008
	Escobar GasPort	Excelerate/Enarsa	2011
Brazil	Pecem, FSRU	Petrobras	2009
	Guanabara Bay FSRU	Petrobras	2009
	Salvador, Bahia FSRU	Petrobras	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, Pertamina	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
Turkey	Aliaga FSRU, Neptune	Etki LNG	2016
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	Browse LNG	Woodside, BHP, BP Chevron, Shell, Mitsubishi, Mitsui	2021+	2	10.0
	Ichthys LNG	INPEX, Total	2017	2	8.4
	Prelude FLNG	Shell, Inpex, Kogas CPC	2018	1	3.5
	Sunrise LNG	Woodside, Osaka Gas, ConocoPhillips, Shell	2020+	1	3.5
	Wheatstone LNG	Chevron, Apache, Shell , Kuwait FPEC	2017	2	9.0
CANADA	Aurora LNG BC	CNOOC, Inpex Corp. and JGC Corp.	2024	4	24.0
	Bear Head LNG, Nova Scotia	LNG Ltd.	2024	4	8.0
	GNL Quebec, Saquenay	Freestone Capital and Breyer Capital	2024	4	10.0
	Goldboro LNG, Nova Scotia	Pieridae Energy	2024	2	10.0
	Grassy Point LNG	Woodside Petroleum	2024	studies	
	Kitimat LNG, BC	Woodside, Chevron	2024	2	10.0
	LNG Canada, BC	Shell, Mitsubishi, Kogas, PetroChina	2024	2	12.0
	Melford LNG project, Nova Scotia	H-Energy Hiranandani Group	Studies		
	Pacific Northwest LNG, BC	Petronas, Japex, Sinopec, Indian Oil, Brunei Petroleum	2021	2	12.0
	Steelhead LNG, Bamfield	Steelhead LNG Corp	2021	2	12.00
	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 and Golar LNG	2019	1	2.0
INDONESIA	Sengkang LNG	Energy World Corp.	2017	4	2.0
MALAYSIA	Rotan FLNG (Sabah)	Petronas	2019	1	1.5
MOZAMBIQUE	Area 1 Onshore	Anadarko Petroleum and partners	2021	2	10
	Area 4 Onshore	Eni and partners	2021	2	10
	Area 4 FLNG	Eni and partners	2019	1	2.5
NIGERIA	NLNG Train 7	NNPC, Shell, BP, Total	2020+	1	8.4
PAPUA NEW GUINEA	Elk-Antelope LNG	Total, InterOil, Oil Search, Petromin	Studies		
RUSSIA	Yamal LNG Siberia	Novatek, Gazprom, Total	2018	3	16.5
	Sakhalin II expansion	Gazprom, Shell, Mitsui, Mitsubishi	2021	studies	
	Vladisvostok LNG	Gazprom, Itochu, various	2021	2	10.0
USA	Alaska LNG Nikiski	Alaska Gasline Development Corp.	2022	3	20.0
	Annova LNG, Brownsville	Exelon Corp.	2021	6	6.0
	Cameron LNG, Louisiana	Sempra	2018	5	24.92
	Corpus Christi Liquefaction, Texas	Cheniere	2019	5	22.5
	Cove Point LNG, Maryland	Dominion	2018	1	5.25
	Delfin LNG, Louisiana	Delfin, Hoegh	2021	3	9.0
	Driftwood LNG, Louisiana	Tellurian Investments	2022	6	26.0
	Elba Island, Georgia	Kinder Morgan, EIG Energy	2018	10	2.5
	Freeport LNG, Texas	Freeport LNG	2018	4	20.4
	Golden Pass, Texas	Qatar Petroleum, ExxonMobil	2021	3	15.6
	Jordan Cove, Coos Bay	Veresen Inc.	2024	2	7.8
	Lake Charles, Louisiana	Shell, ETE	2024	3	15.0
	Magnolia LNG	Louisiana LNG Ltd.	2021	4	8.0
	Port Arthur LNG	Sempra	2021	2	10.0
	Rio Grande LNG	NextDecade	2021	6	27.0
	Sabine Pass LNG, Louisiana	Cheniere	2016-19	5	22.5
	Texas LNG Brownsville	Chandra, Meyer, Samsung, others	2021	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 m³
ABU DHABI (UAE)	Das Island (Adgas)	ADNOC, Mitsui, BP, Total	1977 1994	2 1	3.2 2.5	3	240,000
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
AUSTRALIA	Karratha	NWS Woodside, Shell, BHP	1989	2	5.0	4	260,000
		(BP, Chevron	1992	1	2.5	1	130,000
		(Mitsubishi/Mitsui)	2004	1	4.4	1	130,000
		NWS partners	2008	1	4.4	1	130,000
		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
BRUNEI	Lumut	Brunei/Shell/Mitsubishi/Total	1972-74	5	7.2	3	176,000
EGYPT	Damietta	Union Fenosa, EGPC, EGAS	2004	1	5.0	2	300,000
	Idku	EGPC, EGAS, Shell, Engie, 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 Island	Statoil, Total, GDF-Suez, Petoro	2007	1	4.2	2	280,000
OMAN	Oman LNG	Oman Govt., Shell, Total, Korea LNG	2000	2	7.1	2	240,000
		Mitsubishi, Mitsui, Partex and Itochu					
		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-T1	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	6	840,000
	RasGas II- T4	QP, ExxonMobil	2005	1	4.7		
	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
TRINIDAD & TOBAGO	Point Fortin Train 1	BP, Shell, Suez, 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	1	4.5	5	800,000
	Kenai - Alaska	ConocoPhillips, Marathon Oil	1969	2	1.3	3	108,000
YEMEN	Bal-Haf	Yemen LNG, Total, Yemen Gas, Hunt Oil, SK Group, Hyundai	2009	2	6.7	2	320,000

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