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Kosmos outlines strategy for Senegal and Mauritania LNG and other African basins

US operator says Africans must not miss out on standard of living we take for granted, built on hydrocarbons

Kosmos Energy, the exploration and production and company, based in Dallas, Texas, has made its name in the Atlantic Margin offshore West Africa and with LNG, natural gas and oil projects in its portfolio.

Kosmos has earmarked \$325 million to \$375M for its capital expenditure in 2020, excluding its floating LNG projects and natural gas developments off Mauritania and Senegal.

Prospects

The Mauritania and Senegal capex will amount to a further \$250 and is expected to be funded from farmout proceeds, according to Chairman Chief Executive Andrew Inglis in a conference call with analysts after the fourth-quarter earnings.

"In Mauritania and Senegal, we made excellent progress on the Tortue development, with phase one around 25 percent complete at year-end," said Inglis.

"In exploration and appraisal, five of the seven wells drilled during the year succeeded," he added.

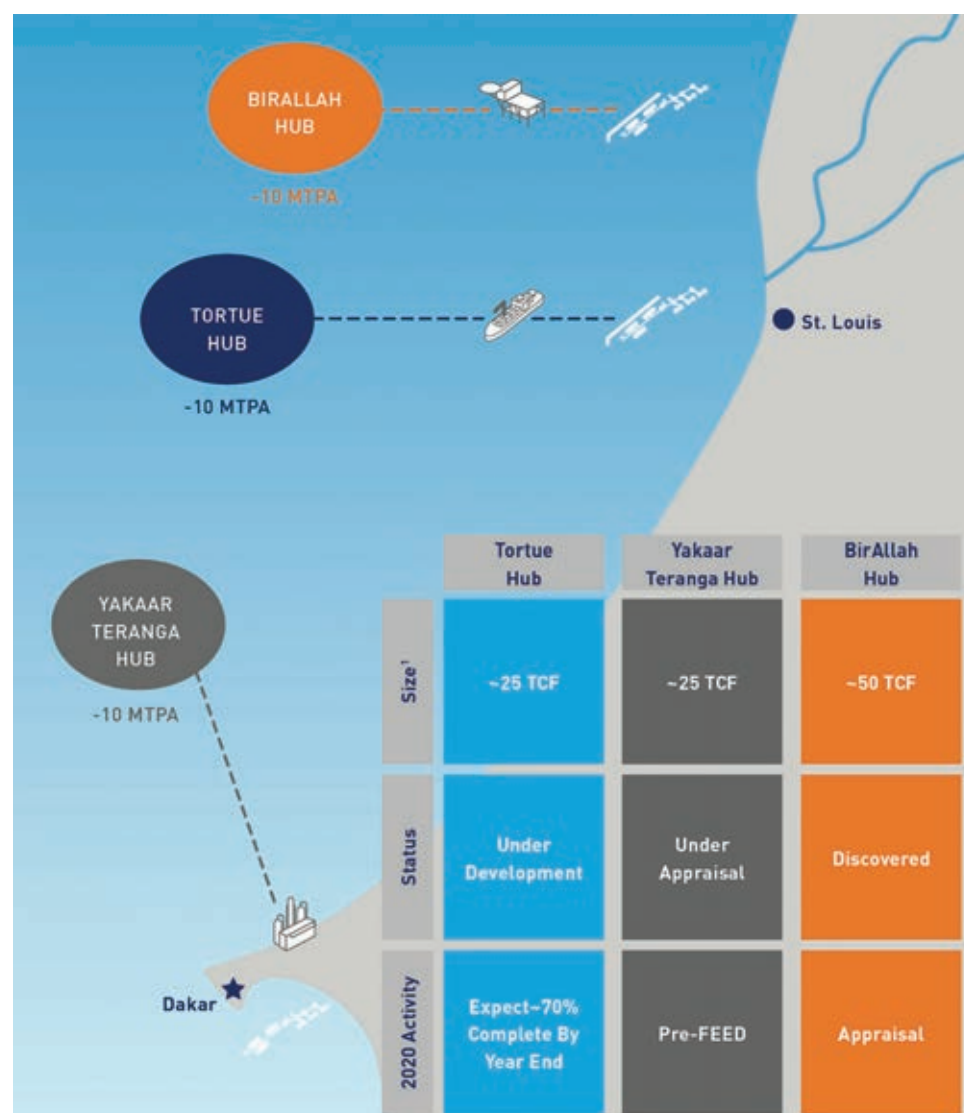
"And finally on reserves, we reported our seventh year in a row of reserve replacement greater than 100 percent, demonstrating the quality of our asset base," he stated.

At the same time, Kosmos was reducing its 2020 capital budget for base by around 30 percent to \$250M in response to the oil price slump.

"Kosmos also has significant flexibility in its 2021 capital program should current market conditions persist," said the company on March 17.

The 2019 exploration and appraisal programme was successful, with five positive results from the seven wells drilled.

Total resources given net to Kosmos was around 380 million barrels oil equivalent or 80 percent of the 480



These three West African gas fields are capable of 30 MTPA of output

million barrels oil equivalent targeted at the beginning of the year.

Drilling

These drilling results came from three different business units, which highlights the depth of opportunities the company has across its varied assets.

"We had 100 percent success rate in Mauritania and Senegal, with the GTA-1 well and the Yakaar-2 appraisal wells and the Orca-1 exploration well, which is the largest deepwater hydrocarbon discovery in 2019," explained Inglis.

"In addition, our infrastructure led exploration, or ILX, delivered a 50 percent success rate in 2019, in line with

our expectations, with success in the Gulf of Mexico with Gladden Deep, and Equatorial Guinea with the S-5 well," he added.

The CEO said the Dallas company's development projects in Mauritania and Senegal continue to move forward.

At Tortue, Kosmos remains on scheduled to deliver gas in the first half of 2022.

The company noted that the signing of a sale and purchase agreement signed with Mauritania-Senegal partner, BP of the UK, through its subsidiary BP Gas Marketing in February 2020 was a landmark deal as it finalized the offtake for all phase one gas and enables Kosmos

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to book the 1P reserves, materially increasing its proved reserves base.

LNG multiples

"With phases two and three, we have made significant progress with BP on finalizing the development concept to increase the LNG capacity from 2.5 million tons per annum to approximately 10 MPTA," stated Inglis.

"The concept will leverage the phase one infrastructure and the nearshore location, with a goal to deliver highly cost competitive LNG scheme with one of the lowest carbon intensities in the world," he explained.

Kosmos confirmed that in the Yakaar-Teranga block, the Yakaar-2 appraisal well proved up the southern extension of the field, confirming the world-scale resource in place.

The company is working with partners to develop the resource.

"We are planning an initial phase one domestic gas to power project, supporting Senegal's plan to replace higher carbon diesel with natural gas," added Inglis.

At BirAllah of Mauritania, the Orca-1 exploration well discovered 13 trillion cubic of gas, materially increasing the size of the Mauritania resource potential to around 50 Tcf of gas in place.

De-risked

"Importantly, this well de-risked more than enough resource to underpin a third LNG hub in the region," said Inglis.

Through exploration success and strategic acquisitions in Equatorial Guinea and the US Gulf of Mexico, the Kosmos reserves have grown at over 50 percent annually, both on a 1P and 2P basis.

equivalent of 2P reserves, the reserves to production ratio is around 22 years, one of the best in the industry for a mid-cap E&P company.

Secondly, with reserve bookings in Mauritania and Senegal, Kosmos now has a much more balanced mix of oil and gas.

Through continued progress in the developments in Mauritania and Senegal, the gas component is likely to increase naturally over time.

Population

Africa is expected to double its current population and grow by more than 1 billion people by 2050, representing more than 50 percent of the worldwide growth projected during that time.

"These men and women aspire to a standard of living that we take for granted, which was built on hydrocarbons," said Inglis.

"Many African leaders have made this point on behalf of their citizens who often lack the basic necessities for a decent and secure life," he added.

"Kosmos can promote that economic development and social progress by providing affordable energy and helping countries accelerate their transition to cleaner sources of energy through oil to gas and renewables," explained the CEO.

"With our partner, BP, we are working on this agenda in Mauritania and Senegal through our natural gas development projects," he continued.

"Our goal is to deliver the lowest carbon LNG projects, providing affordable gas to the local populations and connect into their considerable future capacity for renewables, especially solar and wind," he stated.

Nations await

Kosmos has a strong portfolio of frontier opportunities in Namibia, South Africa, Sao Tome, Equatorial Guinea and Suriname.

The company has decided to efficiently test these opportunities, but would not seek access to new frontier oil basins.

"In essence, we'll use our short-

dated oil production to finance the move toward medium to long-term natural gas projects, all while delivering shareholder returns," said Inglis.

"We believe these portfolio decisions meet both our financial duties to our shareholders and Kosmos' purpose and responsibilities to all stakeholders," he added.

"At Jubilee in Ghana, the fundamental issue that oil production is limited by the associated gas rate. The first step we've taken to increase the oil rate is the gas handling expansion project which was successfully completed in early February and has enabled higher gas throughput," explained the CEO.

"We aim to increase the gas offtake from the field by working with the government to ensure more Jubilee gas is used for domestic power consumption," he said.

Main goals

"In addition, we have a rig contract in the first six months of the year in Ghana and expect to add one producer and two water injection wells in Jubilee which should further support field performance," added the CEO.

In Equatorial Guinea, Kosmos said it was currently working through the upgrade of the two main facilities required for phase two of its programme which is expected to begin in the fourth quarter of 2020.

"As I discussed earlier, our position in the world-class Mauritania and Senegal gas basin, a source of low cost, lower carbon LNG, is core to the strategy of the company and we've decided to retain a greater interest in the Tortue project," he said.

"We still have more gas resource than a company of our size can develop, and we're focusing on monetizing either a smaller portion of Tortue or a larger portion of the remainder of Mauritania-Senegal portfolio to fund the increased interest in Tortue with the goal to deliver a self-funded long-term source of cash flow," Inglis added.

"It's worth remembering the fundamental characteristics of an LNG project," he said.

"Once they're onstream, they deliver reliable cash flow for many years, which provides a solid foundation for the company. Each additional 1 million ton per annum of LNG post-development could deliver free cash flow of \$100M to \$150M per year for 20-plus years," Inglis asserted. ■

*'...our position
in the world-class
Mauritania and
Senegal gas basin
... is core to the strategy
of the company'*

With
over 550
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Australian LNG shipments to China and Japan partially hit as nation also focuses on East Coast gas market

Report considers coronavirus impact and prospects for developing resources in addition to Queensland

Australian liquefied natural gas is starting to experience a double effect of lower volumes and price falls in the global trade disruption.

Australian consultants EnergyQuest said the trade flow logistics with China and Japan from the coronavirus is also partly evident in LNG cargo numbers.

Pronounced

The firm's report said the impact was not particularly serious but most pronounced in shipments from the Queensland port of Gladstone, which supplies two main Chinese customers, China National Offshore Oil Corp. from the Queensland Curtis plant and Sinopec from the Australia-Pacific plant.

"In total Australian projects delivered 29 cargoes to China in February, well down on 40 in January although more than the 26 delivered in February 2019," said EnergyQuest.

"However, cargoes delivered from Gladstone fell from 17 a year ago to 14 this February," it added.

"Further up the supply chain 12 Australian cargoes destined for China were delayed or diverted in February. Shipments from Gladstone bound for China amounted to only 1.05 million tonnes in February, down from 1.24 MT a year earlier and the lowest since September 2018," it stated.

A total of 31 Australian deliveries were made to Japan in February, well down on the 45 delivered in January and 40 in February 2019.

The slump in the oil price will take two or three months to feed through to LNG price realisations but will have a significant impact, according to EnergyQuest.

Price slope

"At a 12 percent slope to the oil price, the LNG price is US\$7.80 per million British thermal units at an oil price of US\$65 per barrel but only US\$4.20/MMBtu at US\$35 per barrel, a fall of 46 percent," said the firm.

"The drop in the oil price will have knock-on effects for Australian producers, as has already been reflected in slumping share prices," added EnergyQuest.

It noted that Origin Energy, a shareholder in the Australia Pacific LNG plant in Queensland, as assumed an oil price of US\$68 per barrel over 2019-2020 when estimating the cash distribution it will receive from its APLNG project. It has a distribution break-even oil price of US\$29-\$32 per barrel.

Santos has a free cash flow breakeven of US\$29 per barrel but requires a price of US\$60 per barrel to fund growth projects while maintaining gearing, in the absence of asset sales.

"Less cash means less cashflow to reinvest, including in exploration and development drilling," said the report.

Total Australian LNG shipments in February were 6.1MT (90 cargoes), significantly lower than 7.0MT (103 cargoes) in January, although higher than the 5.6MT (82 cargoes) in February 2019.

Qatar

Australia's February shipments were 76.2 MTPA on an annualised basis, just below Qatar's nameplate capacity of 77 MTPA.

Average capacity utilisation was down in February due the shutdown of Prelude FLNG and significantly reduced output from the North West Shelf plant.

"West coast LNG shipments were well down in February compared with January due to the closure of the Port of Dampier as a result of Cyclone Damien," said EnergyQuest.

East Coast LNG shipments were 1.8MT, down by 0.13MT (two cargoes) in February compared with January.

"The Gladstone LNG producers had a production deficit in February, with total production from LNG producers 3.0 PJ less than total LNG exports. This is lower compared with January when the producers had a 7.5 PJ surplus," the consultants added.

Australia delivered 12 cargoes to Korea in February, up on the deliveries in the last northern winter. Australia fell to second spot as the largest supplier to Korea in January with Qatar regaining top spot. The US remained in third place.

Spot price

After reaching an all-time low of US\$2.713/MMBtu on 14 February, The

Australian LNG cargoes delivered to China September 2018 to February 2020



Source: EnergyQuest

Australian deliveries to China have not been affected as much as expected

Japan Korea Marker Asian spot LNG price futures rose during February from US\$2.99 per MMBtu (for April deliveries) at the end of January to US\$3.17 per MMBtu (for May deliveries) at the end of February.

Asian spot prices had fallen as high inventories, warm winter weather, increased supply and the coronavirus had all take their toll.

"There is no doubt that the coronavirus is adding to the woes of LNG, already suffering from the ramp-up in global supply," said EnergyQuest Chief Executive Graeme Bethune.

"Tanker charter rates (Tri-fuel Diesel Electric) quoted by shipping broker SSY have fallen from US\$85,000/day at the start of January to US\$37,500/day at the end of February," his report added.

The potential effects of the virus has also hammered share prices of energy companies.

"The sell-off has now reached the point where equity analysts are recommending buying," said the report.

Unknown

EnergyQuest concluded that "nobody knows" how the virus effects will pan out and whether it will be quickly contained.

Australia is also still struggling for firm direction on its Queensland coal-seam gas resources and on the overall East Coast market, taking in New South Wales, Victoria and South Australia.

"The outlook for East Coast gas over

the next 20 years remains subject to considerable uncertainty," said EnergyQuest.

On the one hand, while LNG exports have increased and conditions for gas buyers have eased, the supply of domestic gas has increased and prices have fallen.

"On the other hand, there are numerous delays to new supply projects," stated the report.

Development of the largest uncontracted reserves on the East Coast, those held by Arrow Energy, has been further delayed.

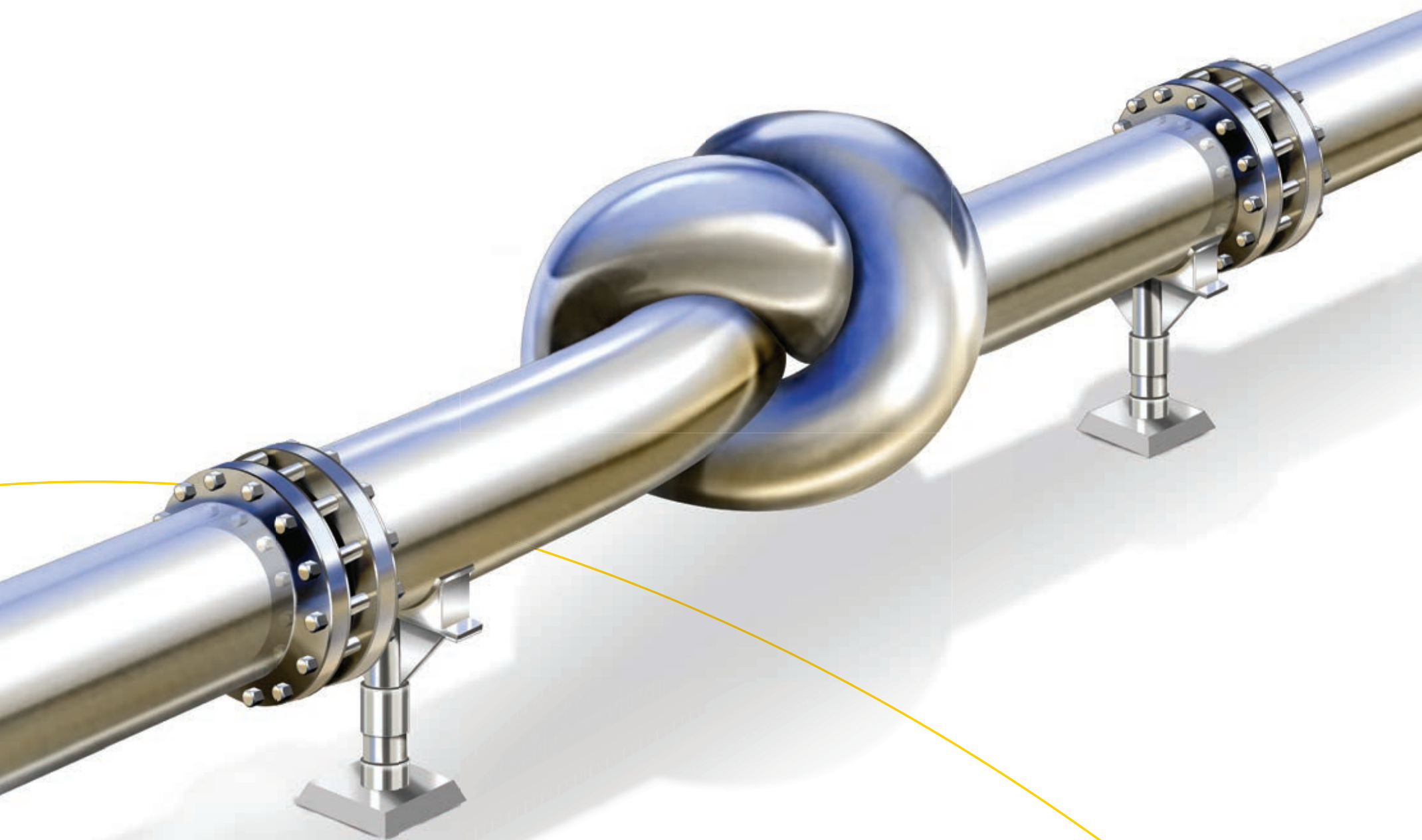
Arrow

The report said a decision was expected by the end of last year. The recent US-China trade deal, requiring China to import substantial volumes of US LNG, may impact on development by Arrow, which is 50 percent Chinese-owned.

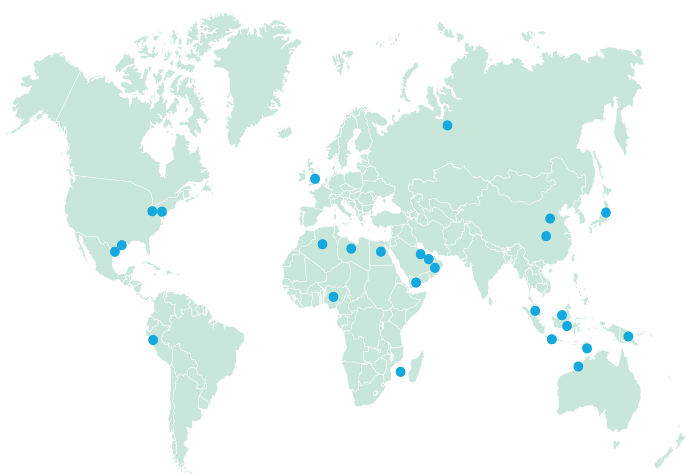
Timing of both the Victorian and NSW LNG import projects have also been pushed back.

However, there has been some movement towards a decision on the Santos-operated coal-seam gas project in northwest New South Wales with up to 850 wells and which the Adelaide-based company said would be less expensive than LNG imports to meet gas shortages.

Santos said the Narrabri Gas Project (NGP) has been referred by the NSW Minister for Planning to the Independent Planning Commission (IPC) for determination.



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AUSTRALIAN PETROLEUM PRODUCTION ANNUAL AND LAST FIVE QUARTERS (MMBOE)							
MMboe	12 Months to:		Q4 2019	Q3 2019	Q2 2019	Q1 2019	Q4 2018
	Dec 2019	Dec 2018					
Conventional gas	155	147	38	42	40	35	36
LNG	711	628	185	185	178	163	176
CSG	255	238	66	65	63	62	60
Total Gas	909	818	233	240	229	207	222
Total Domestic Gas	198	190	48	56	51	44	46
Ethane	4	4	1	1	1	1	1
Oil	48	41	15	12	10	10	10
LPG	22	14	7	6	5	4	4
Condensate	88	61	23	24	23	18	18
Total	1071	938	278	284	269	240	255

Source: EnergyQuest

Steady upwards trajectory of Australian energy output from 2018 to 2019

The operator of the Gladstone LNG export plant in Queensland said that this was a landmark in the Australian independent approvals process.

The next step is for the NSW Department of Planning to complete its assessment report and provide the report to the IPC for its consideration.

The Minister has requested that the IPC hold public hearings and make a determination regarding the Narrabri Gas Project within 12 weeks of receiving the Department’s assessment report.

While coal seam gas has been extracted from wells in Queensland for more 20 years, the industry has stalled in New South Wales, whose state capital is Sydney.

The adjoining eastern Australian states are separated by a border near the Tweed River.

Vital

Santos Chief Executive Kevin Gallagher welcomed the referral, noting that a decision on whether or not Narrabri can proceed is vital for Santos to determine where it will invest in new natural gas developments to supply the East Coast gas market over the coming decade.

“If we can develop Narrabri gas, it will be the most competitively-priced gas for NSW customers, and it will always be cheaper than LNG imports, especially when gas prices are high in Asia,” said Gallagher.

NSW imports more than 95 percent of its gas from other states and as a result, NSW businesses are at a cost disadvantage compared to their peers elsewhere.

“Ours is a cyclical business and we must not lose sight of the fact that the current low price and market conditions are not permanent,” stated Gallagher.

“Demand, and with it, prices, will ultimately recover, and therefore, we

must continue to focus on how and when we need to develop future gas sources at the lowest possible cost of supply to increase competition,” he stated.

Santos is seeking approval to develop the Narrabri Gas Project, which has the potential to supply enough natural gas to meet up to half of NSW’s natural gas demand.

All in

Santos has committed 100 per cent of Narrabri gas to the domestic market.

Santos noted that in NSW more than one million family homes, 33,000 businesses and 300,000 jobs rely on natural gas as a source of energy.

The company explained that with the commercial and industrial sector currently making up almost 50 percent of total gas consumption in NSW, reliable and competitively-priced natural gas is essential for a strong NSW economy.

“We have applied the best science to the environmental impact statement

for Narrabri,” said Gallagher.

“We are confident that it will stand on its merits and that the project could be safely and sustainably developed to protect water resources and the environment. Santos will participate openly and transparently in the IPC process,” stated the CEO.

Santos is also advancing with a project in the Northern Territory linked to the Darwin LNG plant.

The company awarded contracts in early March 2020 to European firms for the supply and installation of subsea infrastructure for the Barossa natural gas field that will provide future feed-gas for the Darwin plant.

Contracts

Santos said these contract awards were the final commitment made prior to the final investment decision for the Barossa project.

The contract for the transport and installation of all the subsea umbilicals, risers, and flowlines, as well as the supply of the in-field flowlines, was awarded to European firm Subsea 7, while Aker Solutions of Norway will supply the umbilicals and National Oilwell Varco Denmark I/S will supply the flexible risers.

“These are the final major facilities contracts for Barossa as we get closer to pushing the button on the project’s development in the second quarter,” said Santos’s Gallagher.

“They follow the award of the floating production, storage and offloading (FPSO) unit, subsea wells and subsea production system, and gas export

pipeline tenders, with the contract for the drilling of the production wells to be awarded in the near future,” explained Gallagher.

Permits

“They represent the final stages of the front-end engineering design phase and give us greater certainty over cost and schedule for the Barossa development,” stated the CEO.

The Barossa project area encompasses petroleum permit NT-RL5 located in Commonwealth waters, 300 kilometres north of Darwin, offshore the Northern Territory.

The development concept consists of an FPSO, six subsea production wells, supporting in-field subsea infrastructure and a gas export pipeline tied into the existing Bayu-Undan-to-Darwin pipeline, supplying gas to Darwin LNG.

On 14th October 2019, Santos announced the acquisition of Australian assets from ConocoPhillips in northern Australia.

These included the Timor-Leste portfolio including its interests in Darwin LNG and the Bayu-Undan and Barossa gas fields.

Completion of the transaction and the planned sell-down to SK E&S of South Korea will leave Santos with increased stakes in these assets amounting to 43.4 percent for Darwin LNG, 43.4 percent for Bayu-Undan and 62.5 percent of the Barossa field.

Santos had said it was prepared to sell down equity in Barossa to a target ownership of 40-50 percent to achieve increased partner alignment. ■

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For the Record

AIR PRODUCTS, the US industrial gases and LNG equipment provider, said its joint venture in Saudi Arabia held a ceremonial ground-breaking to mark the start of work in building a world-class, fully-integrated industrial gases hub in the Jubail Industrial City. The significant investment by Air Products and local partner Qudra Energy, involves building, owning and operating a world-scale steam methane reformer (SMR) to produce hydrogen.

There will also be an air separation unit (ASU) to produce oxygen and nitrogen, hydrogen pressure swing adsorption (PSA) units to recover hydrogen from off-gases and a pipeline networks will be installed to connect and transport industrial gases to the broad refinery and chemical customer base in the region. Air Products, based in Lehigh Valley in Pennsylvania, conducts its industrial gases business alongside its provision of LNG equipment products such as the main cryogenic heat exchangers for plants and its proprietary propane pre-cooled mixed refrigerant liquefaction process. Most of the worldwide LNG production comes from Air Products technology and the company provides key equipment for the natural gas liquefaction process for large export plants, small and mid-sized plants and floating LNG facilities.

The company is also involved in Chinese projects such as the Lu'An gasification project. "It is an honor to be here and to witness the start of another world-scale project in the Kingdom," said Seifi Ghasemi, Chairman, President and Chief Executive of Air Products. "Air Products is leading the way in developing technologies and solutions that make a difference for our world," added the CEO. "These are our priorities and where we are focused. In collaboration with the Royal Commission, this investment in Jubail demonstrates that focus and is another example where we can bring Air Products' full suite of capabilities in support of sustainable energy and chemicals production to the Kingdom of Saudi Arabia," explained Ghasemi. Samir Serhan, Chairman of the Air Products Saudi venture and Executive Vice

President for Air Products said the investment in Jubail is a continuation of operational leadership for large-scale energy projects throughout the Middle East region. "This mega-project again showcases the core strengths and capabilities we bring to support the creation of a world-leading downstream sector in Saudi Arabia," added Serhan. Mohammad A. Abunayyan, Vice Chairman of Air Products Qudra and Chairman of Vision Invest and Qudra Energy, said that the venture continues to demonstrate its commitment to the Kingdom of Saudi Arabia. "We at Qudra Energy are proud of our partnership with Air Products, and we look forward to this and other investments to be undertaken through Air Products Qudra in the near future," stated Abunayyan.

Air Products said that when fully built in 2023, the industrial gases hub will reliably serve the continued growth of Jubail Industrial City and support the growing prosperity of the Kingdom of Saudi Arabia. It will also enable Jubail to achieve higher values for off-gases and introduce new technologies to convert low-value feedstocks into high-value products. The SMR hydrogen production plant to be built, owned and operated by Air Products Qudra, will match the largest ever built by Air Products. The plant, which will serve refineries and petrochemical industries to fulfil the growing demand in the Eastern Region of Saudi Arabia. "The Jubail facility will include an ASU and PSAs and the location will serve as the pipeline hub for industrial gases to be supplied to individual customer connections in the region," said the partners. The investment includes building the second hydrogen fueling station in Saudi Arabia at the site. Saudi Aramco, the world's largest oil production company, and Air Products inaugurated the first hydrogen fueling station in Saudi Arabia at Air Products' new Technology Center in the Dhahran Techno Valley Science Park in June 2019.

BAKER HUGHES Company, the US energy services and LNG equipment supplier, has signed an agreement with Oman LNG for the turbomachinery scope as part of a de-bottlenecking project in the Arabian Peninsula nation. The Omani facilities export to Japan, South Korea and the spot market and comprise the amalgamated three liquefaction Trains of Oman LNG and Qalhat LNG, now producing more than 10 million tonnes per annum. The de-bottlenecking project,

whereby better output can be achieved by fixing inefficiencies, both technical and operational, is expected to increase output to 11.4 MTPA. "This project truly exemplifies the value of legacy partnerships. The opportunity for this seminal de-bottlenecking project grew from our more than 16-year relationship serving Oman LNG's turbomachinery fleet with our equipment and employing top-of-the-line LNG technology and solutions," said Mokhtar Fawaz, Vice President of Turbomachinery & Process Solutions at Baker Hughes.

Under the terms of the deal, Baker Hughes will supply the new helper motors, variable-frequency drives and deliver the engineering, procurement and construction (EPC) for the machinery part of the project. The de-bottlenecking will be completed over the next two years, with the first Train completion by the end of 2020, followed by the second Train in 2021 and the third Train by 2022. "The ambitious de-bottlenecking project is very important for our company," said Harib Al Kitani, Chief Executive of Oman LNG. "We have partnered in this initiative with organisations such as Baker Hughes as they have proper execution, integration and ensure flawless project delivery while sharing similar safety values as ours," added Al Kitani. KBR, the US engineering company, was awarded the front-end engineering and design contract by Oman LNG for the debottlenecking in May 2019.

The Sultanate has revitalised its LNG production after the Khazzan natural gas discovery by BP and the plants near the port of Sur have been at near nameplate capacity since 2017. The three Trains had previously suffered from a lack of feed-gas as supplies were diverted to fill domestic gas shortages. The Omani government allocates Oman LNG feed-gas supplies from various gas fields and the Khazzan field production has ended all resource concerns for the near future. KBR's role in the project is to act as an extension to Oman LNG's project team and help manage the overall execution of the de-bottlenecking efforts. The US company says its contract underpins Oman's commitment to knowledge-sharing and boosting staff competency in dealing with such complex projects.

BURCKHARDT Compression, whose LNG offerings include the Laby brand of compressors and boil-off gas solutions, said it signed a five-year service agreement covering nine LNG carriers

with a total of 12 Laby-GI Compressors onboard. All nine LNG carriers are fitted with two-stroke, slow-speed and electronically-controlled, gas-injection M-type (ME-GI) engines and equipped with Laby-GI Compressors for boil-off gas management. Burckhardt said these service agreements marked a major landmark in the Winterthur, Switzerland-based company's push to offer lifecycle solutions tailored to customer needs.

The new long-term service agreement (LTSA) will bring considerable added value to the customer's operation, such as improved lifecycle costs, operational efficiency and accurate preventive maintenance. "This LTSA is a clear expression of our customer's long-term confidence in our ability to deliver reliable, tangible value to their business," said Rainer Dübi, President of the Burckhardt Compression Services Division. "We look forward to deepening our partnership over time," added Dübi. The scope of the LTSA covers scheduled maintenance parts of the compressors, dedicated supervision, preventive maintenance via remote diagnostics, field services, and project management over a period of five years. Compressor maintenance will be carried out during vessel operations for maximum efficiency.

Burckhardt said in November 2019 that it had acquired a US field services firm, the Arkos Group, by purchasing the 60 percent of Arkos it did not already own. The Arkos workforce numbers 250 employees. Burckhardt initially acquired a 40 percent interest in Arkos Group in December 2015. Arkos Field Services and Burckhardt will aim to be independent one-stop providers for equipment and service in the upstream, midstream and downstream sectors.

CHART Industries, the US liquefied natural gas and industrial gases equipment supplier, has signed a letter of cooperation with ExxonMobil India LNG Ltd, an affiliate of the US major, and Indian Oil Corp. to focus on delivering LNG by Indian roads, railroads and waterways to spread gas use in the absence of physical pipelines. The accord upgrades a previous Memorandum of Understanding between Chart in Indian Oil to promote the development of the LNG market in India. It stated that the companies would focus on modular liquefaction, regasification applications, LNG bunkering, fueling stations and alternative LNG mobile transportation including ISO containers.

Chart said the Letter of Cooperation expanded the reach and potential scale within a significantly growing country that has committed to clean energy options. “We believe this collaboration with ExxonMobil, a major LNG supplier with a local presence in India, coupled with our ongoing work with IOCL will accelerate India’s ability to offer a cleaner energy solution within the growing cities and networks,” said Jill Evanko, Chart’s President and Chief Executive. “We are excited to offer our cryogenic equipment to support what each party in this collaboration believes will accelerate clean energy progress while doing so with localized equipment manufacturing in India,” added the Chart CEO.

CHENIERE Energy, the leading US LNG export company through its Sabine Pass plant in Louisiana and the Corpus Christi facility in Texas, reported annual revenues approaching \$10 billion and more than 400 cargo shipments even amid the industry’s current short-term headwinds. For the year, revenues were 22 percent higher at \$9.73Bln versus \$7.98Bln in 2018. Cheniere shipped 429 cargoes in 2019, a 57 percent increase on the 273 shipments that departed in 2018. Cheniere said fourth-quarter revenues jumped 26 percent to \$3.00Bln compared with \$2.38Bln the same three months of 2018. Annual net income soared 38 percent to \$648M compared with \$471M in 2018.

“As of February 21, 2020, over 1,000 cumulative LNG cargoes totaling over 70 million tonnes of LNG have been produced, loaded and exported from our liquefaction projects,” stated the Houston, Texas-based company, referring to the February 2016 commercial start-up of Sabine Pass. Fourth-quarter net income was \$939M versus \$67M in the same three months of 2018. Cargo departures from Sabine Pass and Corpus Christi in the three months amounted to 130 versus 80 in the fourth quarter of 2018. Sabine Pass currently has five processing Trains on stream with nameplate capacity of 22.5 million tonnes per annum and the second Train at Corpus Christi also came on stream in 2019.

“It was an incredible year for Cheniere as we achieved significant milestones in securing our growth, exhibiting execution and operating excellence, demonstrating capital discipline, and further solidifying our position as a global leader in LNG,” said Jack Fusco, Cheniere’s President and Chief Executive. “It was highlighted by

reaching a positive final investment decision (FID) on Train 6 at Sabine Pass, achieving major commercial and regulatory milestones for the Corpus Christi Stage 3 project, launching our capital allocation plan, and placing three Trains into service within budget and on average more than nine months ahead of schedule,” added the CEO. “Our focus on execution and operational excellence enabled us to increase our run-rate LNG production and financial guidance,” said Fusco. “We are laser-focused on delivering on our promises to our customers and stakeholders in 2020, despite some short-term LNG market headwinds,” stated the CEO. “Today, we are reconfirming our 2020 guidance of Consolidated Adjusted EBITDA of \$3.8 to \$4.1 billion, and Distributable Cash Flow of \$1.0 to \$1.3 billion,” added Fusco.

Cheniere’s plant developments are continuing with the construction of Train 3 at Corpus Christi and Train 6 at Sabine Pass. During the fourth quarter, the company received regulatory permission to proceed with developing what it calls its Stage 3 project comprising seven midscale liquefaction Trains adjacent to the Corpus Christi project, each with an expected nominal production capacity of around 1.4 MTPA of LNG. The total expected output of the seven midscale Trains is around 9.5 MTPA. Cheniere noted that total margins for the three-month and 12-month periods of 2019 increased primarily due to additional volumes of LNG recognized in income primarily due to additional Trains in operation and increased net gain from changes in fair value of commodity derivatives. “During the 12 months, this increase was partially offset by decreased margin per MMBtu of LNG recognized in income primarily as a result of decreased pricing on LNG sold, partially offset by decreased cost of natural gas feedstock related to our LNG sales,” the company explained. Operating costs and expenses also rose as result of additional Trains in operation.

EGYPT is bringing the Damietta LNG plant back into operation. Italian energy company Eni has signed a series of agreements with the government of Egypt and state-owned companies to prepare for the re-opening of the nation’s Damietta liquefaction plant by June 2020. Eni said the accords were signed with Egyptian General Petroleum Corp. (EGPC), the Egyptian Natural Gas Holding Company (EGAS) and the

Spanish company Naturgy, formerly Gas Natural Fenosa. The owner of the liquefaction plant, a joint venture called Segas, is 40 percent-owned by Eni through Union Fenosa Gas (50 percent Eni and 50 percent Naturgy). The plant has a nameplate capacity of 7.56 billion cubic metres of gas per annum (5.5 million tonnes of LNG), but has been idle since November 2012 when Egypt suffered natural gas shortages.

Rather than setting aside feed-gas for LNG exports, the Egyptian government had to meet rising domestic natural gas demand.

Since those days, which Egypt became an LNG importer with two chartered floating storage and regasification units (FSRUs) at Ain Sokhna port in the Gulf of Suez, several natural gas discoveries were made.

Not least was the discovery by Eni of the huge Zohr gas field in the East Mediterranean that helped transform the Arab nation’s LNG and domestic gas fortunes.

“Thanks to the fast time to market of Eni’s new natural gas discoveries, especially the ones in the Zohr and Nooros fields, Egypt has regained its full capacity to meet domestic demand and can allocate surplus production for export through its LNG plants,” said Eni.

In addition to Damietta LNG, Egypt has a second export plant, the Idku facility operated by Royal Dutch Shell and which has been back in commercial operation since 2017.

Eni said the agreements just signed by the Egyptian energy companies and the various parties mean an amicable resolution of the disputes over Union Fenosa Gas and its corporate restructuring.

Its assets will be divided between the shareholders Eni and Naturgy.

In particular, the participation of Union Fenosa Gas in the Damietta plant (80 percent) will be transferred 50 percent to Eni and 30 percent to EGAS.

Eni explained that the resulting shareholding of Segas would therefore be Eni 50 percent, EGAS 40 percent and EGPC 10 percent.

The Italian company would also take over the contract for the purchase of natural gas for the plant and would receive corresponding liquefaction rights, thus increasing the volumes of LNG in its portfolio by 3.78 billion cubic metres per year.

Eni said these volumes would be available on a free-on-board (FOB) with no destination restrictions.

“The agreement is of primary relevance for all the parties involved and resolves all pending disputes,” said Eni.

“In particular, Egypt continues along the path of valorization of the important energy resources developed in the country by Eni and reactivates a strategic asset, while Eni completes an important reorganization of its portfolio in the Mediterranean area,” it added.

ENERGY TRANSFER, the US pipeline owner and shareholder with Royal Dutch Shell in the Lake Charles liquefied natural gas export project, reported solid fourth-quarter results as the LNG venture makes more progress. The Dallas, Texas-based company said fourth-quarter net income attributable to partners amounted to \$1.01 billion, primarily due to higher operating income. It reported adjusted gross earnings of \$2.81 billion, up 5 percent from the fourth quarter of 2018. Energy Transfer said that among the quarterly highlights was the announcement in December 2019 with Shell US LNG of a comprehensive commercial tender package for engineering, procurement and construction contractors to submit final commercial bids.

“The proposed Lake Charles LNG liquefaction project being jointly developed by Energy Transfer and Shell on a 50-50 basis would modify Energy Transfer’s existing LNG import facility in Lake Charles, Louisiana to add LNG liquefaction capacity of 16.45 million tonnes per annum for export to global markets,” the company explained. Energy Transfer also noted that in October 2019 that the Permian Express pipeline expansion went into full service.

The Lake Charles facility was the longest-serving US import terminal before the shale-gas boom and previously imported cargoes from Trinidad and Equatorial Guinea. Under the transformation, Lake Charles will become an export facility and the successful EPC bidder is expected to be chosen after the second quarter of 2020. The commercial tender focused on the technical scope of the project, specifically verifications of the engineering and design of the liquefaction facility. Energy Transfer sees the Lake Charles project would capitalizes on “repurposing” the existing brownfield regas assets to achieve cost savings in the construction of the liquefaction facility.

It added that the project would also benefit from the unique strength of Energy Transfer as a leading natural gas

pipeline operator with extensive connectivity to the Lake Charles facility. Energy Transfer and Shell have signed a framework agreement designating Shell as the project leader and as construction manager and operator of Lake Charles LNG. The Federal Energy Regulatory Commission has authorized a deadline for the Lake Charles plant to be completed by mid-December 2025. Shell gained its stake in the Lake Charles facility from its takeover in 2015 of BG Group of the UK. Energy Transfer began in 1995 as a small intra-state natural gas pipeline operator and is now one of the largest energy infrastructure firms in the US. Lake Charles would be Shell's largest liquefaction foothold in North America, rivalling its LNG Canada joint venture in the province of British Columbia.

FIRST GEN Corp. of the Philippines plans fast-track the LNG and power hub near Batangas City with the interim use of a floating storage and regasification unit to be able to receive LNG as early as the third quarter of 2022 and guarantee energy security for the capital Manila. First Gen said in a statement to the Philippines Stock Exchange that it had submitted an application to the Department of Energy to start construction in May 2020. The company is partnered by Tokyo Gas in jointly developing the LNG hub in Batangas province to meet the nation's growing gas-fired power needs. The only other completed regasification facility in the Philippines is at Pagbilao in Quezon province where Australia-listed Energy World Corp. has a facility linked to a power project that has not yet begun imports. First Gen said its work start-up on the LNG terminal project and infrastructure was based on a Notice to Proceed granted by the DOE in March 2019.

First Gen Chairman and Chief Executive Federico Lopez now intends to fast-track the project. The Batangas LNG and power hub has been previously declared by the Energy Investment Coordinating Council (EICC) through the DOE as an "Energy Project of National Significance". The company has already completed pre-development work to make the site construction-ready. "First Gen plans construction of an interim offshore LNG terminal within the First Gen Clean Energy Complex in Batangas City consisting of construction works necessary to enable multiple-use by large and small-scale LNG vessels of an

onshore gas receiving facility," said the company. "Once completed, the project will allow First Gen to be able to bring in a Floating Storage and Regasification Unit (FSRU) on an interim basis and thus accelerate FGEN LNG's ability to introduce LNG to the Philippines," added the PSE statement.

"This innovation can readily serve the natural gas requirements of existing and future gas-fired power plants of third parties and First Gen affiliates, and bring the country closer to its goals of energy security, expanded energy access and a low-carbon future," said First Gen. "First Gen anticipates that it will be able to commence construction of the project as early as May in order to be able to receive LNG as early as the third quarter of 2022," explained the company. First Gen said it believed that the LNG hub project would play a critical role in ensuring the energy security of the Luzon Grid and Manila. "This will be necessary particularly as the indigenous Malampaya gas resource (offshore) are expected to be less reliable in producing and providing sufficient fuel supply for the country's existing gas-fired power plants, and even less so for additional gas-fired power plants," the company explained.

"The entry of LNG will encourage new gas-fired power plant developments and encourage industry and transport to replace polluting fuels with natural gas," stated First Gen. The First Gen-Tokyo Gas project is on a large scale and will help guarantee supplies for First Gen's four gas-fired power plants with total capacity of about 2,000 megawatts, all of them in Batangas province. The project has estimated costs of at least US\$1 billion. In September 2019, the company announced a partnership with Japan's JGC Corp., which will handle the engineering, procurement and construction (EPC) of the Batangas City project. First Gen said it expected the continuing reduction in gas supply from the Malampaya gas field up to the expiration of contracts by 2024.

FLEX LNG, the Norwegian-listed company with a fleet of six carriers and seven others under construction and with controlling interests held by shipping magnate John Fredriksen, reported a fourth-quarter surge in net income and revenues. Flex reported revenues of \$52.0 million for the fourth quarter of 2019, compared with \$29.8M for the third quarter and \$36.1M for the fourth quarter of 2018. Net income was \$23.9M

for the fourth quarter versus \$500,000 for the previous three months and \$15.2M for the fourth quarter of 2018.

"Lower than expected tonne-mile growth due to muted US-Asia trade and limited arbitrage opportunities has been a challenge for the LNG freight market," said Flex.

"In spite of the lower than expected tonne-mile growth, LNG freight rates performed well in the fourth quarter, suggesting that the recent years fleet growth to a large degree has been absorbed by the market," the company added.

"The glut of liquefaction volumes continues to affect LNG prices, with the average Asian benchmark prices (JKM) averaging \$5.4 per million British thermal units in the fourth quarter compared to \$9.1 per MMBtu the year before," stated Flex.

Flex stated the average the Time Charter Equivalent (TCE) rate was \$94,000 per day for the fourth quarter compared with \$58,222 per day for the third quarter.

The company in November received firm commitments from a syndicate of 11 banks and the Export-Import Bank of Korea (Kexim) for a \$629 million financing for five of the newbuilds scheduled for delivery in 2020.

Flex also entered into a long-term time-charter with Clearlake Shipping, a subsidiary of the commodities firm Gunvor, for the newbuild "Flex Artemis". The period under the charter is up to 10 years, whereby the first five years are firm.

Then in December, Flex entered into a 12-month time-charter with Spanish utility Endesa for the vessel "Flex Ranger".

Flex noted that it had also strengthened its commercial team with the appointment of Ben Martin as Chief Commercial Officer, who will join Flex LNG on or about April 1, 2020.

"The year was eventful and productive year for Flex LNG," said Oystein M Kalleklev, Chief Executive of Flex LNG Management AS.

"We continue to build our organization with exceptional people, most recently with today's announcement of the recruitment of Ben Martin who will join us from Trafigura," added Kalleklev.

"Furthermore, we are taking a greater responsibility of the management of our fleet with Flex LNG Fleet Management currently managing four of our six vessels on the water," explained the CEO.

"Ship management continues to perform excellently with no loss time

injuries recorded for the second year in a row," he added.

Flex stated that due to the uncertainty and disruptions created by the coronavirus and associated low gas prices, the company had elected to be cautious by maintaining a \$0.10 dividend for the fourth quarter, and for the time being rather preserve liquidity, which stood at close to \$130M at year-end.

"While the freight and gas markets are currently challenging, LNG continues to be a long-term story with expected annual growth of around 3 to 4 percent for the next two decades as natural gas, and to a greater extent LNG, is the transition fuel for a cleaner and more sustainable future," said the company.

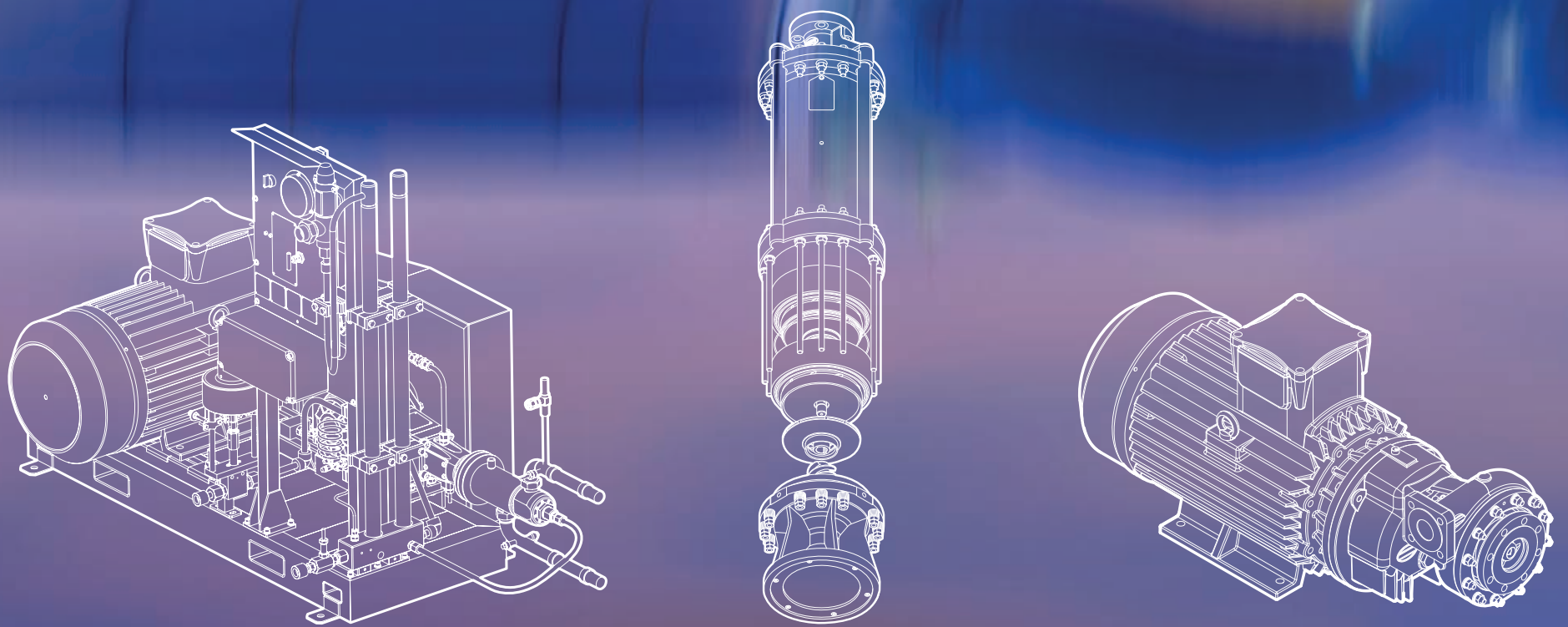
GTT, the French technology firm for designs of systems for the maritime transportation and storage of liquefied natural gas, has acquired Marorka, a smart-shipping company based in Iceland with services sought by the LNG industry. The company said it bought Marorka from its owners and management team for an undisclosed sum. "The company designs maritime energy monitoring and optimization systems for vessels, allowing them to reduce their environmental footprint," said Paris-based GTT. "The company's systems have been installed on more than 600 vessels," it added.

GTT noted that the shipping industry had started its environmental transition in January 2020, when a new International Maritime Organization regulation entered into force, imposing significant reductions in sulphur-oxide emissions. The IMO has furthermore announced a long-term "low-carbon" strategy, including ambitious decarbonisation targets. "In addition to using LNG as a marine fuel, achieving those objectives will necessarily require smart software technologies and operational data analysis," explained GTT. GTT said that Marorka has had more than 17 years of experience and developed a recognized technical platform and value-added applications.

GTT said Marorka was a good technical, commercial and geographical complement to Ascenz, GTT's subsidiary based in Singapore, and represented a new milestone in the Group's digital strategy. The previous owners would continue to manage Marorka and contribute their know-how and experience to the Group's digital strategy. "We are glad to become part of the GTT group and joining forces with Ascenz and

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GTT experts will boost our presence and our ability to satisfy customer needs,” said Darri Gunnarsson, Chief Executive of Marorka. “We share the same vision on smart shipping and its increasing contribution to the improvement of shipping’s operational and environmental performance,” added Gunnarsson. Philippe Berterottière, Chairman and Chief Executive of GTT, said he was happy to welcome Marorka to the GTT Group. “This acquisition is an important new step in GTT’s digital roadmap,” explained Berterottière. “Smart shipping is an essential component to allow the shipping industry to reduce its environmental footprint,” added the GTT CEO. “LNG shipping players are also increasingly seeking digital solutions to optimise their operations and will benefit from an even more compelling service offering from GTT thanks to this acquisition,” added Berterottière. GTT said the acquisition was funded in cash and would have no significant impact on financial structure of the group, which is listed on the Paris Euronext stock exchange.

HOEGH LNG, the Norwegian project company and fleet owner, said that coronavirus outbreak in China has not had any direct effect on the company’s revenues nor operations, including its floating storage and regasification unit deployed at Tianjin port to supply Beijing. Höegh outlined the situation as it reported a total income of \$94.2 million for the fourth quarter compared with \$82.2M for the third quarter and \$122.3M for the fourth quarter of 2018. The company’s “Höegh Esperanza” resumed FSRU operations in Tianjin port in northeast China in mid-November 2019 under charter to China National Offshore Oil Corp. “It continues to perform according to contract,” said Höegh.

“However, it seems clear that the outbreak has already impacted the flow of LNG into the Chinese market, and that this affects the market for LNG carriers, since in recent weeks rates have softened considerably compared to previous levels,” added the company. The first cargo was received in Tianjin on 18 November and FSRU mode was successfully entered with the send-out of natural gas. “The outlook for our industry is optimistic since global LNG trade continues to grow,” said President and Chief Executive Sveinung J.S. Stohle. “The competitive LNG price clearly has a positive effect on LNG demand, supporting the demand for additional import facilities, where FSRUs

have an advantage due to the short time to market,” he added. “Looking forward we are obviously concerned with the potential effects of the coronavirus outbreak, but this has not had any direct effect on HLNG’s personnel, operations or revenues,” he stated.

Höegh also noted that it had reached a settlement of a boil-off claim with French major Total. “In February 2020, Höegh LNG and Total reached a commercial agreement to settle the boil-off dispute regarding the ‘Neptune’ and ‘Cape Ann’ (FSRUs),” said the company. “The settlement amount, which will be paid by the two joint venture companies owning the vessels, is in line with the provision made in 2017 and is subject to executing final binding agreements between the parties,” it added. Höegh said that it had been selected or has exclusivity for three FSRU contracts, including two projects in Australia and a third in a south Asian market. In addition, the company is involved in several planned projects, which include two formal tender processes and a number of bilateral negotiations.

For the full year, Höegh reported \$336.1M in total revenues, down from the \$352.7M recorded in 2018. “The decrease is mainly caused by the \$40.2M one-off revenue recognition of remaining contractual commitments from Egas (in Egypt) under the amended contract structure,” said Höegh. Höegh also took an impairment charge of \$1.6M related to regasification equipment in stock. In its Australian contracts, Höegh signed a conditional 10-year FSRU charter party with AGL Energy for its LNG import facility at Crib Point in the state of Victoria in southern Australia. In a second project, the FSRU charter party with Australia Industrial Energy for its Port Kembla Gas Terminal in New South Wales is close to completion, and the project reports good progress with respect to the other contracts it needs to complete before taking a final investment decision.

IENOVA, the Mexican subsidiary of California-based utility Sempra Energy and developer of the Costa Azul liquefied natural export venture on the Pacific Coast of Mexico, reported a rise in fourth-quarter earnings as it pursues Mexican pipeline projects and LNG feed-gas resources from the US. IEnova, or Infraestructura Energetica Nova SA as it is officially known, said fourth-quarter gross earnings increased 22 percent to \$253.4 million compared with the

\$207.9M posted in the same three months of 2018. “The increase of \$45.5M was mainly due to the start of operations of the South Texas-Tuxpan pipeline, partially offset by the revenue deferment at the Guaymas-El Oro gas pipeline,” added the company.

IEnova’s South Texas-Tuxpan pipeline is a crucial outlet for US natural gas and fundamental to maintaining a reliable gas service in the southeast of Mexico with 2.6 billion cubic feet per day of capacity. The pipeline crosses part of the Gulf of Mexico from Texas and was built at a cost of \$2.5 billion. It is owned by IEnova and Canadian pipeline company TC Energy. IEnova reported adjusted earnings for all of 2019 of \$938.2M, up 7 percent compared with the \$876.4M logged in 2018.

The Costa Azul liquefaction and LNG export project received US authorizations for natural gas to be exported to Mexico and re-exported to Non-FTA countries. Costa Azul will have liquefaction capability constructed in two phases. The first part of the transformation of the plant will see the building of a single liquefaction Train to be located adjacent to the existing terminal and with capacity for 2.4 MTPA of exports. The Mexican-based subsidiary of Sempra, owner of the Cameron LNG export plant in Louisiana, has already signed three Heads of Agreements with French major Total and Japanese companies Mitsui & Co. and Tokyo Gas for the full export capacity of Phase 1 development at Costa Azul. IEnova also noted that in 2019, its investments totaled \$655.0M, primarily related to the solar and liquid terminal projects and funding of \$49.1M for Costa Azul LNG and \$15.8M in the South Texas-Tuxpan pipeline.

The South Texas-Tuxpan pipeline is inter-connected to the Valley Crossing Pipeline in Texas completed by Enbridge Inc., another Canadian company like TC Energy and based in Calgary. The 168-mile Valley Crossing pipeline runs from the Agua Dulce hub in Texas to the Gulf of Mexico east of the port of Brownsville. IEnova add that it entered into a revolving credit agreement with the Bank of Nova Scotia in Canada for up to \$100M. IEnova parent company Sempra has a strategy to achieve around 45 MTPA of LNG production by the mid-2020s through three plants, the Cameron facility at Hackberry in Louisiana that came on stream in 2019, the Port Arthur plant in Texas and the Costa Azul facility. Costa Azul was the first LNG import

terminal on North America's West Coast and was built in 2008 about 15 miles north of Ensenada in the Mexican state of Baja California.

KATE ENERGY Holdings Inc., the Canadian company based in Calgary, has entered into a long-term master services agreement with Ferus Natural Gas Fuels Inc. to secure liquefied natural gas from the Dawson Creek liquefaction facility in northeast British Columbia. Kate Energy said the agreement would provide it and Ferus NGF clients, including Yukon Energy Corp. with a cost-effective fuel solution delivered from Canada's northernmost LNG facility. Ferus NGF and Yukon Energy entered into a four-year contract for the supply and delivery of LNG for power generation in Whitehorse, in the Yukon territory. “In effect since January 1, 2020, the contract was the result of a competitive tender process in the fall of 2019 that saw Kate Energy and Ferus NGF enter a ‘co-bid’ led by Ferus NGF,” said in a statement.

LNG as the cleanest fossil fuel is being sought by companies using diesel for power and other heavy machinery in isolated areas. “There is ever-increasing need for remote communities and industrial operations to replace diesel and other distillates as power and heating fuels,” said Thomas Elwell, Chief Executive of Kate Energy. Elwell explained that the collaboration between Kate Energy and Ferus NGF showcases how uniquely positioned, Western Canadian energy companies can work together to service the ongoing needs of larger communities in an efficient and effective manner. “This is an important step toward providing a cleaner, more cost-effective power and heating solution to communities and industrial operations in remote Canada for years to come,” added Elwell. “As an early adopter, Yukon Energy proves that domestically distributed LNG and power generation can be a successful and sustainable model to power the North,” he stated.

NEW FORTRESS Energy, the developer of liquefied natural gas and power projects in Latin America and the Caribbean, narrowed its fourth-quarter losses while revenues rose as it embarked on new LNG import projects in Nicaragua and Mexico and was set to bring a venture on stream in Puerto Rico. New Fortress said its fourth-quarter losses amounted to \$38.4 million compared with \$54.4M in the previous quarter ending in

September 2019. Revenues during the three months increased to \$69.8M from \$49.7M in the previous three months. “The company had its first quarter of positive operating margin as we continue to transform from a development company to an operating business,” said the earnings statement. Annual total revenues continued to rise, reaching \$189.1M in 2019, from \$112.3M in 2018 and \$97.2M in 2017.

The company said income increased from the third quarter primarily due to revenue generated from the Old Harbour terminal. There were increases in volumes sold to industrial end-users in Jamaica and additional sales at the Caribbean nation’s Montego Bay LNG terminal. “The increase was also due to the recognition of revenue of \$13.2M for development services in the fourth quarter, primarily attributable to the conversion of our customer’s infrastructure in Puerto Rico,” said New Fortress. “The decrease in net loss resulted from a positive operating margin in the fourth quarter as well as decreases in selling, general and administrative (SG&A) expenses,” said the company. New Frontier said it was now consistently delivering about 100 megawatts to the Jamaican power grid from the combined heat-and-power cogeneration station at the Jamalco bauxite plant.

The company said the Puerto Rico facility was also being commissioned with the floating storage vessel having arrived on February 24, 2020. Among other quarterly highlights, the La Paz import terminal proposed for the Pacific Coast of Mexico received all necessary permits for the onshore construction of the associated power plant which is expected to produce about 135MW. The New York-based company also executed a 25-year, 300MW Public-Private Partnership with an 85 percent take-or-pay requirement in Nicaragua. New Frontier said it additionally concluded a long-term LNG supply agreement to secure significant volumes to supply certain of its committed volumes for five projects at historically low LNG prices.

“We expect to be able to continue to capitalize on the depressed LNG market to both expand and secure long-term operating margins,” said the company. In its Mexico project over the past months, marine work at the facility Baja California Sur has been underway at the site. New Fortress said all the necessary permits obtained for onshore construction of the power plant, additional equipment,

materials and workers will be deployed to the site to expedite completion of the project. It also recently signed an agreement to supply LNG to Nicaragua and also signed a 25-year power purchase agreement with two of Nicaragua’s main electricity distribution companies. The Mexican facility is being constructed with power generation to provide low-cost electricity and truck loading bays for the supply of LNG to local hotel and industrial customers. The New Fortress company is led by Wes Edens, co-founder of the private equity group Fortress Investment. The company made its debut on the Nasdaq global exchange in January 2019 after an initial public offering. Its main corporate focus now is introducing LNG to markets that lack access to the fuel.

NEW FORTRESS said it was progressing with construction of a Mexican liquefied natural gas import and regasification terminal in the port of Pichilingue on the Pacific Coast. Over the past months, marine work at the facility in the state of Baja California Sur has been underway at the site on the northwest Coast of Mexico. New Fortress said all the necessary permits obtained for onshore construction of the power plant, additional equipment, materials and workers will be deployed to the site to expedite completion of the project. “The BCS (State) Government is in full readiness to achieve an energy transition that promotes new public and private investments in this sector, under a sustainability scheme that helps to avoid harming the environment,” said Governor Carlos Mendoza Davis. New Fortress is the owner of LNG facilities in Florida and in Jamaica and projects in Puerto Rico. The Mexican facility is being constructed with power generation to provide low-cost electricity and truck loading bays for the supply of LNG to local hotel and industrial customers. “With the project well underway, we are closer to introducing more affordable and cleaner energy for Baja California Sur,” said CEO Edens.

The terminal is in the same region of Mexico as the Costa Azul terminal, owned by a subsidiary of San Diego, California-based Sempra Energy and which is now being transformed into and export plant. “We have witnessed how LNG supply can become a catalyst for energy diversification and economic development and look forward to seeing similar results,” add Edens. The company said it also provided opportunities for job

creation, training of a new, more specialized workforce, economic development and improved environmental management. “The LNG terminal at Pichilingue port is an important infrastructure project that will undoubtedly bring significant benefits to Baja California Sur,” said José López Soto, director of Port Authority Administration of Baja California Sur.

OIL SEARCH, the Papua New Guinea-focused oil and gas company listed in Australia, reported an 8 percent drop in net profits because of lower prices as Managing Director Peter Botten handed over to his successor while expressing hope that the delay in the PNG LNG expansion project was only temporary. The company said annual profits came to US\$312.4 million compared with US\$341.2M in 2018 after an 11 percent decline in realised oil and condensate prices and 5 percent lower LNG and gas prices, reflecting a weaker global energy market. However, revenue from Oil Search’s operations grew 3 percent in the year to US\$1.58 billion from US\$1.53Bln in the previous year. Botten now hands over control of Oil Search to the previously named new Managing Director, Keiran Wulff. The company confirmed that Botten had now stepped down from the leadership and from the board of directors and will depart from Oil Search on 25th August 2020. “This is my final report as Managing Director of Oil Search and I am extremely proud of the company’s achievements over the past 25 years,” said Botten. “While 2019 has proven to be a challenging year, I am confident that the new Managing Director, Dr Keiran Wulff, with the support of the Board and management team, has the skills and experience required to continue to lead the company to further success in both Papua New Guinea and Alaska,” added Botten.

Looking at the over-supplied global LNG market, Botten said that the company strategy to contract most of its excess PNG LNG volumes under medium-term Sale and Purchase Agreements “has proven to be very sensible and has protected the company’s earnings from weakness in LNG spot prices” earlier in 2019 and over the winter season. The two existing LNG Trains at the plant northwest of Port Moresby have a nominal capacity of 6.9 million tonnes per annum, though have consistently produced more and will be the site of any

future expansion. Three new liquefaction Trains are proposed in the now delayed plan, though the five Trains when operational would have capacity of nearly 20 MTPA and would give PNG a more substantial role as a regional producer. The onshore P’nyang gas field licence, controlled by PNG LNG plant operator ExxonMobil, also includes Australian-listed Santos as well as Oil Search and they have yet to reach agreement with the Government on the expansion terms. The Papua Gas Agreement is with holders of the onshore PNG Elk-Antelope gas field licence, led by Total and also including shareholders in the P’nyang field lease, ExxonMobil as well as Oil Search. Elk-Antelope onshore gas fields are covered by petroleum retention licence PRL15 and by the Papua Gas Agreement and the P’nyang onshore gas fields are in the PRL3 licence area of PNG. “We remain committed to the development of the three-Train integrated Papua LNG and P’nyang expansion projects in PNG, which we, and our partners, believe is in the best interests of all stakeholders, including the State and provincial governments, landowners and citizens of Papua New Guinea,” stated Botten. “The PRL 3 joint venture partners are aligned in wishing to achieve a fair and equitable agreement with the PNG Government for the P’nyang development, so we can progress into the front-end engineering and design phase,” explained the outgoing MD. “The recent COVID-19 outbreak has dampened short-term demand for LNG from China, but we expect this to be a temporary phenomenon,” said Botten. “We are confident in our ability to secure LNG offtake agreements once we resume discussions with potential Asian buyers, due to the attractiveness of LNG from PNG,” he stated.

SANTOS has awarded contracts to European firms for the supply and installation of subsea infrastructure for the Barossa natural gas field that will provide future feed-gas for the Darwin LNG export plant in the Northern Territory. Santos, operator of the Gladstone LNG plant in Queensland and with stakes in Darwin LNG and the Papua New Guinea plant, said these contract awards were the final commitment made prior to the final investment decision for the Barossa project.

The contract for the transport and installation of all the subsea umbilicals,

risers, and flowlines, as well as the supply of the in-field flowlines, was awarded to European firm Subsea 7, while Aker Solutions of Norway will supply the umbilicals and National Oilwell Varco Denmark I/S will supply the flexible risers. “These are the final major facilities contracts for Barossa as we get closer to pushing the button on the project’s development in the second quarter,” said Santos Chief Executive Kevin Gallagher.

“They follow the award of the floating production, storage and offloading (FPSO) unit, subsea wells and subsea production system, and gas export pipeline tenders, with the contract for the drilling of the production wells to be awarded in the near future,” explained Gallagher. “They represent the final stages of the front-end engineering design phase and give us greater certainty over cost and schedule for the Barossa development,” stated the CEO of the Adelaide-based company. The Barossa project area encompasses petroleum permit NT-RL5 located in Commonwealth waters, 300 kilometres north of Darwin, offshore the Northern Territory.

SEMPRA ENERGY, the California company operating the Cameron LNG export plant in Louisiana, has signed a fixed-price contract with US engineer Bechtel to construct its second Gulf Coast plant at Port Arthur in Texas to be backed by a subsidiary of Saudi Aramco, the largest oil producing company. Semptra’s engineering, procurement and construction (EPC) contract for the Port Arthur facility is part of its plan to be a major North American exporter of LNG, with a third facility being developed at Costa Azul on the Pacific Coast of Mexico, and with total overall volumes of more than 65 million tonnes per annum. “Building new export infrastructure in the US is critical to providing overseas markets with cleaner fuel alternatives,” said Jeffrey W. Martin, Chairman and Chief Executive of Semptra Energy. “Partnering with a world-class construction firm like Bechtel bolsters our execution plan for one of the world’s largest LNG development projects,” added Martin.

Bechtel’s Chairman and CEO Brendan Bechtel said he was honored and grateful that Semptra had chosen privately-held and San Francisco-based Bechtel as its trusted EPC partner. “Together, we will deliver an important, clean and sustainable energy source to the world while creating jobs and building economic

opportunities for the Gulf Coast community,” stated the Bechtel CEO. Semptra said that as part of the EPC contract, Bechtel would perform the detailed engineering, procurement, construction, commissioning, start-up, performance testing and operator training activities for the project. “The scope of the agreement also includes continuing pre-final investment decision engineering to better assure project cost and schedule certainty,” said Semptra. The Port Arthur LNG project is expected to initially include two liquefaction Trains, two storage tanks, a marine berth and associated loading facilities and related infrastructure for exports of 13.5 MTPA. The project site sits on nearly 3,000 acres of land along three miles of the Sabine-Neches waterway and has the potential to become one of the largest LNG export projects in North America, with expansion capabilities of up to eight liquefaction Trains and around 45 MTPA of capacity. “Port Arthur LNG plays an important role in Semptra’s goal of becoming one of North America’s largest developers of liquefaction-export infrastructure projects and we look forward to continuing to move the project forward,” added CEO Martin.

SINGAPORE company Atlantic, Gulf and Pacific (AG&P) has broken ground and started construction of infrastructure for what will be India’s eighth liquefied natural gas import terminal when it starts up in 2021 and only the second on the East Coast. AG&P said it would own and operate the facility to be sited at the Port of Karaikal on the Southeast Coast of India. It was first proposed in November 2017 and was originally expected to be commissioned in mid-2019. AG&P said the terminal was now scheduled to begin commercial operations by the fourth quarter of 2021.

Karaikal Port is south of Puducherry, one of the eight union territories of India and formed out of four territories of former French India. The terminal is south of the only operating East Coast terminal at Kamarajar Port, formerly known as Ennore, 25 kilometres north of Chennai in Tamil Nadu. The Karaikal import facility, which is being constructed on a 12-hectare site within the Karaikal Port, will have an initial capacity of 1 million tonnes per annum. The LNG project will feature a floating storage unit (FSU), which will be leased from 2021 through a long-term charter agreement with Abu Dhabi-based ADNOC Logistics

and Services. The main operating terminals on India’s West Coast are at Dahej, Hazira and Dabhol, near Mumbai. The newest terminal at Mundra is also now operational.

There is also a terminal at Kochi the southwest state of Kerala. The commissioning of the new Mundra terminal on the West Coast gave the nation its sixth facility. Another terminal at Jaigarh will be the seventh when it is completed in 2020 on the West Coast state of Maharashtra, while Karaikal will be the eighth. The other main addition to Indian capacity will be the expansion of Dahej by 2.5 MTPA, which should be completed during 2020. The latest terminal to start up at Mundra is co-owned by Gujarat State Petroleum Corp. and the Adani Group. Mundra is north of Mumbai and is designed with two storage tanks and capacity of 5 MTPA.

India imports about 250 cargoes a year, mainly from Qatar, the US, Russia, Australia and Africa and its LNG use is growing annually. AG&P said that the leasing of the FSU would help in offering an efficient solution at affordable prices at Karaikal Port. “With the addition of AG&P’s LNG import terminal, the Karaikal Port will become a gateway for the delivery of cleaner and lower-cost fuel to downstream demand centres that are unable to access natural gas today,” said the President of AG&P terminals and logistics Karthik Sathyamoorthy. “Our goal is to bring down the unit cost of regasification terminals for smaller volumes to make LNG commercially viable for scattered and smaller customers,” added Sathyamoorthy. The AG&P-owned Karaikal terminal will offer regasified LNG to power plants, and industrial and commercial customers within a radius of 300 kilometres. Additionally, the Karaikal terminal will serve gas firms that supply LNG and compressed natural gas for vehicles. AG&P believes the terminal will complement Indian Oil’s facility at Kamarajar Port and offer wider gas accessibility to Puducherry and Tamil Nadu and the East Coast in general.

TECHNIPFMC, the LNG and energy engineering company planning to soon separate into two companies, posted a fourth-quarter net loss of \$2.41 billion because of charges, though LNG project contract awards in 2019 soared to \$8 billion and more are expected even amid the current weak commodity prices. The Franco-US company said fourth quarter

impairment and other charges totaled \$2.26Bln for goodwill and fixed assets. “Separation costs, purchase price accounting adjustments and restructuring and other charges totaled \$52.5 million,” said TechnipFMC. However, fourth-quarter revenues jumped more than 12 percent to soared to \$3.72Bln from \$3.32Bln in 2018.

Annual revenues were \$13.41Bln, up 6.8 percent from the \$12.55Bln recorded in 2018. The annual net loss was \$2.41Bln versus \$1.92Bln in 2018. The earnings statement said that TechnipFMC and Technip Energies, the two new businesses, were well on track for completion of the split in the second quarter of 2020. The company said that onshore-offshore orders were up 76 percent and included the LNG contracts that amounted to \$8Bln. TechnipFMC’s total contract backlog came in at \$24.3Bln, an increase of 67 percent on 2018. TechnipFMC is one of the leading engineering, procurement and construction companies and 2019 awards included projects in the US, as well as the Russian Arctic LNG II project proposed for the Gydan Peninsula and the Mozambique LNG joint venture in southeast Africa.

“We achieved an unprecedented level of inbound in 2019, including over 50 percent order growth in Subsea,” said Doug Pferdehirt, Chairman and Chief Executive of TechnipFMC. “With this success, our backlog now stands at \$24Bln. Backlog grew across all segments, with onshore-Offshore increasing almost 90 percent when compared to the prior year,” added the CEO.

“Our success was driven by an acceleration in the market adoption of our new subsea technologies, our integrated subsea model (iEPCI™) and continued strength in both LNG and downstream project sanctioning,” stated Pferdehirt. TechnipFMC said in August 2019 that it had decided to spin off its European-based engineering and construction operations into a separate business, leaving the Houston-based half of the firm as a technology-focused equipment supplier to the oil and gas sector. The strategy is to reverse the 2017 merger of Technip of France and FMC Technologies of the US, a transaction valued at the time at \$20Bln as it created TechnipFMC as a fully-integrated subsea provider.

“For our onshore-offshore business, we remain confident that additional LNG projects will be sanctioned in the near-to-intermediate-term despite current

weakness in the commodity price,” said Pferdehirt. “The growth outlook for long-term demand requires this additional capacity. Beyond LNG, we continue to selectively pursue refining, petrochemical, and biofuel project opportunities,” he stated. Technip Energies (the spin-off) would have around 15,000 employees after the split and be one of the largest engineering and construction companies. The spin-off will be well positioned to capture LNG opportunities as a result of its project delivery model and track record. Technip Energies will be incorporated in the Netherlands with headquarters in Paris and listed on the Euronext Paris exchange. The remainder of TechnipFMC with around 22,000 employees would be a fully-integrated technology and services provider, continuing to drive energy development. TechnipFMC will remain incorporated in the UK with headquarters in Houston, Texas, and listed on both the New York Stock Exchange and the Euronext Paris exchange.

TELLURIAN Inc., the developer of Driftwood LNG project on the US Gulf Coast and whose executives were in India pitching for an investment by Indian company Petronet, posted a 20 percent increase in 2019 net losses as the development and marketing process continued. Tellurian reported an annual net loss of \$151.7 million, which was 21 percent more than the loss of \$125.7M reported in the previous year. The 2019 losses amounted to \$0.69 per basic or diluted share versus \$0.59 per share in 2018. Tellurian said in its statement that

it had cash at the end of 2019 amounting to \$68.5M compared with of \$183.6M at the end of 2018. Debts were reported as \$136.6M. “Tellurian secured equity partners for the Driftwood project, advanced engineering and site testing, and finalized critical permits, making Driftwood LNG shovel ready for 2020,” said President and Chief Executive Meg Gentle. “We plan to complete our financing in the coming months and begin construction on the largest privately funded energy infrastructure project in the United States,” stated the Tellurian CEO.

Tellurian and Petronet are negotiating an equity investment in the Driftwood project of up to \$2.5 billion. The plant is proposed for the west bank of the Calcasieu River, south of Lake Charles in Louisiana, and with output of just over 26 MTPA when the first cargo is shipping by around 2024. Tellurian noted in its earnings that it established partnership terms for the Driftwood project by executing final documents with a US subsidiary of French energy major Total for a \$500 million equity investment. Total also agreed to purchase 1 million tonnes of LNG and an additional 1.5 MTPA from Tellurian’s offtake volumes from Driftwood. An agreement was also put in place for Total to purchase about \$200M of Tellurian common stock, bringing its aggregate investment in the Tellurian portfolio to \$907M upon a final investment decision for Driftwood. Tellurian additionally received Federal Energy Regulatory Commission authorization for the Driftwood plant and the affiliated feed-gas pipeline. The Department of Energy then granted authorization to ship cargoes to non-free trade agreement countries. The FERC pre-filing process was also started for the Permian Global Access Pipeline, a 625-mile, 42-inch inter-state natural gas pipeline proposed from the Waha Hub in West Texas to near Lake Charles.

US President Donald Trump concluded his two-day visit to India in late February by issuing a joint statement with Indian Prime Minister Narendra Modi on a variety of issues, including future cooperation on liquefied natural gas as both leaders noted that the US-Indian energy relationship over the last four years had been worth \$20 billion. They said they welcomed growing links between the United States and India in trade and investment in hydrocarbons. “Through their Strategic Energy

Partnership, the United States and India are seeking to enhance energy security, expand energy and innovation linkages across respective energy sectors, bolster strategic alignment, and facilitate increased engagement between industry and other stakeholders,” they said.

Trump and Modi noted the potential for the US to meet India’s goal to diversify its import base for coking and metallurgical coal and natural gas. “We welcome recent commercial arrangements intended to accelerate access to LNG in the Indian market,” they added, in reference to the accord between US company Tellurian and state-owned Petronet LNG, the nation’s largest importer. They also referenced moves by ExxonMobil and others to advance with the provision of more LNG fuel use for transportation and small-scale distribution. “The US has indeed become a very important oil and gas source for India,” they said. “Over the last four years, our total energy trade volume is about \$20 billion,” added the statement. They also noted that they encouraged the Nuclear Power Corporation of India Limited and US company Westinghouse Electric to finalize the techno-commercial offer for the construction of six civil nuclear reactors in India at the earliest date. Westinghouse and the Indian nuclear power operator plan to build the 1,100 megawatts reactors in the southeast Indian state of Andhra Pradesh.

US Government forecasters have issued a new short-term energy outlook to take account of what it said was the second-largest daily oil price decline caused by the lack of an agreement between leading oil nations such as Saudi Arabia, Russia and other members of the Organization of Petroleum Exporting Countries. The Energy Information Administration delayed its March short-term outlook by 24 hours to incorporate recent significant global oil market developments. The report noted that on March 9, Brent North Sea crude oil front-month futures prices fell below \$35 a barrel, a 24 percent daily decline. “As a result of the outcome of the March 6 OPEC meeting, EIA’s forecast assumes that OPEC will target market share instead of a balanced global oil market,” stated the EIA. The report forecasts Brent crude oil prices will average \$43 a barrel in 2020, down from an average of \$64 a barrel in 2019.

The government body forecasts that Henry Hub natural gas spot prices will begin to rise in the second quarter of 2020

as US production declines and natural gas use for power generation increases the demand. “EIA expects prices to average \$2.22 per million British thermal units in the third quarter of 2020,” said the report. However, Henry Hub spot prices are seen averaging \$2.11 per MMBtu in 2020 and increasing in 2021, reaching an annual average of \$2.51 per MMBtu. In February, the Henry Hub natural gas spot price averaged \$1.91 per MMBtu. “Warmer-than-normal temperatures in February reduced demand for space heating and put downward pressure on prices,” it said.

US dry natural gas production set a record in 2019, averaging 92.2 billion cubic feet per day (Bcf/d). Although the EIA forecasts dry natural gas production will average 95.3 Bcf/d in 2020, a 3 percent increase from 2019, the report expects monthly production to generally decline through 2020, falling from an estimated 96.5 Bcf/d in February to 92.3 Bcf/d in December. “The falling production mostly occurs in the Appalachian and Permian regions,” stated the EIA. “In the Appalachian region, low natural gas prices are discouraging producers from engaging in natural gas-directed drilling, and in the Permian region, low oil prices reduce associated gas output from oil-directed wells,” explained the report. In 2021, the EIA forecasts dry natural gas production will rise from December 2020 levels in response to higher prices. Forecast dry natural gas production for 2021 averages 92.6 Bcf/d. The agency estimated that total US working natural gas in storage ended February at 2.1 trillion cubic feet (Tcf), 9 percent more than the five-year (2015-2019) average.

It forecasts that total working inventories will end March at 1.9 Tcf, 12 percent more than the five-year average. In the forecast, inventories rise by almost 2.1 Tcf during the April through October injection season to reach almost 4.0 Tcf on October 31. The EIA forecasts OPEC crude oil production will average 29.2 million barrels per day (b/d) from April through December 2020, up from an average of 28.7 million b/d in the first quarter of 2020. The EIA forecasts also forecasts that OPEC production will rise to an average of 29.4 b/d in 2021. The OPEC production data in the US March outlook includes Ecuador, which finalized its withdrawal from OPEC at the March 6 meeting. Beginning with the April 2020 the outlook will include Ecuador’s production volumes in non-OPEC data.

Diary of events

July

FLAME natural gas and LNG conference

6 - 7 July 2020

Hotel Okura, Ferdinand Bolstraat 333, Amsterdam, The Netherlands
<https://informaconnect.com/flame-conference/>

September

Gastech Exhibition & Conference 2020

8 -10 September 2020

Singapore EXPO, 1 Expo Drive, Singapore
<https://www.gastechevent.com/>

December

23rd World Petroleum Congress

6 - 10 December 2020

George R. Brown Convention Center 1001 Avenida De Las Americas, Houston, Texas, USA
<https://www.wpc2020.com/>

EIA expects global petroleum and liquid fuels consumption will average 99.1 million b/d in the first quarter of 2020, a decline of 0.9 million b/d from the same period in 2019. The report also expects global petroleum and liquid fuels demand will rise by less than 0.4 million b/d in 2020 and by 1.7 million b/d in 2021. “Lower global oil demand growth for 2020 in the March outlook reflects a reduced assumption for global economic growth along with reduced expected travel globally because of the 2019 novel coronavirus disease (COVID-19),” said the EIA. For 2020, EIA expects prices will average \$37/b during the second quarter and then rise to \$42/b during the second half of the year. The EIA expects that average Brent prices will rise to an average of \$55/b in 2021, as declining global oil inventories put upward pressure on prices.

US Regulators have denied requests for the rehearing of its orders authorizing construction and operation of two of three proposed liquefied natural gas export plants on the shore of the Brownsville Ship Channel in Cameron County in Texas. The Federal Energy Regulatory Commission refused rehearing requests from the environmental group, the Sierra Club and others, on the Texas LNG Brownsville and Annova LNG Brownsville liquefaction and export projects. The opponents of the projects accused the FERC of failing to adequately consider the environmental and other impacts of the ventures. “Approval of the projects was not inconsistent with the public interest,” stated the Commissioners. “Although the Final Environmental Impact Statements (EIS) for the projects identified some adverse environmental impacts, the Commission found that the projects, if constructed and operated as described with the required conditions, were environmentally acceptable actions,” the FERC explained in its ruling.

Both the Texas LNG project and Annova LNG, along with a third venture, NextDecade Corp.’s Rio Grande LNG, were recently given permits by the Department of Energy granting authorization to export cargoes for 20 years to non-free trade agreement countries. The Rio Grande venture will export around 27 million tonnes per annum MTPA and its associated Rio Bravo Pipeline will transport 4.5 billion cubic feet per day of feed-gas from the

Agua Dulce natural gas hub. The two other plants at Brownsville are much smaller. Annova plans around 7 MTPA of output and Texas LNG 4 MTPA. Annova LNG’s owners include Chicago-based power company Exelon Corp. Other shareholders include Black & Veatch Corp. of Kansas and Kiewit Corp. of Nebraska. Texas LNG Brownsville is owned by energy executives Vivek Chandra, who is Chief Executive, and Langtry Meyer who is the venture’s Chief Operating Officer. Construction of the Rio Grande facility is expected to commence shortly after the final investment decision and with first commercial operations scheduled before the end of 2024.

VENTURE GLOBAL, the US developer of three LNG export plants in Louisiana, said the European utility, Electricite de France SA (EDF), had signed a long-term supply contract. EDF has entered into 20-year Sales and Purchase Agreement for the supply of 1 million tonnes per annum from the Plaquemines LNG export facility in Plaquemines Parish, Louisiana. The Plaquemines facility will be built at river mile-marker 55 on the west side of the Mississippi River, 30 miles south of New Orleans. Under the agreement, EDF will purchase LNG on a free on board basis (FOB) for a 20-year term starting from the commercial operational start-up. The 20 MTPA Plaquemines facility utilizes an identical configuration to the company’s Calcasieu Pass LNG project, currently under construction in Cameron Parish, Louisiana.

Plaquemines LNG has previously sold 2.5 MTPA under a 20-year SPA to the Polish national gas company. The project has already received its final authorizations from both the US Federal Energy Regulatory Commission and the US Department of Energy. Plaquemines will be constructed in two phases, each phase designed with liquefaction and export capacity of 10 MTPA and a peak capacity of 12 MTPA under optimal operating conditions. The plan also includes four LNG storage tanks with a capacity of around 200,000 cubic metres and three marine loading berths each designed to accommodate LNG carriers of 120,000 to 185,000 cubic metres capacity. Other facilities to be built are two 710-megawatt electric power generation plants with one built during each phase.

Venture Global’s most advanced plant in terms of development is at Calcasieu

Pass in Louisiana with current nameplate export volumes of 12 MTPA. Calcasieu Pass is expected to come on stream in 2022, along with associated facilities, including the TransCameron Pipeline. The third project in the portfolio of Arlington, Virginia-based Venture Global is the Delta plant with a site also on the Mississippi River. The Delta project and its associated Delta Express pipeline would have output capacity of up to 24 MTPA. The proposed Delta and Plaquemines plants are stand-alone projects with no shared facilities and are under different development schedules.

WOODSIDE and Anglo-Australia commodities company BHP have decided to align their interests in the offshore Scarborough gas field to ease the path to expansion of the Pluto LNG plant on the Burrup Peninsula. The current feed gas for the single-Train Pluto plant is supplied from the Pluto and Xena offshore gas fields in the North Carnarvon Basin. However, the feed-gas from the Scarborough gas field will enable the development of a second liquefaction Trains. The second Train would have 5 million tonnes per annum of output, and take total nameplate capacity to 9.2 MTPA. The Scarborough field contains an estimated contingent resource of 11.1 trillion cubic feet of dry gas, of which 8.2 Tcf would be Woodside’s share under the alignment.

Woodside and BHP have agreed to combine their participating interests across the WA-1-R (Scarborough) and WA-62-R (North Scarborough) titles, resulting in Woodside holding a 73.5 percent interest and BHP owning a 26.5 percent interest in each title. Woodside and BHP have also agreed to apply for production licences in respect of both titles. The agreement is subject to regulatory approvals. Woodside Chief Executive Peter Coleman said that aligning these interests will support the development of the Scarborough field across the two titles and demonstrates the strong commitment of the joint venture to making a final investment decision this year. “This is a world-class Australian resource. The production licence applications are another key step to unlocking the full value of the Scarborough resource through the expansion of our existing Pluto LNG facility,” added Coleman. Woodside is targeting a final investment decision in 2020 for the Scarborough development and first cargo in 2024.

WORLEY, the Australian engineering company, said it was awarded two master service agreements by French major Total to provide specialised services for the Mozambique LNG export project at Pemba on the northern coast of the southeast African nation. “Under the MSAs, Worley will provide in-and-out of country services, including engineering, consulting and specialist engineering for delivery of onshore and offshore (subsea) facilities,” said Worley. “The services will support the development of the new LNG facility,” the company added. Worley said the work would be under its local Mozambique operational division with support from Worley’s global businesses, including the consultancy subsidiary Advisian.

Sydney-based Worley has already supported the LNG development, located on the Afungi peninsula in Mozambique’s Cabo Delgado province, since natural gas was first discovered there in 2010. Analysts said Worley was a highly experienced LNG and natural gas contractor, having played a leading role in the build-out of Australia’s liquefaction plants. “We are pleased to continue providing services to the LNG development and to support one of Africa’s largest projects,” said Andrew Wood, Chief Executive of Worley. “Through the MSAs, we will help Total and its partners in the Mozambique LNG Project meet the world’s changing energy needs,” added Wood. The French company has already said it planned to expand its Mozambique venture with up to two additional processing Trains, taking the total up to four Trains.

Total is looking at studies for Train 3 and Train 4 because of the huge feed-gas resources offshore Mozambique. Total confirmed in October 2019 that it paid \$3.9 billion to close the acquisition of Anadarko Petroleum’s 26.5 percent operated interest in the Mozambique LNG project from Anadarko purchaser Occidental Petroleum. Total had previously reached a binding agreement with Occidental to buy Anadarko’s assets in Africa, including Mozambique, Algeria, Ghana and South Africa. Patrick Pouyanné, Chairman and Chief Executive of Total, has said that Mozambique LNG was a one-of-a-kind asset that perfectly fitted with the company strategy. Total plans to work on the strong foundations established by the previous operator Anadarko and its partners. ■

Australian consultants try to crack emissions code and credibility of zero reduction targets

Largest LNG producer sees little action from Asia while even Iceland struggles to measure up on CO₂, says consultancy firm EnergyQuest

We are often told that Australia only contributes around 1.3 percent of global emissions so anything Australia does to reduce its own emissions will be immaterial, writes the Australian consultants EnergyQuest in their monthly report.

However, a different picture emerges if we look at absolute emissions by country.

The Organization for Economic Co-operation and Development is the grouping of the 36 wealthiest countries, including Australia.

Placings

According to the OECD statistics on total greenhouse gas emissions (a wider definition than CO₂ emissions) for 2017 (the latest year) Australia had the 7th highest greenhouse emissions out of the 36 OECD countries.

The only countries with higher emissions than Australia were the USA, Japan, Germany, Canada, Korea and Mexico.

Australian emissions were higher than those of the UK, 474 million tonnes in 2017.

Australia is also significant globally. According to the BP statistics of CO₂ emissions, Australia ranked 15th globally in level of absolute emissions 2018.

These statistics only measure in-country emissions (Scope 1 and Scope 2).

As a major energy exporter Australia's emissions footprint is actually much larger globally than this implies, if we take account of emissions from consumption of Australian fossil fuel exports (Scope 3 emissions).

Statistics

According to the BP statistics, while Australia only accounted for 1.3 percent of global CO₂ emissions in 2018, it accounted for 3.7 percent of global fossil fuel production, only 0.7 percent for oil but 3.4 percent for gas and 7.7 percent for coal.

Because Australia is particularly vulnerable to climate change, it is in its interests to encourage other countries to adopt measures to mitigate change as much as possible.

While Australia itself can only have a modest impact on mitigating global climate change, it must show that it is more than pulling its weight internationally if it is to have credibility in arguing for others to act.

Australia's high rate of emissions reflects its energy mix, with the use of both coal and oil higher than the global average.

In 2018 coal comprised 31 percent of

Australian primary energy consumption (PEC) (global average 27 percent) and oil 37 percent (34 percent).

Australian coal consumption is falling, by 14 million tonnes of oil equivalent in the decade to 2018, the fifth-largest absolute decline globally.

Coal-fired power

Coal consumption and the emissions it creates will continue to decline as coal-fired power is increasingly replaced by renewables, batteries, pumped hydro and gas (or new lower emission coal stations).

However Australian oil consumption continues to rise, now more than one million barrels a day and mostly imported, with relatively little focus on stemming the growth in consumption and the emissions and air pollution it creates. In the year to September 2019 transport contributed 18.9 percent of Australia's emissions.

In addition, the mining sector uses diesel for power generation on remote mine sites.

If oil consumption keeps growing at the same rate as over the last decade, we estimate consumption will grow by more than 50 percent by 2050, adding additional emissions of around 90 MT CO₂-e.

Restraining growth in use of petrol and diesel by electrification, biofuels, hydrogen, higher fuel standards, encouragement of hybrids, use of compressed natural gas (CNG) and LNG for heavy transport and replacing diesel in mining with renewables and/or gas would not only mitigate emissions but also reduce imports.

While this will be partly advanced by technology (batteries and hydrogen) fuel choices are also dictated by regulation and taxation, both critical to reducing growth in oil consumption but politically unpopular.

Proportions

The Australian share of natural gas in PEC in 2018, 24.7 percent, was closer to the global average of 23.9 percent.

However, gas also needs to play its part through reducing fugitive emissions, developing carbon capture and storage and commercialising hydrogen.

Santos has just announced a deal with BP to develop Cooper Basin carbon-capture (CCS) and is seeking federal government funding, pointing out that after 50 years of gas production there is massive scope for CCS in the Basin.



Australia's Gorgon LNG on Barrow Island has carbon dioxide injection system

Santos believes there is potential to store 20 MTPA for 50 years at a cost of \$26-30 per tonne.

Book

Similarly, the North West Shelf fields must also have scope for CCS, as must the nearly-depleted Bayu-Undan field in the Bonaparte Basin.

In his recent book, "Super-Power: Australia's low-carbon opportunity", Professor Ross Garnaut argues that Australia's large per capita endowment of forests and woodlands also provides immense bio-sequestration potential of hundreds of millions of tonnes per annum.

LNG plant operator Woodside is working with Greening Australia to generate carbon offsets.

More inconvenient energy truths

Two areas where Australia is disadvantaged in limiting emissions compared with other countries are the absence of nuclear (zero in Australia compared with 4.4 percent of PEC globally) and modest hydro (2.7 percent of PEC in Australia but 6.8 percent globally).

The absence of nuclear and low level of hydro compared with other countries makes it harder for Australia to reduce its emissions.

Which country has achieved the biggest emissions reduction?

Emission reduction targets are usually expressed as percentages.

However, it is the absolute numbers that count in mitigating global warming.

Which country has achieved the biggest absolute reduction in CO₂ emissions?

According to the BP statistics it is the United States, with a total reduction of 603MT over the decade to 2018.

This puts the US miles ahead of any other country. The second biggest reduction was in the UK, with 169MT.

The US was also number one in reducing coal consumption (down by 219 MTOE) and increasing gas consumption (up 162 MTOE) due to the shale revolution that activists have successfully derailed elsewhere (including Australia).

The US has achieved this while maintaining a higher rate of economic growth than the UK (an average of 1.6 percent pa in the US compared with 1.1 percent pa in the UK).

According to Bloomberg New Energy Finance, energy efficiency, natural gas and renewable energy have driven a decade of US energy transformation.

In the process the US has posted 10 straight years of economic growth, while cutting both power-sector CO₂ emissions and consumer energy costs to their lowest levels in a generation.

The number of residential natural gas customers grew by 10 percent in the last decade while overall residential consumption of gas rose by 5 percent.

Consumers are now spending record low proportions of their household budgets on energy costs.

According to Bloomberg NEF, "The idea that energy must be dirty to be cheap is simply a myth".

All or part

Some might argue that the correct benchmark for emissions reduction in Europe should be the whole EU rather than a single country.

On that basis the EU is ahead of the US with a CO₂ reduction of 735MT over the decade.

However, this has been at the cost of lower economic growth, averaging 1.1 percent pa for the whole EU. The Americans would argue that their record shows the superiority of a free market over government intervention (including a carbon tax in the EU) to reduce emissions.



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POLICY

Zero net carbon by 2050?

Targets of zero net carbon by 2050 are increasingly being adopted by countries, regions, cities and companies.

In Australia the Labor Opposition has committed to the target, as have all states and territories.

In September last year the UN announced that more than 60 countries had said they will try to reduce their carbon emissions to zero by 2050.

The World Resources Institute has a Net Zero Tracker. For 2020 this claims that two countries have achieved net zero emissions, Bhutan and Suriname.

Five other countries have legislated the target, the UK, New Zealand, Sweden, France and Denmark.

The EU, Spain, Chile and Fiji are proposing legislation. That makes 11 countries.

Top 20 target

Another nine countries, of which Germany is the only significant emitter, incorporate the target in policy documents.

That makes 20 countries. Beyond that there is a long list of countries where the target is “under discussion.”

The only major non-European emitters on this list are Canada and Mexico.

Notably missing, even from the list of countries discussing the target (whatever that means), are most of the world’s major emitters, all of which are non-European: Brazil, China, India, Indonesia, Iran, Japan, Korea, Russia, South Africa and the United States.

None of Australia’s major trading partners, China, Japan and Korea, are on the list.

Are there any countries close to zero net emissions already? There are around 40 countries that produce less than 1 MTPA of CO₂ emissions, mostly small islands or poor African countries like Chad or the Central African Republic.

Iceland

The only Asian country is Timor Leste, presumably because the emissions from the Darwin LNG plant are in Australia.

Having an LNG plant in Timor Leste, as the country wants, would boost their emissions.

One country we would expect to have low emissions is Iceland, with all of its renewable hydro and geothermal.

According to the EU emissions statistics, in 2018 Iceland had 4.0MT of CO₂ emissions, 12.1 tonnes per head, the same as Russia, despite having 96 percent renewable electricity.

Presumably its emissions come from transport, fishing boats and agriculture.

It is not clear whether emissions from international aviation to and from Iceland and international merchant shipping and cruise liners are counted in Iceland’s emissions.

Contradictions

If a small, wealthy country like Iceland with bountiful renewable energy is unable to already achieve close to net zero, it shows how difficult it will be for China or India (or even for another small wealthy country like Australia).

Having a target is one thing but turning into reality is another.

Closer to home, our world-scale fossil fuel exporters NSW (coal), Queensland (coal and LNG), Western Australia (LNG) and the Northern Territory (LNG) have all adopted targets of 2050 net zero emissions.

However, there is an absence of clarity about how this might be achieved or its implications for, for example, their LNG industries, which in 2020 are expected to emit 42MT CO₂-e (Scope 1 and 2 but not 3). Achieving net zero will require CCS on a massive scale.

The transition to anything like net zero carbon emissions by 2050 will be difficult, if not impossible.

There is no sign that it can be done by renewables alone. Even in South Australia where renewables generate around 50 percent of electricity, the share of renewables in total energy consumption in 2017-2018 was only 13.8 percent.

Future

Vaclav Smil is one of the world’s foremost thinkers on energy.

His book, “EnergyTransitions, Global and National Perspectives” (2017) is a comprehensive, scholarly and objective review of historical energy transitions and future prospects.

He concludes that advancing into the post-fossil fuel future will require us to moderate our energy expectations, implying reduced demand combined with a difficult but eventually rewarding quest for a civilisation powered by renewable energy flows.

The transition is going to be much harder than just sitting back and adopting a nice sounding 2050 target.

That’s not to decry ambitious target setting but it is only meaningful if followed up with the detail on how it can be achieved and widespread support for achieving it.

In particular, until Australia’s key trading partners, China, Japan and Korea, sign up to net zero by 2050, the Australian Government is wise being cautious about populist demands that it signs up. ■

Second wave of US LNG export plants proposed for Texas and Louisiana may rely on low-priced Permian feed gas

Multiple obstacles face the planned increase in associated natural gas production for Gulf Coast

The Permian Basin in western Texas and southeast New Mexico is currently under a cloud after the oil price slump made its oil resources uneconomic even as it has seen large increases in associated natural gas production in recent years and with prospects of future high demand from LNG export plants on the Gulf Coast.

Natural gas produced in the Permian Basin is largely associated natural gas, which is produced as a by-product of crude oil output.

Takeaway

Crude oil takeaway capacity in the region expanded in early 2019. However, Gulf Coast Express CX is the first addition to takeaway capacity for natural gas since that date.

Producers in the region may vent or flare limited volumes of natural gas and the Texas Railroad Commission regulates these activities.

After GCX enters service, several additional new natural gas pipelines are currently planned from the Permian to the Gulf Coast, which may further reduce the Waha-Henry Hub price differential with the benchmark Henry Hub.

These projects include: the Permian Highway Pipeline (2.1 Bcf/d); the Whistler Pipeline (2.0 Bcf/d); the Permian 2 Katy Pipeline (1.7 Bcf/d to 2.3 Bcf/d) and the Pecos Trail Pipeline (1.9 Bcf/d).

One pipeline project is being developed by Tellurian Inc., the owner of the

Driftwood LNG plant planned for Lake Charles. This is the Permian Global Access Pipeline with 2.0 Bcf per day of capacity.

Ventures

Two other natural gas pipeline ventures include the Bluebonnet Market Express Pipeline (2.0 Bcf/d) and the Permian Pass Pipeline (2.0 Bcf/d)

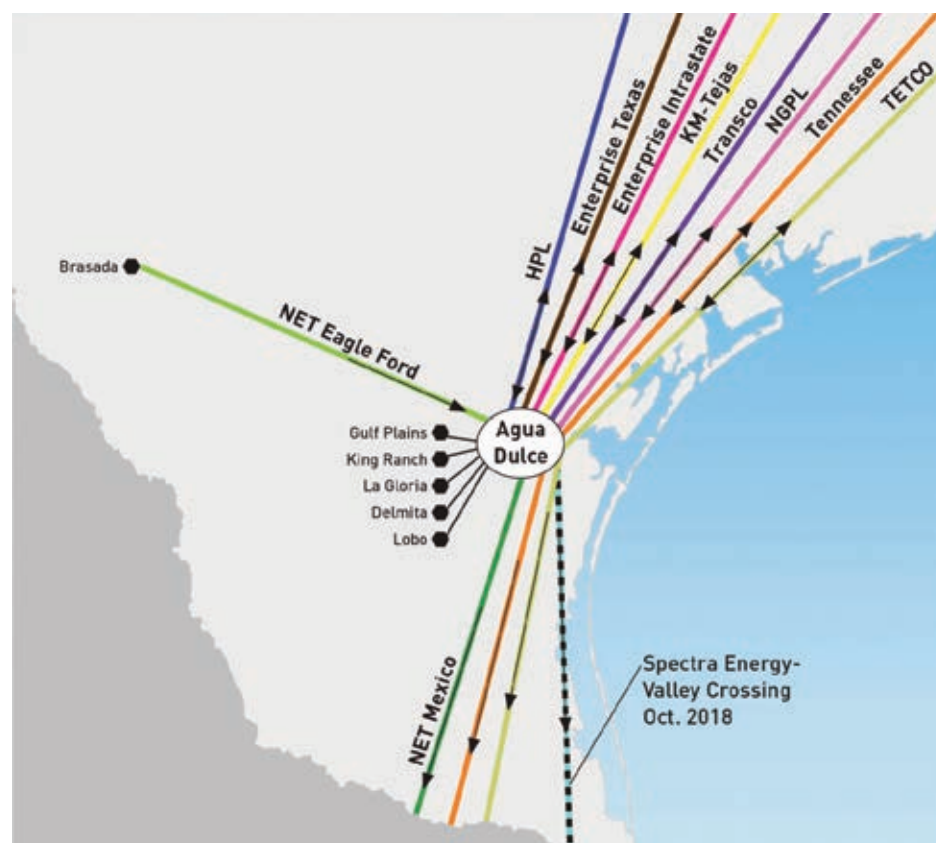
Of these additional projects, currently only the Permian Highway Pipeline and the Whistler Pipeline have reached a final investment decision (FID) and are currently scheduled to enter service in 2020 and 2021, respectively, according to the Energy Information Administration.

These projects plan to serve growing natural gas demand in Texas and Louisiana, in particular for LNG liquefaction and export.

It is a distance of 475 miles from the Waha Hub in northwest Texas to the Agua Dulce Hub in south Texas.

The Whistler Pipeline is part of a plan put forward in mid-2019 by three Gulf Coast companies to finance the construction of a new pipeline that would move natural gas from the Permian and Waha Hub to the Agua Dulce hub near the port of Corpus Christi in Texas, where Cheniere Energy has one of its LNG export plants.

Ohio-based MPLX LP, Austin, Texas-based pipeline operator WhiteWater Midstream and a joint venture between New York private equity firm Stonepeak



There are projects being developed to transport Permian gas to the Waha Hub and on to Agua Dulce hub near the port of Corpus Christi. One such venture is the Whistler Pipeline. Others are in the development stage

Infrastructure Partners and Midland pipeline operator West Texas Gas announced a final investment decision on the Whistler Pipeline.

They said that the decision to move forward with this project after securing sufficient commitments from shippers demonstrated an alternative to getting reliable residue gas transportation out of the Permian, which was described as vital to the growing gas processing position and producers in the region.

The proposed 42-inch pipeline will move 2 Bcf per day from the Waha Hub to the Agua Dulce Hub.

Expected to be in service by the third quarter of 2021, the Whistler Pipeline is expected to connect with various processing facilities and pipelines along its route, including some that feed LNG plants and pipelines to Mexico.

Permian Basin prices strengthen in early March and then dropped with the oil price plunge, according to the EIA.

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The Waha Hub price averaged a low of \$0.29 per million British thermal units, which was \$1.51 per MMBtu lower than the Henry Hub price.

Suffering

Permian prices have suffered from uncertainty about future oil and natural gas production since the March 9 oil plunge and as West Texas Intermediate oil dropped to \$20 per barrel before recovering.

Investments in crude drilling in the

Permian were already slowing before the oil price crash.

Drilling activity in the Permian increased between 2018 and 2019 as producers took advantage of recovering crude prices, but the number of rigs in the Permian had steadily fallen.

The Permian had 414 rigs about midway through December 2019, about 14 percent down from a year earlier, according to oilfield services provider Baker Hughes.

“As Permian oil and gas well production

growth slows, producers who want to keep or increase production levels will need to accelerate their drilling activity, a huge challenge now for those who rely on profitable crude prices,” said the EIA.

Constrained

Another ongoing problem is the constrained pipeline capacity for natural gas.

Analysis say that even as companies with extensive interstate pipeline networks can take Permian gas East, finding

economic capacity is not easy for shippers.

Total Permian gas production reached 16.2 Bcf per day by the year end, according to EIA data.

The Permian accounts for about 19 percent of total gas production in the US at the end of 2019.

The completion of Kinder Morgan's Gulf Coast Express gave a temporary boost to Permian prices in late September and early October 2019, but once the 2 Bcf/d pipeline reached its full capacity, prices fell again.

Online

Despite the continuing need for takeaway capacity in the Permian, no new pipeline projects are expected to come online during 2020, particularly in the current crisis environment.

Kinder Morgan had earlier announced it would delay completion of its Permian Highway project until early 2021.

That pipeline had been scheduled to be in service in the fourth quarter of 2020. The company said the delay was because of a slow permit process.

NAmerico Energy Holdings made a similar decision when it announced in 2019 that it would push the 2 Bcf/d Pecos Trail pipeline, set to move gas from the Permian to the Gulf Coast, to the middle of 2021.

Targa Resources and its partners expect their 2 Bcf/d Whistler pipeline to be in service late 2021 as well.

More delays

However, give the current circumstances, these projects may be delayed by several more years because of across-the-board capital expenditure cuts in the oil and gas industry worldwide.

Limited natural gas pipeline takeaway capacity from the region has kept prices very low, or even negative, and this trend is likely to continue until the LNG projects planned for Texas and Louisiana start taking final investment decisions.

These LNG FIDs now have large questions marks over them, even those scheduled for 2020.

During the first eight months of 2019, the Waha spot price averaged just \$0.65 per MMBtu.

Towards the end of March 2020, Permian Basin prices were relatively stable.

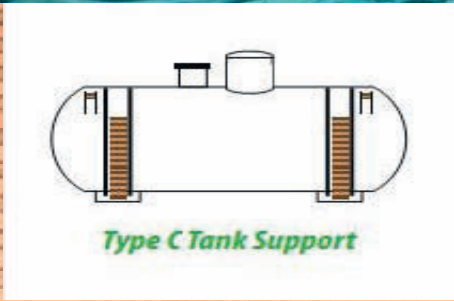
The price at the Waha Hub on the week ending March 20, 2020, reached a high of \$0.96 per MMBtu before falling back to average \$0.89 per MMBtu, 76 cents per MMBtu lower than the Henry Hub price. ■



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LNG boil-off and contractual compensation regimes - is past practice still best practice?

Marcus Dodds, Partner at Reed Smith LLP, the international law firm

Boil-off issues, predominantly in the context of time charterparties for liquefied natural gas carriers, but also in the context of short-term trading arrangements under Master Sale & Purchase Agreements (MSPA), are considered in this paper.

It will be presented in two parts in the April and May 2020 editions of the LNG Journal.

For those less familiar with time charterparties, the essential points to understand are those requirements expected of who are making the transaction.

Expected

The party with control of the ship (Owner) hires it out to the party wishing to employ it to carry cargoes (Charterer) by an arrangement whereby the Charterer (aside from paying hire) is required to provide and pay for all of the fuel needed to perform the required employment orders.

To make such arrangements commercially viable, the Owner provides certain warranties (binding promises) as to what his ship can achieve, including what speeds it can achieve by consuming a certain quantity of the Charterer's fuel.

If the ship cannot perform as warranted, the terms of the charterparty typically provide a regime by which the Charterer can be compensated.

In this respect, the following discussion considers whether the performance assessment and compensation regimes for LNG carriers have kept pace with the technological advances made over time, and particularly the last decade or so, and whether a fresh approach is needed to counter (what the writer considers to be) an obvious potential for non-compensatory outcomes.

Regimes

With regards to MSPAs the discussion considers whether compensation regimes should sacrifice accuracy for the sake of pragmatism, again, against (what the writer considers to be) the obvious potential for non-compensatory outcomes.

Here is a look at the evolution of LNG carriers from steamships to



A cargo transfer: Boil-off gas rates can vary from ship to ship of different classes and propulsion

diesel engine: Since the first purpose-built (large-scale) LNG carriers entered into service, their cargo containment systems have followed the same basic design.

Insulating the cargo tanks minimises heat in-leak to the cargo (in liquid phase), and vaporisation of the cargo (boil-off) matches (by way of auto-refrigeration) the heat that does still leak-in.

A small flow of this boil-off gas from the head of the cargo tanks is then extracted in order to maintain stable pressures and temperatures in the cargo tanks.

Until 2006, all such LNG carriers were propelled by steam turbines that could use such boil-off gas as fuel in their boilers (originally alongside a small quantity of 'pilot' fuel oil) and most of their auxiliaries were steam powered (typically with diesel back-ups).

If the speed (and power) requirements did not consume all of the available steam generated by the boilers whilst burning all the boil-off gas, the excess steam could be 'dumped' to the seawater-cooled condenser (as this avoided the alternative of venting the boil-off to the atmosphere) and thus stable pressures and temperatures could be maintained in the cargo tanks.

Proportions

Such an arrangement made it impossible to measure what proportion of natural

boil-off was being utilised to achieve the required speed, and what proportion was being 'dumped' as steam, at least when not all of the steam available (from burning the natural boil-off in the boilers) was needed in the turbine.

Which is why the practice developed that, while a Charterer might be able to require a lower speed than that which the Owner could achieve using only natural boil-off, the Owner would provide no consumption warranty when the LNG carrier performed such speed: as, with such an arrangement, it simply was not possible to hold the Owner to account.

Of course, in the early years, many LNG carriers could only steam at full speed on a laden voyage, which typically would be around 19 knots or more.

However, over time, there were various incremental improvements to the efficiency of the steam plants and significantly greater improvements to the efficiency (insulation) of cargo containment systems.

As a result of which, by the 1990s new build LNG carriers could usually achieve a more useful (lower) speed of around 15 knots on natural boil-off gas (and pilot fuel oil) alone.

If the natural boil-off gas did not produce sufficient fuel to produce the volume of steam needed for the LNG carrier to achieve the required speed, the additional fuel needed could be provided

to the boilers either by way of bunkers or by 'forcing' boil-off.

Where 'forcing' boil-off was achieved either by taking a small flow of LNG from the cargo tanks (in liquid phase) to a vaporiser (in the compressor house) while on a laden voyage or by spraying the LNG within the cargo tank to vaporise it while on a ballast voyage.

Warranties

For such higher (than natural boil-off) speeds, the Owner would be required to provide consumption warranties.

As it would be appropriate to assume that, all available boil-off was usefully consumed as fuel and any bunkers used would be quantifiable in the usual way (i.e. by taking ullages in the fuel oil tanks), a practice that could attract little criticism in the context of these steamships.

However, in 2006, the first purpose-built dual-fuel diesel engine LNG carrier entered into service.

This and many that followed (including tri-fuel variants) had diesel-electric systems which were considerably more efficient than the steamships of the time (by a factor of about a third).

And in lieu of steam dumping these were fitted with a gas combustion unit (GCU), effectively an incinerator, to avoid venting boil-off into the atmosphere.

It is not an overstatement to say that this was revolutionary and created a new

paradigm in terms of the performance characteristics of LNG carriers.

Qatari vessels

These first diesel ships were closely followed into service by the first of the Q-ships (meaning the Q-Flex and Q-Max series).

These sacrificed the possibility of burning boil-off gas as fuel, for the calculated benefit of reliquefying the boil-off gas (even including nitrogen), albeit with the further sacrifice of bunkers to run the reliquefaction plant: an evolution which created another new paradigm, which was much closer to standard diesel engine cargo ships in terms of performance warranties.

Meanwhile, the increasing efficiency of the diesel engine (dual-fuel, and later tri-fuel) LNG carriers,

particularly when in the ME-GI (in service since 2016) and XDF (in service since 2018) format, eventually outstripped the commercially feasible improvements to the efficiency of cargo containment systems.

In some cases, raising the natural boil-off speeds of such LNG carriers to around 19 knots (again), where post 2000 steamships typically would have achieved only around 15 knots.

To avoid wasting the full balance of such boil-off at lower speeds various types of partial reliquefaction system (PRS) were introduced onto most such LNG carriers.

The intention being that with the PRS in operation, the speed achievable when utilising the (remaining) available boil-off would be closer to that which might typically have been achieved with an albeit much less efficient steamship arrangement.

Technologies

There is a variety of PRS technologies available; however, all create some additional load or consumption demand. Indeed, in the last year or so, some shipyards have promoted the incorporation of full reliquefaction systems (FRS) into newbuilds (albeit perhaps not including nitrogen recovery).

However, despite all this change the practice for assessing the performance of LNG carriers has hardly moved on, at least not in terms of the use of reliquefaction plant (for those ships that can consume boil-off as fuel).

The time charter-party boil-off warranty and reliquefaction systems: The simplest benchmark is to consider the two

variants of the only published industry standard form charterparty, the ShellLNGTime forms.

The first variant of this as published in 2005 and then lightly amended in 2006, just before the entering into service of the first diesel engine LNG carriers.

The second variant was published in 2017, having been used by Shell since 2016, the year that ME-GI engine LNG carriers first entered into service and PRS technology was a common feature of newer LNG carriers.

For obvious reasons the terms of the first variant are silent as to the use of PRS or FRS, but so too are the terms of the second variant.

Clauses

Indeed, the only mention is in LNG Form B, which forms Part II of the charterparty. This is at item 6(g), where the possibility of such plant existing is addressed solely in terms of what its daily consumption needs (in terms of “Gas Oil” only) would be.

Which, by virtue of Clause 1(m) of Part III of the charterparty, if the entry for Item 6(g) is completed as the form intends, will amount to a maximum consumption warranty from the Owner, when the reliquefaction plant is operated, but no more.

On the face of it, the parties are either expected to address the use of the PRS or FRS in Part I of the charterparty, by way of entries in the “Maximum Daily Boil-Off Rate” section for laden or ballast passages or by way of a bespoke provision in the “Other Terms” section.

Given the relative complexity of the performance calculation provisions in Appendix A to Part III, it is unsurprising that Part I is the usual point of entry.

Indeed, few parties adopting the form seem willing to entertain any substantive changes to Appendix A.

The question that an Owner has to consider when negotiating a charterparty on the ShellLNGTime2 form is whether these entries in Part I should reflect the passive (natural) or active (PRS or FRS enabled) boil-off rates.

Given that submitting a completed Form B is usually the prelude to negotiating the terms of Part I, it would be unsurprising if the reasonable expectation of a Charterer is that entries from Item 8(h) and (i) are simply to be carried over at this point.

Passive

Both of these entries (at Item 8(h) and (i)) point towards the use of the passive boil-

off rates, linked as they are to the gross capacity of the cargo tanks. However, they are also the only logical places, under the constraints of the formatting, for the Owner to promote the benefits of the PRS or FRS to the Charterer and, thus, seek to justify a higher daily hire rate than that which the passive boil-off rate might suggest.

How an Owner chooses to promote the capabilities of its LNG carrier at this point, or at least in completing Part I, can make a significant financial difference over the period of the charterparty.

As a general comment, where both maximum boil-off and fuel consumption rates are (for obvious reasons) warranted, there is an obvious risk of double-counting, in terms of compensation, bearing in mind that boiloff can and is expected to be utilised as fuel where possible.

Both of the ShellLNGTime form variants attempt to avoid double counting by excluding any excessive volume of boil-off (as against the boil-off warranties) from the quantification of fuel consumed in assessing performance against the corresponding fuel consumption warranty.

This arrangement means that the Owner will have to compensate the Charterer for any boil-off in excess of the warranted daily rate (albeit, as finally calculated over the period of assessment) and separately compensate the Charterer for any other consumption in excess of the warranted daily consumption rates for given speeds (again, as finally calculated over the period of assessment).

All of which seems eminently reasonable, until one considers the implications for the Owner if the active boil-off rates have been warranted in the charterparty and the PRS or FRS does not perform or underperforms. The important point being that by way of additional load).

Simplicity

This represents a level of simplicity which often stands in stark contrast to the more complex warranty that a Charterer may seek in this respect (accepting risk has its rewards of course for an Owner).

The most extreme example of such warranty that I have seen lately involved a table that, in the context of new-build LNG carriers, created a multi-layered warranty such that, for any speed ordered (in one knot increments), a certain quantity of boil-off would be reliquefied as against a certain consumption.

A level of complexity that seems somewhat out of touch with how most

PRS operate and arguably is commercially pointless, as perhaps all that a Charterer sensibly needs is the same warranty as the Owner is likely to obtain from a builder.

That is, the Charterer needs the Owner to warrant that the PRS or FRS will have the capacity to reliquefy up to a certain quantity of boil-off per day (while consuming no more than a certain amount of fuel), so that it can assess what proportion of the cargo (or heel) may be lost during the intended voyage.

Indeed, where a full cargo is not carried, it is obviously preferable for a Charterer to have a reliquefaction warranty that is not pro-rated to

tank capacity usage in the way that boil-off warranties usually are (see, for example, Clause 24(a) of ShellLNGTime 2).

Densities

Admittedly, having the reliquefaction capacity of the PRS or FRS warranted in metric tonnes (as often warranted to the Owner by a builder) is not particularly helpful to a Charterer in this respect.

It certainly does not lend itself to easy comparison between variously equipped LNG carriers or the assessment of their respective value to the Charterer in terms of potential daily hire rates.

However, the densities of different cargoes will vary according to their composition. Further, even while on a voyage the density of a cargo will change, albeit to a lesser extent the fuller the capacity of the reliquefaction plant.

Thus for the Owner to offer the Charterer a warranty in volumetric units (e.g. cubic metres) invites a margin to be applied based on the least favourable density to be expected; which ultimately is less favourable to the Charterer, but much easier to police and utilise for comparisons.

Further, depending upon the PRS or FRS technology, the fuel consumption may vary if the full capacity is not needed, but rarely will the Owner be in a position to offer any sensible incremental consumption warranty as against operating the system at partial capacity.

Therefore, again, demanding such a warranty may be inviting the application of safe margins by the Owner, unless the warranty is based on experience or there is a review and retrospective amendment mechanism (as might be expected where a new building is chartered).

Regret

Taking into account the above, it seems

regrettable that the ShellLNGTime2 form does not provide for an appropriate PRS or FRS enabled warranty, which could have been achieved either by way of expanding Form B Item 6(g) to invite a maximum capacity to be inserted (not merely a maximum consumption for such plant) or by way of amending the negotiated terms and prompts in Part I inviting the same.

This could perhaps have saved a number of disputes.

The time charterparty consumption warranty (out of the frying pan...):

The boil-off warranty is not the only issue with the ShellLNGTime approach that can produce an inequitable result in the diesel engine era.

As mentioned earlier, a higher efficiency diesel engine LNG carrier might have a natural (passive) boil-off rate that could allow it to perform at around 19 knots in fair conditions.

So the earlier, steamship era, approach of an Owner simply not warranting consumption performance below that which would be the minimum speed achieved using all natural boil-off (which typically was closer to 15 knots, as mentioned above), would probably be a difficult sell to a Charterer, or at least be a negative in terms of negotiating the hire rate.

The problem for the Owner is that the ShellLNGTime assessment of consumption assumes that all boil-off is both available for and consumed as fuel, save to the extent that it is in excess of the warranted boil-off rate (as explained earlier).

This means that if the Owner accurately warranted consumption rates for speeds less than the minimum speed achieved on natural boil-off alone, and any excess of available boil-off were incinerated in the GCU, there would be an over-consumption claim.

At least assuming that there were no under consumptions at higher speeds to balance out the apparent over-consumptions at the lower (sub-minimum natural boil-off speed) over the period of assessment.

Outcome

This is obviously a one-sided outcome, where the Charterer would be aware from the boil-off warranty that at such speed(s) there would be a volume of boil-off that was excess to requirement and which (absent the existence and operation of a PRS or FRS) would have to be incinerated in the GCU.

Indeed, it is the very prospect of this apparent inequity that no doubt prompted some Owners to include the capability of any PRS in their boil-off warranty, albeit mistakenly, for the reason already explained, as it created a different exposure for them.

Of course, there is always the legal argument that such a regime as exists under both ShellLNGTime forms needs to be read in such a way as to reflect the compensatory principle that underlies the legal concept of damages for breach of a warranty.

However, again there is no direct English law precedent on these regimes, only analogous decisions. Which really begs the question as to whether approaches such as that of the ShellLNGTime forms are still fit for purpose, and whether there is a better approach.

The obvious question is why, in the diesel engine paradigm, does all boil-off (subject to the cap provided by the boil-off warranty) still have to be treated as if it were consumed as fuel.

This was an approach that made sense in the context of steam-dumping as that was unquantifiable (as explained above), but seems less than convincing in the context of a GCU equipped diesel engine LNG carrier.

This is because diesel engine LNG carriers are usually capable of quantifying the volume of boil-off that has been incinerated in the GCU: perhaps if only by virtue of gas flow meters fitted to prove compliance with EU legislation (e.g. Commission Decision 2010/769/EU).

Distinguishing

There is therefore the ability, or at least capability, to distinguish between the volume of boil-off that is used as fuel and that which is wasted.

If the accuracy of such means of quantification is an issue, then one has to question whether, as against the prospect of inequitable performance claims, any Owner might not be tempted to invest in improving the accuracy of such means of quantification.

That is, if every Charterer were willing to revise the approach to assessing what volume of boil-off has in fact been consumed as fuel.

If the accuracy of such means of quantification were acceptable, the only reason not to revise the approach would seem to be a lack of trust by the Charterer in the Owner or their crew to faithfully record and report such volumes.

An awkward objection, given the obvious issue with the present approach, but an issue that presumably could be addressed by a data-logger or similar (relatively low-end) technology.

Given the potential for dispute, and the potential value of such disputes over the life of any LNG carrier, it is hard to believe it would not be a worthwhile exercise to explore whatever degree of sophistication might suffice to address the reasonable concerns from the Charterers' side.

Otherwise, an Owner is set to remain reliant on the use and performance of a PRS or FRS to stay out of trouble under its consumption warranties.

Spot context

Noting that, in the context of spot trading or at least the operation of LNG carriers on portfolio rather than milk-run delivery schedules, the need or orders for speeds that demand all available natural boil-off seem less likely.

Quantifying the loss due to boil-off: Without exception, LNG cargoes are traded by reference to their calorific value, whether a cargo is to be used as fuel, such as for power stations, or network gas.

The commonly used unit being the British thermal unit (Btu). Charterparties also, invariably, value LNG (whether in liquid or gaseous (boil-off) phase) in Btu.

However, the compensatory regimes within charterparties invariably quantify loss of LNG (by virtue of boiloff) by reference to the volume reduction and then evaluate the loss by applying a value to each unit of volume.

The compensatory regimes in most MSPAs are essentially the same, at least in terms of loss during periods of demurrage.

Rate of loss

However, many MSPAs also apply a deemed rate of loss approach, even where to the extent that nothing catastrophic has happened to the LNG carrier's containment system, no failures within the custody transfer measurement system (CTMS) have occurred and the compositional analyses are accurate, all of the difference (in Btu) should be attributable to boil-off of the cargo while onboard.

If an Owner had warranted to the Charterer that there would be no boil-off (other than nitrogen) on passage, it would then be a simple matter of pricing the Btu

appropriately to quantify the loss of the Charterer (or the shipper or consignee).

Noting that for LNG carriers fitted with full re-liquefaction plants, this is at least a possibility.

Unfortunately, most existing LNG carriers either do not have such reliquefaction plant or are only capable of partial reliquefaction of the natural boil-off.

Further, the Charterer may at times prefer not to sacrifice bunkers for cargo preservation, if the price differentials support such tactic (albeit such occurrences are rare at this time).

Therefore, as discussed, the Owner will usually warrant to the Charterer the boil-off performance that the LNG carrier will achieve.

The origins of this warranty are (usually) the ship-builder's warranty.

Although, when relying upon the ShellLNGTime1 form, it was common for an Owner to be able eke out a small additional margin by offering the Charterer a warranty against net cargo capacity, having received a warranty as against gross cargo capacity from the shipbuilder.

However, this warranty may be revisited with the benefit of actual experience, either by a review mechanism in a longer-term (and particularly a delivered ex shipyard) charterparty or by the Owner's election when negotiating the terms of a subsequent charterparty. ■

Part 2 of this paper "LNG boil-off and contractual compensation regimes - is past practice still best practice?" will be published in the May editor of LNG Journal.

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Marcus is an experienced litigator and transactional lawyer. He is capable of handling shipping, trading and Admiralty disputes and also has extensive experience in non-contentious shipping and trading matters, particularly in relation to LNG. He is the leading lawyer in Reed Smith's LNG shipping practice and has been engaged as the legal advisor to SIGTTO for many years. He also sits on Lloyd's Register's Classification Committee, the final arbiter of issues of class, and prior to his legal career was a Captain in the merchant navy having served on a wide variety of ships, including gas carriers. He has over 30 years of experience in the marine industry.

World LNG Carrier Fleet

LNG carrier	Capacity m ³	Owned or Ordered by	Builder	Delivery Date	Flag	Power Plant	Cargo System	No. of tanks	Ship built for Export plant
Aamira	266,000	QGTC	Samsung	Dec-10	Liberia	DRL	GTT	5	Qatargas IV
Abadi	135,000	Brunei Gas Carriers	Mitsubishi Nagasaki	Jun-02	Brunei	S	Moss	5	Brunei LNG
Abalamabie	174,900	Bonny Gas	Samsung	June-16	Bermuda	DFDE	GTT	4	Nigeria LNG
Adam LNG	162,000	Oman LNG	Hyundai	Dec-14	Marshall Is.	DFDE	GTT	4	Oman LNG
Adriano Knutsen	180,000	Knutsen	Hyundai	Jul-19	Spain	MEGI-DF	GTT	4	charter
Al Aamriya	210,100	J5 Consortium	Daewoo	Feb-08	Marshall Is.	DRL	GTT	4	Qatargas
Al Areesh	151,700	Teekay LNG	Daewoo	Jan-07	Qatar	S	GTT	4	Ras Gas II
Al Bahiya	210,185	QGTC	Samsung	Oct-09	Liberia	DRL	GTT	5	Qatar-Atlantic
Al Biddah	135,275	J4 Consortium	Kawasaki Sakaide	Nov-99	Japan	S	Moss	5	Qatargas
Al Daayen	151,700	Teekay LNG	Daewoo	Apr-07	Qatar	S	GTT	4	RasGas II
Al Dafna	266,000	QGTC	Samsung	Oct-09	Marshall Is.	LR DRL	GTT	4	Qatar-Atlantic
Al Deebel	145,000	Peninsular LNG	Samsung	Dec-05	Bahamas	S	GTT	4	Qatargas
Al Gattara	216,200	OSG/Nakilat	Hyundai	Oct-07	Marshall Is.	DRL	GTT	4	Qatargas II
Al Ghariya	210,100	ProNav	Daewoo	Feb-08	Bahamas	DRL	GTT	4	Qatargas
Al Gharaffa	216,200	OSG/Nakilat	Hyundai	Jan-08	Marshall Is.	DRL	GTT	4	Various
Al Ghashamiya	216,000	QGTC	Samsung	Mar-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Al Ghuwairiya	261,700	QGTC	Daewoo	Aug-08	Marshall Is.	DRL	GTT	5	Qatar-Atl'c Basin
Al Hamla	216,000	OSG	Samsung	Feb-08	Marshall Is.	DRL	GTT	4	QatarGas
Al Hamra	137,000	National Gas Shipping	Kvaerner-Masa	Jan-97	Liberia	S	Moss	4	ADGAS
Al Huwaila	217,000	Teekay	Samsung	May-08	Bahamas	DRL	GTT	4	RasGas III
Al Jasra	137,100	J4 Consortium	Mitsubishi Nagasaki	Jul-00	Japan	S	Moss	5	Qatargas
Al Jassasiya	145,700	Maran-Nakilat	Daewoo	May-07	Greece	S	GTT	4	RasGas
Al Kharaitiyat	216,200	QGTC	Hyundai	May-09	Liberia	DRL	GTT	4	Qatargas III
Al Kharaana	210,000	QGTC	Daewoo	Oct-09	Marshall Is.	DRL	GTT	4	Qatargas IV
Al Kharsaah	217,000	Teekay	Samsung	May-08	Bahamas	DRL	GTT	4	RasGas III
Al Khattiya	210,000	QGTC	DSME	Oct-09	Marshall Is.	DRL	GTT	4	Qatargas IV
Al Khaznah	135,500	National Gas Shipping	Mitsui Chiba	Jun-94	Liberia	S	Moss	5	ADGAS
Al Khor	137,350	J4 Consortium	Mitsubishi Nagasaki	Dec-96	Japan	S	Moss	5	Qatargas
Al Khuwair	217,000	Teekay LNG	Samsung	Jul-08	Korea	DRL	GTT	4	RasGas
Al Mafyar	266,000	OSG/Nakilat	Hyundai	Oct-07	Marshall Is.	DRL	GTT	4	Qatargas II
Al Marrouna	151,700	Teekay	Daewoo	Nov-07	Bahamas	S	GTT		Ras Gas I
Al Mayeda	266,000	QGTC	Samsung	Jan-09	Liberia	DRL	GTT	5	Qatar-US/Var.
Al Nuaman	210,000	QGTC	DSME	Dec-09	Marshall Is.	DRL	GTT	4	Qatargas IV
Al Oraiq	210,000	J5 Consortium	Daewoo	Apr-08	Marshall Is.	DRL	GTT	4	Various
Al Rayyan	135,360	J4 Consortium	Kawasaki Sakaide	Mar-97	Japan	S	Moss	5	Qatargas
Al Rekayyat	216,200	QGTC	Hyundai	Jun-09	Bahamas	DRL	GTT	4	Qatar-Atlantic
Al Ruwais	210,100	ProNav	Daewoo	Nov-07	Germany	DRL	GTT	4	Qatargas II
Al Sadd	210,100	QGTC	Daewoo	Mar-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Al Safliya	210,100	ProNav	Daewoo	Dec-07	Bahamas	DRL	GTT	4	Qatargas II
Al Sahla	216,200	J5	Hyundai	Jun-08	Japan	DRL	GTT	4	Ras Gas III
Al Samriya	261,700	QGTC	Daewoo	Sep-08	Marshall Is.	DRL	GTT	5	Qatargas II
Al Sheehaniya	210,100	QGTC	Daewoo	Feb-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Al Shamal	217,000	Teekay LNG	Samsung	Jun-08	Qatar	DRL	GTT	4	RasGas
Al Thakhira	145,000	Peninsular LNG	Samsung	Sep-05	Bahamas	S	GTT	4	Qatargas
Al Thumama	216,000	J5 Consortium	Hyundai	Apr-08	Japan	DRL	GTT	4	Rasgas
Al Utouriya	215,000	J5	Hyundai	Sep-08	Panama	DRL	GTT	4	RasGas
Al Utourma	215,000	J5	Hyundai	Sep-08	Panama	DRL	GTT	4	Ras Gas III
Al Wajbah	137,350	J4 Consortium	Mitsubishi Nagasaki	Jun-97	Japan	S	Moss	5	Qatargas
Al Wakrah	135,360	J4 Consortium	Kawasaki Sakaide	Dec-98	Japan	S	Moss	5	Qatargas
Al Zhubarah	137,570	J4 Consortium	Mitsui Chiba	Dec-96	Japan	S	Moss	5	Qatargas
Alto Acrux	147,000	LNG Marine Transport	Mitsubishi	Mar-08	Bahamas	S	Moss	4	Various
Amali	148,000	Brunei-Shell	DSME	Jul-11	Brunei	DFDE	GTT	4	Brunei LNG
Amanl	154,800	Brunei-Shell	Hyundai	Nov-14	Brunei	DFDE	GTT	4	Brunei LNG
Aman Bintulu	18,928	Perbadanan / NYK Line	NKK Tsu	Oct-93	Malaysia	S	GTT	3	Petronas
Aman Hakata	18,800	Perbadanan / NYK Line	NKK Tsu	Nov-98	Malaysia	S	GTT	3	Petronas
Aman Sendai	18,928	Perbadanan / NYK Line	NKK Tsu	May-97	Malaysia	S	GTT	3	Petronas
Arctic Aurora	160,000	Dynagas	Hyundai	Jul-13	Marshall Is.	DFDE	GTT	4	Various
Arctic Discoverer	140,000	K Line	Mitsui Chiba	Jan-06	Bahamas	S	Moss	4	Various
Arctic Lady	147,200	MOL/Hoegh LNG	Mitsubishi Nagasaki	Apr-86	Norway	S	Moss	4	Various
Arctic Princess	147,200	MOL/Hoegh LNG	Mitsubishi Nagasaki	Jan-06	Norway	S	Moss	4	Various
Arctic Sun	89,880	Arctic LNG Shipping	IHI Chita	Dec-93	Liberia	S	IHI SPB	4	ConocoPhillips/Marathon
Arctic Voyager	140,000	K Line	Kawasaki	Jul-06	Bahamas	S	Moss	4	Statoil
Arkat	148,000	Brunei-Shell	DSME	Feb-11	Brunei	DFDE	GTT	4	Brunei LNG
Arwa Spirit	165,000	Teekay LNG	Samsung	Sep-08	Marshall Is.	DFDE	GTT	4	Various
Aseem	154,850	K Line-Petronet	Samsung	Nov-09	Malta	S	GTT	4	Qatar-India
Asia Endeavour	160,000	Chevron	Samsung	Dec-14	Bahamas	DFDE	GTT	4	Various
Asia Energy	160,000	Chevron	Samsung	Sept-14	Bahamas	DFDE	GTT	4	Various
Asia Excellence	160,000	Chevron	Samsung	Sept-13	Bahamas	DFDE	GTT	4	Various
Asia Venture	160,000	Chevron	Samsung	Sept-17	Bahamas	DFDE	GTT	4	Various
Asia Vision	160,000	Chevron	Samsung	June-14	Bahamas	DFDE	GTT	4	Various
Bahrain Spirit	173,000	Teekay	Daewoo	Sept-18	Bahamas	DFDE	GTT	4	Various



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Barcelona Knutsen	173,400	Knutsen	Daewoo	May-10	N.I.S.	DFDE	GTT	4	Various
Bebatic	75,060	Brunei Shell Tankers	Atlantique	Oct-72	Brunei	S	GTT	6	Brunei LNG
Beidou Star	172,000	MOL	Hudong	Oct-15	Hong Kong	DRL	GTT	4	Various
Berge Arzew	138,088	BW Gas	Daewoo	Jul-04	Norway	S	GTT	4	Sonatrach
Bilbao Knutsen	138,000	Knutsen / Marpetrol	IZAR Sestao	Jan-04	Spain	S	GTT	4	Atlantic LNG
Bilis	77,730	Brunei Shell Tankers	La Seyne	Mar-75	Brunei	S	GTT	5	Brunei LNG
Bishu Maru	162,000	K Line-Transpacific	Kawasaki Sakaide	Dec-15	Panama	S	Moss	4	Australia-Japan
Boris Davydov	172,600	Dynagas	Daewoo	Sept-18	Cyprus	DFDE	GTT	4	Yamal LNG
Boris Vilkitsky	172,600	Dynagas	Daewoo	Jan-17	Cyprus	DFDE	GTT	4	Yamal LNG
British Achiever	173,644	BP Shipping	Daewoo	June-18	IOM	MEGI-DF	GTT	4	Various
British Contributor	173,644	BP Shipping	Daewoo	Oct-18	IOM	MEGI-DF	GTT	4	Various
British Diamond	155,000	BP Shipping	Hyundai	Sep-08	IOM	DFDE	GTT	4	Indonesia-Various
British Emerald	155,000	BP Shipping	Hyundai	Jun-07	UK	DFDE	GTT	4	Tangguh LNG
British Innovator	138,200	BP Shipping	Samsung	Jul-03	Isle of Man	S	GTT	4	Various
British Merchant	138,000	BP Shipping	Samsung	Apr-03	Isle of Man	S	GTT	4	Various
British Partner	173,644	BP Shipping	Daewoo	Mar-18	IOM	MEGI-DF	GTT	4	Various
British Ruby	155,000	BP Shipping	Hyundai	Jan-08	U.K.	DFDE	GTT	4	Various
British Sapphire	155,000	BP Shipping	Hyundai	Sep-08	IOM	DFDE	GTT	4	Tangguh
British Trader	138,000	BP Shipping	Samsung	Dec-02	Isle of Man	S	GTT	4	Engas
Broog	135,466	J4 Consortium	Mitsui Chiba	May-98	Japan	S	Moss	5	Qatargas
Bu Samara	266,000	QGTC	Samsung	Dec-08	Qatar	DRL	GTT	5	Qatargas
BW GDF Suez Boston	138,059	BW Gas	Daewoo	Jan-03	Norway	S	GTT	4	Suez LN
BW GDF Suez Everett	138,028	BW Gas	Daewoo	Jun-03	Norway	S	GTT	4	Suez LNG
BW Integrity	170,000	BW Gas	Samsung	May-17	Singapore	DFDE	GTT	4	FSRU
BW Lilac	173,400	BW Gas	Daewoo	Mar-18	Malta	MEGI-DF	GTT	4	various
BW Pavilion Leeara	161,880	BW Gas	Hyundai	Feb-15	Singapore	DFDE	GTT	4	Various
BW Pavilion Vanda	161,880	BW Gas	Hyundai	Feb-15	Singapore	DFDE	GTT	4	Various
BW Singapore	170,000	BW Gas	Samsung	May-15	Singapore	DFDE	GTT	4	FSRU
BW Suez Brussels	162,400	BW Gas	Daewoo	May-09	N.I.S.	DFDE	GTT	4	Yemen-Atlantic
BW Suez Paris	162,400	BW Gas	Daewoo	May-09	N.I.S.	DFDE	GTT	4	Yemen-Atlantic
BW Tulip	173,400	BW Gas	Daewoo	Jan-18	Malta	MEGI-DF	GTT	4	various
Cadiz Knutsen	138,826	Knutsen / Marpetrol	IZAR Puerto Real	Jun-04	Spain	S	GTT	4	Engas
Cape Ann	145,000	Hoegh LNG/MOL	Samsung	May-10	Liberia	DFDE	GTT	4	Various
Castillo de Santisteban	173,600	Elcano	STX	Aug-10	Malta	S	GTT		Various
Castillo de Villalba	138,000	Elcano	IZAR	Nov-03	Spain	S	GTT	4	Sonatrach
Catalunya Spirit	138,000	Teekay LNG Partners	IZAR Sestao	Mar-03	Liberia	S	GTT	4	Atlantic LNG
Celestine River	145,000	KLNG	Kawasaki	Dec-07	Bahamas	S	Moss		Various
Cesi Beihai	174,100	MOL-China LNG	Hudong	June-17	Hong Kong	S	GTT	4	Australia-China
Cesi Gladstone	174,100	MOL-China LNG	Hudong	Oct-16	Hong Kong	S	GTT	4	Australia-China
Cesi Lianyungang	174,100	MOL-China LNG	Hudong	June-18	Hong Kong	S	GTT	4	Australia-China
Cesi Qingdao	174,100	MOL-China LNG	Hudong	Nov-16	Hong Kong	S	GTT	4	Australia-China
Cesi Tianjin	174,100	MOL-China LNG	Hudong	Sept-17	Hong Kong	S	GTT	4	Australia-China
Challenger FSRU	263,000	MOL LNG	Daewoo	Oct-17	St Kitts	DFDE	GTT	4	Various
Cheikh Bouamama	75,500	Skikda LNG Transport	USC	Jul-08	Bahamas	S	GTT	4	Sonatrach
Cheikh El Mokrani	75,500	Med LNG Corp	USC	Jun-07	Bahamas	S	GTT	4	Sonatrach
Christophe de Margerie	172,600	SCF	Daewoo	Nov-16	Cyprus	DFDE	GTT	4	Various
Clean Energy	150,000	Dynagas	Hyundai	Mar-07	Marshall Is.	S	GTT	4	Various
Clean Force	150,000	Dynagas	Hyundai	Jan-08	Marshall Is.	S	GTT	4	Various
Clean Ocean	155,900	Dynagas	Hyundai	Mar-14	Marshall Is.	DFDE	GTT	4	Various
Clean Planet	155,900	Dynagas	Hyundai	Mar-14	Marshall Is.	DFDE	GTT	4	Various
Clean Vision	160,000	Dynagas	Hyundai	Jun-15	Marshall Is.	DFDE	GTT	4	Various
Cool Explorer	160,000	Thenamaris	Samsung	Oct-13	Bermuda	DFDE	GTT	4	Various
Cool Runner	160,000	Thenamaris	Samsung	May-14	Bermuda	DFDE	GTT	4	Various
Cool Voyager	160,000	Thenamaris	Samsung	Oct-13	Bermuda	DFDE	GTT	4	Various
Corcovado LNG	160,106	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GTT	4	Various
Creole Spirit	174,000	Teekay	Daewoo	Jan-16	Bahamas	MEGI-DF	GTT	4	Cheniere
Cubal	160,400	Mitsui/NYK/Teekay	Samsung	Jan-12	Bahamas	DFDE	GTT	4	Various
Cygnus Passage	145,400	Cygnus LNG	Mitsubishi	Feb-09	Panama	S	Moss	4	Various
Dapeng Moon	147,000	China Ships	Hudong	Jul-09	China	S	GTT	4	Various
Dapeng Star	147,000	China Ships	Hudong	Nov-09	China	S	GTT	4	Various
Dapeng Sun	147,000	China Ships	Hudong	Jul-07	China	S	GTT	4	Woodside Energy
Diamond Gas Orchid	165,000	MOL-Jera	MHI-Nagasaki	Aug-18	Japan	S-gas	Moss	4	US-Japan
Diamond Gas Rose	165,000	MOL-Jera	MHI-Nagasaki	Aug-18	Japan	S-gas	Moss	4	US-Japan
Disha	136,000	Petronet LNG Ltd.	Daewoo	Jan-04	Malta	S	GTT	4	Qatargas
Doha	137,350	J4 Consortium	Mitsubishi Nagasaki	Jun-99	Japan	S	Moss	5	Qatargas
Duhail	210,100	ProNav	Daewoo	Jan-08	Germany	DRL	GTT	4	Various
Dukhan	135,000	J4 Consortium	Mitsui Chiba	Oct-04	Japan	S	Moss	4	Qatargas
Dwiputra	127,385	Humpuss Consortium	Mitsubishi Nagasaki	Mar-94	Bahamas	S	Moss	4	Pertamina
Ebisu	147,547	Golar LNG	Kawasaki	Sep-08	Bahamas	S	Moss	4	Various
Eduard Toll	172,000	Teekay-CLNG	Daewoo	Dec-17	Bahamas	MEGI-DF	GTT	4	Various
Ejnan	145,000	4J	Samsung	Jan-07	Bahamas	S	GTT		RasGas
Ekaputra	136,400	Humpuss Consortium	Mitsubishi Nagasaki	Jan-90	Liberia	S	Moss	5	Pertamina
Energy Advance	145,000	Tokyo LNG Tankers	Kawasaki Sakaide	Mar-05	Japan	S	Moss	4	Darwin
Energy Atlantic	159,924	Alpha	STX Jinhae	Sep-15	Malta	DFDE	GTT	4	Various
Energy Confidence	155,000	Tokyo LNG Tankers	Kawasaki	Apr-09	Panama	S	Moss	4	Various
Energy Frontier	147,600	Tokyo LNG Tankers	Kawasaki Sakaide	Sep-03	Japan	S	Moss	4	Darwin



Energy Glory	165,000	Tokyo LNG Tankers	JMU	Sept-18	Japan	S	Moss	4	Various
Energy Horizon	177,000	Tokyo LNG Tankers	Kawasaki	Jul-11	Japan	S	Moss	4	Pluto LNG
Energy Liberty	165 000	MOL	JMU Tsu	Oct-18	Japan	TFDE	IHI-SPB	4	Various
Energy Navigator	147,000	Tokyo LNG Tankers	Kawasaki Sakaide	May-08	Japan	S	Moss	4	Various
Energy Progress	145,000	MOL	Kawasaki	Nov-06	Japan	S	Moss	4	Bayu Undan LNG
Enshu Maru	165,257	K Line	Kawasaki	June-18	Japan	S	Moss	4	Various
Esshu Maru	162,000	K Line-Transpacific	Kawasaki Sakaide	Dec-14	Panama	S	Moss	4	Australia-Japan
Excalibur	138,200	Exmar/ Excelerate	Daewoo	Oct-02	Belgium	S	GTT	4	Various
Excel	138,106	Exmar/ MOL	Daewoo	Sep-03	Belgium	S	GTT	4	Various
Excelerate	138,000	Exmar/Excelerate	Daewoo	Oct-06	Belgium	S	GTT	4	Various
Excellence	138,000	GKFF Ltd.	Daewoo	May-05	Belgium	S	GTT	4	Excelerate Energy
Excelsior	138,000	Exmar	Daewoo	Jan-05	Belgium	S	GTT	4	Various
Exemplar	150,900	Excelerate	Daewoo	Jun-10	Belgium	S	GTT	4	Various
Expedient	151,000	Excelerate	Daewoo	Nov-09	Belgium	S	GTT	4	Various
Experience RV	174,000	Exmar/Excelerate	Daewoo	Jul-14	Marshall Is.	DFDE	GTT		Various
Explorer	150,900	Exmar/Excelerate	Daewoo	Mar-08	Belgium	S	GTT	4	Excelerate
Express	151,000	Exmar/Excelerate	Daewoo	May-09	Belgium	S	GTT	4	Various
Exquisite	150,900	Excelerate	Daewoo	Sep-09	Belgium	S	GTT	4	Various
Fedor Litke	172,636	Dynagas	Daewoo	Nov-17	Cyprus	DFDE	GTT	4	Various
Flex Endeavour	173,400	Flex LNG	Daewoo	Jan-18	Marshall Is.	MEGI-DF	GTT	4	Various
Flex Enterprise	173,400	Flex LNG	Daewoo	Jan-18	Marshall Is.	MEGI-DF	GTT	4	Various
Flex Rainbow	174,000	Flex LNG	Samsung	July-18	Marshall Is.	MEGI-DF	GTT	4	Various
Flex Ranger	174,000	Flex LNG	Samsung	April-18	Marshall Is.	MEGI-DF	GTT	4	Various
Fraiha	210,100	J5 Consortium	Daewoo	Sep-08	Marshall Is.	DRL	GTT	4	Qatargas
FSRU Independence	170,000	Hoegh	Hyundai	Feb-14	NIS	DFDE	GTT	4	Various
FSRU Lampung	170,000	Hoegh	Hyundai	May-14	Indonesia	DFDE	GTT	4	Various
Fuji LNG	147,895	TMSC Gas	Kawasaki	Jun-04	Malta	S	Moss	4	Various
Fuwairit	138,000	Peninsular LNG	Samsung	Jan-04	Bahamas	S	GTT	4	RasGas II
Galea	134,425	Shell Shipping	Mitsubishi Nagasaki	Oct-02	Singapore	S	Moss	5	Shell
Galicia Spirit	140,620	Teekay LNG Partners	Daewoo	Jul-04	Liberia	S	GTT	4	Engas
Gaselys	153,500	GdF/NYK	Atlantique	Mar-07	France	DFDE	CS 1	4	Engas
Gallina	134,425	Shell Shipping	Mitsubishi Nagasaki	Oct-02	Singapore	S	Moss	5	Shell
GasLog Chelsea	153,000	GasLog	Hanjin Korea	Dec-09	Panama	TFDE	GTT	4	Various
Gaslog Geneva	174,000	GasLog	Samsung	Sept-16	Bermuda	TFDE	GTT	4	Shell charter
Gaslog Genoa	174,000	GasLog	Samsung	Jun-18	Bermuda	TFDE	XDF	4	Various
Gaslog Gibraltar	174,000	GasLog	Samsung	Oct-16	Bermuda	TFDE	GTT	4	Shell charter
Gaslog Glasgow	174,000	GasLog	Samsung	Jun-16	Bermuda	TFDE	GTT	4	Shell charter
Gaslog Gladstone	174,000	GasLog	Samsung	May-19	Bermuda	XDF	GTT	4	Various
Gaslog Greece	174,000	GasLog	Samsung	Mar-16	Bermuda	TFDE	GTT	4	Shell charter
GasLog Hongkong	174,000	GasLog	Hyundai	Jun-18	Bermuda	XDF	GTT	4	Various
GasLog Houston	174,000	GasLog	Hyundai	Jan-18	Bermuda	XDF	GTT	4	Various
GasLog Salem	165,000	GasLog	Samsung	Apr-15	Liberia	TFDE	GTT	4	Various
GasLog Santiago	155,000	GasLog	Samsung	Mar-13	Liberia	TFDE	GTT	4	Various
GasLog Saratoga	155,000	GasLog	Samsung	Dec-14	Bermuda	TFDE	GTT	4	Various
Gaslog Savannah	155,000	GasLog	Samsung	May-10	Bermuda	DFDE	GTT	4	Various
GasLog Seattle	155,000	GasLog	Samsung	Oct-13	Bermuda	TFDE	GTT	4	Various
GasLog Shanghai	155,000	GasLog	Samsung	Jan-13	Liberia	TFDE	GTT	4	Various
Gaslog Singapore	155,000	GasLog	Samsung	Jul-10	Bermuda	DFDE	GTT	4	Various
Gaslog Skagen	155,000	GasLog	Samsung	Oct-13	Bermuda	DFDE	GTT	4	Various
Gaslog Sydney	155,000	GasLog	Samsung	May-13	Bermuda	DFDE	GTT	4	Various
Gaslog Warsaw	174,000	GasLog	Samsung	May-19	Bermuda	TFDE	GTT	4	Various
GDF-Suez Global Energy	74,000	Gaz de France	Chantiers	Dec-06	France	DFDE	CS1	4	Sonatrach
GDF-Suez Point Fortin	154,200	LNG Japan	Imabari/Koyo	Feb-10	Panama	DFDE	GTT	4	Various
Gemmata	138,100	Shell Shipping	Mitsubishi Nagasaki	Mar-04	Singapore	S	Moss	5	Shell
Georgiy Brusilov	172,000	Dynagas	Daewoo	Jun-18	Cyprus	DFDE	GTT	4	Yamal LNG
Ghasha	137,510	National Gas Shipping	Mitsui	Jun-95	Liberia	S	Moss	5	ADGAS
Gigira Laitebo	177,000	MOL-Itochu	Hyundai	Feb-09	Panama	DFDE	GTT	4	Various
Golar Arctic	140,645	Golar LNG	Daewoo	Dec-03	Marshall Is.	S	GTT	4	Shell Spot
Golar Bear	160,000	Golar	Samsung	Mar-14	Bermuda	TFDE	GTT	4	Various
Golar Celsius	160,000	Golar LNG	Samsung	Sep-13	Bermuda	DFDE	GTT	4	Various
Golar Crystal	160,000	Golar LNG	Samsung	Oct-13	Bermuda	TFDE	GTT	4	Various
Golar Eskimo (FSRU)	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	GTT	4	Various
Golar Freeze	125,850	Golar LNG	HDW	Feb-77	UK	S	Moss	5	Various
Golar Glacier	162,000	Golar LNG	Hyundai	Sep-14	Marshall Is.	TFDE	GTT	4	Various
Golar Grand	145,880	Golar LNG	Daewoo	2006	IoM	S	GTT	4	Various
Golar Ice	160,000	Golar LNG	Samsung	Feb-15	Bermuda	DFDE	GTT	4	Various
Golar Igloo (FSRU)	160,000	Golar LNG	Samsung	Oct-13	Bermuda	DFDE	GTT	4	Various
Golar Kelvin	160,000	Golar LNG	Samsung	Jan-15	Bermuda	DFDE	GTT	4	Various
Golar Maria	145,950	Golar LNG	Daewoo	2006	Marshall Is.	S	GTT	4	Various
Golar Mazo	135,225	Golar LNG/CPP	Mitsubishi	Jan-00	Liberia	S	Moss	5	Pertamina
Golar Penguin	160,000	Golar LNG	Samsung	Mar-14	Marshall Is.	TFDE	GTT	4	Various
Golar Seal	160,000	Golar LNG	Samsung	Aug-13	Bermuda	TFDE	GTT	4	Various
Golar Singapore (FSRU)	160,000	Golar LNG	Samsung	June-15	Bermuda	TFDE	GTT	4	Various
Golar Snow	160,000	Golar LNG	Samsung	Jan-15	Bermuda	TFDE	GTT	4	Various
Golar Tundra (FSRU)	160,000	Golar LNG	Samsung	Dec-15	Bermuda	TFDE	GTT	4	Various



Golar Viking	140,000	Golar LNG	Hyundai	Jan-05	Marshall Is.	S	Moss	4	Various
Golar Winter	138,250	Golar LNG	Daewoo	Apr-04	Marshall Is.	S	GTT	4	Petrobras
Grace Acacia	150,000	Algaet Shipping	Hyundai	Jan-07	Japan	S	GTT	4	Various
Grace Barleria	150,000	Swallowtail Ship	Hyundai	Oct-07	Japan	S	GTT	4	Various
Grace Cosmos	150,000	AGH Shipping	Hyundai	Mar-08	Japan	S	GTT	4	Various
Grace Dahlia	177,000	Tokyo Gas	Kawasaki	Oct-13	Japan	S	Moss	4	Various
Gracilis	138,830	Golar LNG	Hyundai	Jan-05	Marshall Is.	S	GTT	4	Shell BG
Granatina	140,645	Shell Shipping	Daewoo	Dec-03	Singapore	S	GTT	4	Shell
Grand Aniva	147,200	Sovcomflot/NYK	Mitsubishi	Jan-08	Japan	S	Moss	4	Various
Grand Elena	147,200	Sovcomflot/NYK	Mitsubishi	Oct-07	Japan	S	Moss	4	Various
Grand Mereya	147,200	Primorsk/MOL/K Line	Chiba	May-08	Japan	S	Moss	4	Sakhalin II
Hanjin Muscat	138,200	Hanjin Shipping	Hanjin	Jul-99	Panama	S	GTT	4	Oman Gas
Hanjin Pyeong Taek	130,600	Hanjin Shipping	Hanjin	Sep-95	Panama	S	GTT	4	Pertamina
Hanjin Ras Laffan	138,214	Hanjin Shipping	Hanjin	Jul-00	Panama	S	GTT	4	QatarGas
Hanjin Sur	138,333	Hanjin Shipping	Hanjin	Jan-00	Panama	S	GTT	4	Oman Gas
Hispania Spirit	140,500	Teekay LNG Partners	Daewoo	Sep-02	Spain	S	GTT	4	Atlantic LNG
Hoegh Esperanza FSRU	170,000	Hoegh	Hyundai	April-18	Norway	DFDE	GTT	4	Various
Hoegh Gallant FSRU	170,050	Hoegh LNG	Hyundai	May-14	Marshall Is.	DFDE	GTT	4	chartered
Hoegh Giant FSRU	170,050	Hoegh LNG	Hyundai	Jan-18	Marshall Is.	DFDE	GTT	4	various
Hoegh Grace FSRU	170,050	Hoegh LNG	Hyundai	May-15	Marshall Is.	DFDE	GTT	4	various
Hyundai Aquapia	135,000	Hyundai MM	Hyundai	Mar-00	Panama	S	Moss	4	Oman Gas
Hyundai	135,000	Hyundai MM	Hyundai	Jan-00	Panama	S	Moss	4	RasGas
Hyundai Ecopia	145,000	Hyundai	Hyundai	Nov-08	Panama	S	GTT	4	Various
Hyundai Greenpia	125,000	Hyundai MM	Hyundai	Nov-96	Panama	S	Moss	4	Pertamina
Hyundai Oceanpia	135,000	Hyundai MM	Hyundai	Jul-00	Panama	S	Moss	4	Oman Gas
Hyundai Technopia	135,000	Hyundai MM	Hyundai	Jul-00	Panama	S	Moss	4	RasGas
Hyundai Utopia	125,182	Hyundai MM	Hyundai	Jun-94	Panama	S	Moss	4	Pertamina
Iberica Knutsen	138,000	Knutsen OAS	Daewoo	Aug-06	Norway	S	GT 96	4	Gas Natural
Ibra LNG	147,100	Oman Gas	Samsung	Jun-06	Panama	S	GTT	4	Oman LNG
Ibri LNG	145,000	Oman Gas	Mitsubishi	Jul-06	Panama	S	GTT	4	Oman LNG
Ish	137,540	National Gas Shipping	Mitsubishi Nagasaki	Nov-95	Liberia	S	Moss	5	ADGAS
K Acacia	138,017	Korea Line	Daewoo	Jan-00	Panama	S	GTT	4	Oman Gas
K Freesia	135,256	Korea Line	Daewoo	Jun-00	Panama	S	GTT	4	RasGas
Kinisis	173,400	K-Line	Daewoo	Jan-18	Liberia	MEGI-DF	GTT	4	Various
K Jasmine	145,700	Korea Line	Daewoo	Mar-08	Panama	S	GTT	4	Kogas offtake
K Mugungwha	152,000	K Line	Daewoo	Nov-08	Panama	S	GTT	4	Various
Kita LNG	160,106	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GTT	4	Various
Kotawaka Maru	125,200	J3 Consortium	Kawasaki Sakaide	Jan-84	Japan	S	Moss	5	Darwin
Kumul	172,000	MOL	Hudong	May-16	Hong Kong	DRL	GTT	4	PNG-Asia
Lalla Fatma N'Soumer	145,000	Algeria Nippon Gas	Kawasaki Sakaide	Dec-04	Bahamas	S	Moss	4	Various
Lijmilya	261,700	QGTC	Daewoo	Sep-08	Marshall Is.	DRL	GTT	5	Various
LNG Abalamabie	174,900	Bonny Gas	Samsung	Nov-16	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Abuja	126,530	Bonny Gas Transport	GD Quincy	Sep-80	Bahamas	S	Moss	5	Nigeria LNG
LNG Abuja II	174,900	Bonny Gas	Samsung	Oct 16	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Adamawa	141,000	Bonny Gas Transport	Hyundai	Jun-05	Bermuda	S	Moss	4	Various
LNG Akwa Ibom	141,000	Bonny Gas Transport	Hyundai	Nov-04	Bermuda	S	Moss	4	Various
LNG Aquarius	126,300	MOL/LNG Japan	GD Quincy	Jun-77	Marshall Is.	S	Moss	5	Various
LNG Barka	153,000	NYK	Kawasaki	Jan-09	Bahamas	S	Moss	4	Various
LNG Bayelsa	137,500	Bonny Gas Transport	Hyundai	Feb-03	Bermuda	S	Moss	4	Nigeria LNG
LNG Benue	145,700	BW Gas	Daewoo	Mar-06	Bermuda	S	GTT	4	Nigeria LNG
LNG Bonny	177,000	Bonny Gas Transport	Hyundai	Oct-15	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Borno	149,600	NYK Line	Samsung	Aug-07	Japan	S	GTT	4	Nigeria LNG
LNG Capricorn	126,300	MOL/LNG Japan	GD Quincy	Jun-78	Marshall Is.	S	Moss	5	Pertamina
LNG Cross River	141,000	Bonny Gas Transport	Hyundai	Sep-05	Bermuda	S	Moss	4	Various
LNG Dream	145,000	Osaka Gas	Kawasaki	Sep-06	Japan	S	Moss	4	Woodside Energy
LNG Dubhe	174,000	MOL-Cosco	Hudong	Sept-19	China	S	GTT	4	Russia-Asia
LNG Ebisu	147,500	MOL	Kawasaki	Sep-08	Bahamas	S	Moss	4	Various
LNG Edo	126,530	Bonny Gas Transport	GD Quincy	May-80	Bahamas	S	Moss	5	Nigeria LNG
LNG Enugu	145,000	BW Gas	Daewoo	Oct-05	Bermuda	S	GTT	4	Nigeria LNG
LNG Fimina	175,000	Bonny Gas Transport	Samsung	Oct-15	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Flora	127,700	J3 Consortium	Kawasaki Sakaide	Mar-93	Japan	S	Moss	4	Pertamina
LNG Fukurokuju	165,000	MOL	Kawasaki	June-15	Japan	S	Moss	4	Various
LNG Gemini	126,300	MOL/LNG Japan	GD Quincy	Sep-78	Marshall Is.	S	Moss	5	Pertamina
LNG Imo	148,300	BW Gas	Daewoo	Jun-08	Bermuda	S	GTT	4	Nigeria LNG
LNG Jamal	135,330	Osaka Gas/J3 Consortium	Mitsubishi Nagasaki	Oct-00	Japan	S	Moss	5	Oman Gas
LNG Juno	177,300	MOL-Osaka	Mitsubishi	Oct-18	Marshall Is.	DFDE	Moss	4	Freeport LNG/Various
LNG Jupiter	145,000	NYK Line	Kawasaki	Jul-09	Bahamas	S	Moss	4	Various
LNG Jurojin	155,300	MOL	MHI Nagasaki	Nov-15	Japan	S	KM	4	Various
LNG Kano	148,471	BW Gas	Daewoo	Jan-07	Bermuda	S	GTT	4	NLNG
LNG Lagos	177,000	Bonny Gas	Hyundai	Oct-15	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Leo	126,400	MOL/LNG Japan	GD Quincy	Dec-78	Marshall Is.	S	Moss	5	Pertamina
LNG Lerici	65,000	Exmar	Italcantieri Sestri	Mar-98	Italy	S	GTT	4	Sonatrach
LNG Libra	126,400	Hoegh LNG	GD Quincy	Apr-79	Marshall Is.	S	Moss	5	Various
LNG Lokoja	148,300	BW Gas	Daewoo	Dec-06	Bermuda	S	GTT	4	Nigeria LNG
LNG Mars	155,000	MOL/Osaka Gas	Mitsubishi	Oct-16	Marshall Is.	S	Moss	5	Various

CARRIER FLEET



LNG Merak	174,000	MOL-Cosco	Hudong	Nov-19	China	S	GTT	4	Russia-Asia
LNG Ogun	148,300	NYK Line	Samsung	Aug-07	Japan	S	GTT	4	Nigeria LNG
LNG Ondo	148,300	BW Gas	Daewoo	Sep-07	Bermuda	S	GTT	4	Nigeria LNG
LNG Oyo	140,500	BW Gas	Daewoo	Dec-05	Bermuda	S	GTT	4	Nigeria LNG
LNG Pioneer	138,000	MOL	Daewoo	Jul-05	Bahamas	S	GTT	4	Idku
LNG Port Harcourt	175,000	Bonny Gas	Samsung	Oct-15	Bermuda	DFDE	GTT	4	Nigeria LNG
LNG Portovenere	65,000	Exmar	Italcantieri Sestri	Jun-96	Italy	S	GTT	4	Sonatrach
LNG River Niger	141,000	Bonny Gas Transport	Hyundai	May-06	Bermuda	S	Moss	4	Various
LNG River Orashi	145,910	BW Gas	Daewoo	Nov-04	Bermuda	S	GTT	4	Nigeria LNG
LNG Rivers	137,231	Bonny Gas Transport	Hyundai	Jun-02	Bermuda	S	Moss	4	Nigeria LNG
LNG Sakura	177,000	NYK-Kepco	Kawasaki	Mar-18	Bahamas	DFDE	GTT	4	Various
LNG Saturn	153,000	MOL	MHI	Nov-15	Japan	S	Moss	4	Various
LNG Schneeweisschen	180,000	MOL-Itochu	Daewoo	Aug-18	Panama	XDF	GTT	4	Various
LNG Sokoto	137,231	Bonny Gas Transport	Hyundai	Aug-02	Bermuda	S	Moss	4	Nigeria LNG
LNG Taurus	126,300	MOL/LNG Japan	GD Quincy	Aug-79	Marshall Is.	S	Moss	5	Various
LNG Venus	155,000	Osaka/MOL	MHI	Oct-14	Japan	S	Moss	4	Various
LNG Vesta	127,547	Tokyo Gas Consortium	Mitsubishi Nagasaki	Jun-94	Japan	S	Moss	4	Pertamina
LNG Virgo	126,400	MOL/LNG Japan	GD Quincy	Dec-79	Marshall Is.	S	Moss	5	Pertamina
Lobito	160,400	Mitsui/NYK/Teekay	Samsung	Oct-11	Bahamas	DFDE	GTT	4	Various
Lusail	138,000	Peninsular LNG	Samsung	May-05	Bahamas	S	GTT	4	Qatar
Macoma	173,400	Teekay	Daewoo	Oct-17	Bahamas	DFDE	GTT	4	Various
Madrid Spirit	138,000	Teekay LNG Partners	IZAR Puerto Real	Jan-05	Spain	S	GTT	4	Engas
Magdala	173,400	Teekay	Daewoo	Feb-18	Bahamas	DFDE	GTT	4	Various
Magellan Spirit	165,500	Teekay LNG Partners	Samsung	Sep-08	Denmark	DFDE	GTT	4	Various
Malanje	160,400	Mitsui/NYK/Teekay	Samsung	Jul-11	Bahamas	DFDE	GTT	4	Various
Maran Gas Achilles	174,000	Maran	Hyundai Samho	Feb-16	Greece	DFDE	GTT	4	Various
Maran Gas Agamemnon	174,000	Maran	Hyundai Samho	May-16	Greece	DFDE	GTT	4	Various
Maran Gas Alexandria	161,870	Maran	Hyundai Samho	Sep-15	Greece	DFDE	GTT	4	Various
Maran Gas Amphipolis	173,400	Maran	Daewoo	Aug-16	Greece	DFDE	GTT	4	Various
Maran Gas Apollonia	161,870	Maran	Daewoo	Jan-14	Greece	DFDE	GTT	4	Various
Maran Gas Asclepius	145,000	Kristen Navigation	Daewoo	Jul-05	Bermuda	S	GTT	4	Qatar
Maran Gas Coronis	145,700	Maran	Daewoo	Sep-07	Greece	S	GTT	4	Rasgas II
Maran Gas Delphi	159,800	Maran	Daewoo	Feb-14	Greece	DFDE	GTT	4	Various
Maran Gas Efessos	159,800	Maran	Daewoo	Jun-14	Greece	DFDE	GTT	4	Various
Maran Gas Hector	174,000	Maran	Hyundai Samho	Nov-16	Greece	DFDE	GTT	4	Various
Maran Gas Lindos	159,800	Maran	Daewoo	Jun-15	Greece	DFDE	GTT	4	Various
Maran Gas Mystras	155,900	Maran Gas	Daewoo	May-15	Greece	DFDE	GTT	4	Various
Maran Gas Olympias	174,500	Maran	DSME	Feb-17	Greece	DFDE	GTT	4	Various
Maran Gas Pericles	174,000	Maran	Hyundai Samho	June-16	Greece	DFDE	GTT	4	Various
Maran Gas Posidonia	161,870	Maran	Daewoo	May-14	Greece	DFDE	GTT	4	Various
Maran Gas Roxana	173,400	Maran	Daewoo	Jan-17	Greece	DFDE	GTT	4	Various
Maran Gas Sparta	161,870	Maran	Hyundai Samho	April-15	Greece	DFDE	GTT	4	Various
Maran Gas Spetses	174,000	Maran	Daewoo	Feb-18	Greece	DFDE	GTT	4	Various
Maran Gas Troy	155,900	Maran Gas	Daewoo	May-15	Greece	DFDE	GTT	4	various
Maran Gas Ulysses	174,000	Maran	Hyundai Samho	Jan-17	Greece	DFDE	GTT	4	Various
Maria Energy	174,000	Tsakos	Hyundai	Mar-15	Marshall Is.	TFDE	GTT	4	Various
Marib Spirit	165,000	Teekay LNG	Samsung	May-08	Marshall Is.	DFDE	GTT	4	Various
Marvel Crane	177,000	NYK-Mitsui	Mitsubishi	Mar-19	Singapore	S	Moss	4	US/Various
Marvel Eagle	155,000	MOL-Osaka	Kawasaki	Sept-18	Marshall Is.	S	Moss	4	Cameron LNG/Various
Marvel Falcon	174,000	NYK-Mitsui	Samsung	Dec-18	Singapore	XDF	GTT	4	Cameron LNG/Various
Marvel Hawk	174,000	NYK-Mitsui	Samsung	Dec-18	Singapore	XDF	GTT	4	Cameron LNG/Various
Marvel Kite	174,000	NYK-Mitsui	Samsung	Dec-18	Singapore	XDF	GTT	4	Various
Matthew	126,540	Suez LNG Shipping	Newport News	Jun-79	Bahamas	S	GTT	6	Atlantic LNG
Megara	173,000	Teekay	Daewoo	Oct-18	Bahama	MEGI-DF	GTT	4	Various
Mekaines	266,000	Naklilat	Samsung	Mar-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Meridian Spirit	165,500	Teekay LNG	Samsung	Jan-10	Denmark	DFDE	GTT	4	Various
Mesaimeer	210,100	Naklilat	Hyundai	Mar-09	Liberia	DRL	GTT	4	Qatar-Atlantic Basin
Methane Alison Victoria	145,000	GasLog	Samsung	Aug-07	Bermuda	S	GTT	4	Eq.Guinea LNG
Methane Becki Anne	170,000	GasLog	Samsung	Sep-10	Bermuda	TFDE	GTT	4	Various
Methane Heather Sally	145,000	GasLog	Samsung	Jul-07	Bermuda	S	GTT	4	Eq.Guinea LNG
Methane Jane Elizabeth	145,000	GasLog	Samsung	Jun-06	Bermuda	TFDE	GTT	4	Engas
Methane Julia Louise	170,000	GasLog	Samsung	Dec-09	Bermuda	TFDE	GTT	4	Various
Methane Kari Elin	138,200	Shell	Samsung	Jun-04	Bermuda	S	GTT	4	Various
Methane Lake Charles	145,000	Shell	Samsung	Feb-07	Bermuda	S	GTT	4	Marathon Oil
Methane Lydon Volney	145,000	Shell	Samsung	Aug-06	Bermuda	S	GTT	4	Engas
Methane Mickie Harper	170,000	Shell-GasLog	Samsung	Nov-10	Bermuda	TFDE	GTT	4	Various
Methane Nile Eagle	145,000	Shell-GasLog	Samsung	Dec-07	Bermuda	S	GTT	4	Engas
Methane Patricia Camila	170,000	Shell-GasLog	Samsung	Oct-10	Bermuda	TFDE	GTT	4	Various
Methane Princess	138,159	Golar LNG	Daewoo	2003	UK	S	GTT	4	Spot BG
Methane Rita Andre	145,000	GasLog	Samsung	Mar-06	Bermuda	S	GTT	4	Engas
Methane Shirley Elizabeth	145,000	GasLog	Samsung	Apr-07	Bermuda	S	GTT	4	Marathon Oil
Methane Sprit	165,000	Teekay LNG	Samsung	Mar-08	Singapore	DFDE	GTT	4	Various
Milaha Qatar	145,000	Milaha	Samsung	Apr-06	Denmark	S	GTT	4	Qatar
Milaha Ras Laffan	138,270	Milaha	Samsung	Mar-04	Denmark	S	GTT	4	RasGas II
Min Lu	147,000	China Ships	Hudong	Aug-09	China	S	GTT	4	Various



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

CARRIER FLEET



Seri Balhaf	152,000	MISC	Mitsubishi	Sep-08	Malaysia	S	GTT	4	Various
Seri Balquis	152,000	MISC	Mitsubishi	Dec-08	Malaysia	S	GTT	4	Various
Seri Begawan	152,300	MISC	Mitsubishi	Dec-07	Malaysia	S	GTT	4	Various
Seri Bijaksana	152,300	MISC	Mitsubishi	Feb-08	Malaysia	S	GTT	4	Petronas
Seri Camar	150,200	MISC	Hyundai	Feb-18	Malaysia	S	Moss	4	Petronas
Seri Camellia	150,000	MISC	Hyundai	Nov-16	Malaysia	S	Moss	4	Petronas
Seri Cemara	150,200	MISC	Hyundai	Apr-18	Malaysia	S	Moss	4	Petronas
Seri Cempak	150,200	MISC	Hyundai	Feb-18	Malaysia	S	Moss	4	Petronas
Seri Cenderawasih	150,000	MISC	Hyundai	Jan-17	Malaysia	S	Moss	4	Petronas
Sestao Knutsen	138,000	Knutsen	IZAR Sestao	Jan-07	Spain	S	GTT	4	Atlantic LNG
Sevilla Knutsen	173,400	Knutsen	Daewoo	Jun-10	N.I.S.	DFDE	GTT	4	Various
Shahamah	135,500	National Gas Shipping	Kawasaki Sakaide	Oct-94	Liberia	S	Moss	5	ADGAS
Shangra	266,000	QGTC	Samsung	Nov-09	Liberia	DRL	GTT	5	Qatargas IV
Shen Hai	147,100	China LNG	Hudong Zhonghua	Sep-12	China	AB/CC Steam	GTT	4	Various
Simaisma	147,700	Maran Gas Maritime	Daewoo	Jul-06	Greece	S	GTT	4	Qatar
SK Audace	180,000	SK-Marubeni	Samsung	Jul-17	Panama	XDF	GTT	4	Various
SK Resolute	180,000	SK-Marubeni	Samsung	Jun-18	Panama	XDF	GTT	4	Various
SK Splendor	138,375	SK Shipping	Samsung	Mar-00	Panama	S	GTT	4	Oman Gas
SK Stellar	138,375	SK Shipping	Samsung	Dec-00	Panama	S	GTT	4	RasGas
SK Summit	138,000	SK Shipping	Daewoo	Aug-99	Panama	S	GTT	4	RasGas
SK Sunrise	138,306	I. S. Carriers	Samsung	Sep-03	Panama	S	GTT	4	RasGas
SK Supreme	138,200	SK Shipping	Samsung	Jan-00	Panama	S	GTT	4	RasGas
Sohar LNG	137,250	Oman Gas/ MOL	Mitsubishi Nagasaki	Oct-01	Malta	S	Moss	5	Oman Gas
Solaris	155,000	GasLog	Samsung	Jul-14	Bermuda	TFDE	GTT	4	Various
Sonangol Benguela	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GTT	4	Angola LNG
Sonangol Etosha	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GTT	4	Angola LNG
Sonangol Sambizanga	160,500	Sonangol	Daewoo	Sep-11	Bahamas	S	GTT	4	Angola LNG
Southern Cross	172,000	MOL	Hudong	May-15	Hong Kong	DRL	GTT	4	Various
Soyo	160,400	Mitsui/NYK/Teekay	Samsung	May-11	Bahamas	DFDE	GTT	4	Various
Spirit of Hela	177,000	MOL	Hyundai	Oct-09	Panama	DFDE	GTT	4	Various
Stena Blue Sky	145,700	Stena	Daewoo	Jan-06	Panama	S	GTT	4	Various
Stena Clear Sky	171,800	Stena	Daewoo	Sep-10	Panama	DFDE	GTT	4	Various
Stena Crystal Sky	171,800	Stena	Daewoo	Jul-10	Panama	DFDE	GTT	4	Various
STX Kolt	145,700	STX Panocean	Korea Hanjin	Nov-08	Panama	DFDE	GTT	4	Various
Suez Point Fortin	154,200	Trinity LNG	Koyo Japan	Nov-09	Panama	S	GTT	4	Yemen LNG
Symphonic Breeze	147,608	K-Line	Mitsubishi Nagasaki	Oct-07	Bahamas	DFDE	Moss	4	Australia-Japan
Taitar No. 1	145,000	NYK Line	Mitsubishi	Oct-09	Liberia	S	Moss	4	Various
Taitar No. 3	145,000	NYK Line	Mitsubishi	Jan-10	Liberia	S	Moss	4	Various
Taitar No. 4	145,000	NYK	Mitsubishi	Jan-10	Liberia	S	Moss	4	Various
Tangguh Batur	145,700	Sovcomflot/NYK	Daewoo	Dec-08	Cyprus	S	GTT		Tangguh
Tangguh Foja	155,000	K Line	Samsung	Jul-08	Panama	DFDE	GTT	4	Tangguh LNG
Tangguh Hiri	155,000	Teekay LNG	Hyundai	Nov-08	IOM	DFDE	GTT	4	Tangguh
Tangguh Jaya	145,700	K Line	Samsung	Nov-08	Panama	DFDE	GTT	4	Tangguh
Tangguh Palung	155,000	K Line	Samsung	Mar-09	Panama	DFDE	GTT	4	Tangguh
Tangguh Sago	155,000	Teekay LNG	Hyundai	Mar-09	IOM	DFDE	GTT	4	Tangguh LNG
Tangguh Towuti	145,700	Sovcomflot/NYK	Daewoo	Oct-08	Cyprus	S	GTT	4	Tangguh
Tembek	216,200	OSG/Nakilat	Samsung	Sep-07	Marshall Is.	DRL	GTT	4	Qatargas II
Tenaga Satu	130,000	MISC	Dunkerque	Sep-82	Malaysia	S	GTT	5	Petronas
Tessala	171,866	Hyproc Shipping	Hyundai	Dec-16	Algeria	DFDE	GTT	4	Sonatrach
Torben Spirit	173,000	Teekay	Daewoo	Feb-17	Bahama	MEGI-DF	GTT	4	Various
Trinity Arrow	154,900	K Line	Imabari Shipbuilding	Mar-08	Panama	S	GTT	4	Various
Umm Al Amad	210,100	J5	Daewoo	Aug-08	Marshall Is.	DRL	GTT	4	Ras Gas III
Umm Al Ashtan	137,000	National Gas Shipping	Kvaerner- Masa	May-97	Liberia	S	Moss	4	ADGAS
Umm Bab	145,000	Kristen Navigation	Daewoo	Nov-05	Bermuda	S	GTT	4	Qatargas
Umm Slaal	266,000	QGTC	Samsung	Nov-08	Qatar	DRL	GTT	5	Qatargas
Valencia Knutsen	173,400	Knutsen	Daewoo	Sep-10	Nor-NIS	DFDE	GTT	4	Various
Velikiy Novgorod	170,200	SovComFlot	STX	Feb-14	Liberia	DFDE	GTT	4	Various
Vladimir Rusanov	172,000	MOL-China Shipping	Daewoo	Mar-18	Hong Kong	DFDE	GTT	4	Yamal
Vladimir Viz	172,000	MOL-China Shipping	Daewoo	Sept-18	Hong Kong	DFDE	GTT	4	Yamal
Vladimir Voronin	172,600	Teekay	Daewoo	Jun-19	Bahamas	MEGI-DF	GTT	4	Various
Wakaba Maru	125,000	J3 Consortium	Mitsui Chiba	Apr-85	Japan	S	Moss	5	Pertamina
WilForce	156,000	Teekay LNG	Daewoo	Aug-13	NIS	DFDE	GTT	4	Various
WilPride	156,000	Teekay	Daewoo	June-13	NIS	DFDE	GTT	4	Various
Woodside Cheney	174,000	Maran	Hyundai Samho	Mar-16	Greece	DFDE	GTT	4	Various
Woodside Donaldson	165,500	Teekay LNG	Samsung	Dec-09	Singapore	DFDE	GTT	4	Various
Woodside Goode	159,800	Maran	Daewoo	Jul-14	Greece	DFDE	GTT	4	Various
Woodside Reeswithers	173,400	Maran	Daewoo	Nov-16	Greece	DFDE	GTT	4	Various
Woodside Rogers	155,900	Maran Gas	DSME	Jul-13	Greece	DFDE	GTT	4	Various
Yamal Spirit	174,000	Teekay	Hyundai Samho	Jan-19	Bahama	MEGI-DF	GTT	4	Various
Yari LNG	159,983	TMSC Gas	Daewoo	Jun-14	Malta	TFDE	GTT	4	Various
Yenisei River	155,000	Dynagas	Hyundai	Jul-13	Marshall Is.	DFDE	GTT	4	Various
YK Sovereign	127,125	SK Shipping	Hyundai	Dec-94	Panama	S	Moss	4	Pertamina
Zarga	266,000	QGTC	Samsung	Dec-09	Liberia	DRL	GTT	5	Qatar-Atlantic
Zekreet	135,420	J4 Consortium	Mitsui Chiba	Dec-98	Japan	S	Moss	5	Qatargas

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

LNG Import Terminals

Explanatory Notes

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

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

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

LNG Import Terminals (continued)

Country	Location (Project)	Owners	Start up	Storage	
				Tanks	Capacity
Japan (continued)	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
	Soma Fukushima	Japan Petroleum Exploration	2017	1	225,000
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
Malaysia	Pengerang Johor	Petronas Gas	2017	2	400,000
Mexico	Altamira	Vopak, Enagas	2006	2	300,000
	Energia Costa Azul	Sempra LNG	2008	2	320,000
	Manzanillo	Samsung, Kogas, Mitsui	2012	2	300,000
Netherlands	Gate LNG	Gasunie, Royal Vopak	2011	3	540,000
Panama	Costa Norte	AES	2018	1	130,000
Phillipines	Pagbilao LNG	Energy World Corp.	2017	1	130,000
Poland	Swinoujscie	Baltic Gaz System	2015	2	320,000
Portugal	Sines	REN Atlantico	2004	3	390,000
Puerto Rico	Penuelas	EcoElectrica	2000	1	160,000
Singapore	Singapore	Singapore Energy Authority	2013	3	540,000
Spain	Barcelona	Enagas	1969	8	840,000
	Huelva	Enagas	1988	5	610,000
	Cartagena	Enagas	1989	5	587,000
	Bilbao	Enagas, EVE	2003	3	450,000
	Sagunto	GNF, Osaka Gas, Oman Oil	2006	4	600,000
	Mugardos, El Ferrol	Reganosa, Sonatrach, Sojitz Corp.	2006	2	300,000
	El Musel, Gijón,	Enagas	2013	2	300,000
Taiwan	Yung-An	CPC	1990	6	690,000
	Tai-Chung	CPC	2009	5	800,000
Thailand	Map Ta Phut	PTT LNG	2011	2	320,000
Turkey	Marmara Ereglisi	Botas	1994	3	255,000
	Izmir	EgeGaz	2006	2	280,000
USA	Everett	Suez LNG NA	1971	2	155,000
	Lake Charles	Shell, ETE	1982	4	425,000
	Freeport	Freeport LNG Development	2008	2	320,000
	Golden Pass, TX	Qatar Petroleum, ExxonMobil	2010	5	775,000
	Pascagoula, MS	Gulf LNG, Kinder	2012	2	320,000
UK	Isle of Grain	National Grid	2005	8	1,000,000
	South Hook	ExxonMobil, Qatar Petroleum, Total	2009	5	775,000
	Dragon LNG, Milford Haven	Shell, Petronas	2009	2	310,000

LNG Import Terminal Projects

Country	Location/Project	Owners/Project Developers	Start up	Storage	
				Tanks	Capacity
China	Shenzhen	CNPC Yudean Power	2021	2	120,000
	Tianjin (Nangang)	Beijing Energy	2022	10	2,000,000
	Yangjiang	CNPC Yudean Power	2023	2	120,000
	Zhangzhou Fujian	CNOOC	2022	2	160,000
India	Dhamra Odisha	Indian Oil, Adani, GAIL	2020	2	320,000
	Jaigarh	Hiranandani Group	2019	2	320,000
	Kodinar	Hindustan Petroleum Corp.	2022	1	160,000
Japan	Himuka	Diagas Group-Osaka Gas	2022	1	65,000

LNG FSRU Import Facilities

Country	Location (Project)	Owners	Start up
Argentina	Bahia Blanca GasPort	Excelerate/YPF Repsol	2008
	Escobar GasPort	Excelerate/Enarsa	2011
Bangladesh	Moheshkhali	Excelerate, PetroBangla	2018
	Cox's Bazar	Summit Power International, Excelerate Energy	2019
Brazil	Pecem, FSRU	Petrobras	2009
	Guanabara Bay FSRU	Petrobras	2009
	Salvador, Bahia FSRU	Petrobras	2013
China	Tianjin FSRU	CNOOC, Hoegh, various	2013
Colombia	Cartagena FSRU	Promigas, Sociedad Portuaria El Cayao	2016
Egypt	Ain Sokhna, Suez	EGAS, Hoegh	2015
	Ain Sokhna, Suez	EGAS, BW Gas	2015
Indonesia	Lampung	Hoegh LNG, PGN LNG	2014
	Nusantara (Jakarta Bay)	Golar LNG, 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 Mediterranea	ElectroGas	2016
Pakistan	Port Qasim	Excelerate, Engro Corp	2015
	Port Qasim	BW-Mitsui, PGP Consortium	2017
Turkey	Aliaga FSRU, Turquoise FLNG	Etik LNG	2016
	Dortyol FSRU Challenger	Botas	2018
UAE	Ruwais, Abu Dhabi	Gasco (UAE)	2016
	Jebel Ali Port, Dubai	DSA (UAE)	2010

LNG Export Projects

Country	Location/Project	Project Developers	Planned Start Up	Number of Trains	Capacity In MTPA
AUSTRALIA	Pluto LNG expansion	Woodside	2021+	2	10.0
CANADA	Bear Head LNG, Nova Scotia	LNG Ltd.	2024	4	8.0
	Goldboro LNG, Nova Scotia	Pieridae Energy	2024	2	10.0
	Kitimat LNG, BC	Woodside, Chevron	2024	2	10.0
	LNG Canada, BC	Shell, Mitsubishi, Kogas, PetroChina, Petronas	2024	2	12.0
	Kwispaa FLNG, Vancouver	Steelhead LNG	2024	4	12.0
	Vancouver Tilbury	WesPac Midstream	2021	1	3.25
	Woodfibre LNG, Squamish	Pacific Oil & Gas Co	2020	2	2.1
EQ. GUINEA	Equatorial Guinea Fortuna FLNG	Ophir, Golar LNG, GEPetrol	2020+	1	2.0
INDONESIA	Sengkang LNG	Energy World Corp.	2019	4	2.0
MALAYSIA	Rotan FLNG (Sabah)	Petronas, Murphy Oil	2021	1	1.5
MOZAMBIQUE	Area 1 Onshore	Anadarko Petroleum and partners	2023+	2	10.0
	Area 4 Onshore	Eni and partners	2023+	2	10.0
	Area 4 FLNG	Eni and partners	2022	1	3.4
NIGERIA	NLNG Train 7	NNPC, Shell, Eni, Total	2022+	1	7.0
PAPUA NEW GUINEA	Elk-Antelope LNG	Total, ExxonMobil Oil Search, Petromin	Studies		
RUSSIA	Sakhalin II expansion	Gazprom, Shell, Mitsui, Mitsubishi	2021	studies	
	Vladisvostok LNG	Gazprom, Itochu, various	2023+	2	10.0
	Arctic LNG II Siberia	Novatek, Total	2023	3	19.8
USA	Alaska LNG Nikiski	Alaska Gasline Development Corp.	2023+	3	20.0
	Annova LNG, Brownsville	Exelon Corp.	2023+	6	6.0
	Commonwealth LNG, Louisiana	Commonwealth LNG LLP	2023+	8	9.0
	Delfin LNG, Louisiana	Delfin	2023+	3	9.0
	Driftwood LNG, Louisiana	Tellurian, Total and others	2023	6	27.6
	Galveston Bay LNG	NextDecade	2023+	6	27.0
	Golden Pass, Texas	Qatar Petroleum, ExxonMobil	2024	3	15.6
	Jacksonville, St John's River	Eagle LNG, Ferus Natural Gas Fuels	2021+	small	-1
	Jordan Cove, Coos Bay	Pembina Corp.	2024	2	7.8
	Lake Charles, Louisiana	Shell, ETE	2024	3	15.0
	Magnolia LNG	Louisiana LNG Ltd.	2023+	4	8.0
	Port Arthur LNG	Sempra	2023+	2	10.0
	Rio Grande LNG	NextDecade	2023+	6	27.0
	Sabine Pass LNG, Louisiana	Cheniere	2016-19	1	4.5
	Texas LNG Brownsville	Chandra, Meyer, Samsung, others	2023+	2	4.0
	VG LNG (Cameron Parish)	Venture Global	2022	5	12.0
	VG LNG (Plaquemines)	Venture Global	2022	10	20.0
	VG LNG (Delta-Plaquemines)	Venture Global	2024	36	22.5

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
ARGENTINA	FLNG Tango	Bahia Blanca	2019	1	0.5	1	16,100
AUSTRALIA	Karratha	NWS Woodside, Shell, BHP	1989	2	5.0	4	260,000
		(BP, Chevron	1992	1	2.5	1	130,000
		(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
		Wheatstone LNG Chevron, Woodside, Kuwait (KUFPEC), Jera, Kyushu	2017	2	8.9	2	300,000
		Ichthys LNG Inpex Corp., Total	2018	2	8.9	2	330,000
		Prelude FLNG Shell, Inpex, Kogas CPC	2019	1	3.5		
BRUNEI	Lumut	Brunei/Shell/Mitsubishi/Total	1972-74	5	7.2	3	176,000
CAMEROON	Hilli Episeyo FLNG	Kribi Perenco	2018	1	1.2	1	125,000
EGYPT	Damietta	Union Fenosa, EGPC, EGAS	2004	1	5.0	2	300,000
	Idku	EGPC, EGAS, Shell, Total, Petronas	2005	2	7.2	2	280,000
EQ.GUINEA	Bioko Island	Marathon, Sonagas, Mitsui, Marubeni	2007	1	3.4	2	272,000
INDONESIA	Bontang I	Pertamina, VICO, JILCO, Total	1977	2	5.2	5	635,000
	Bontang II		1983	2	5.2		
	Bontang III		1989	1	2.8		
	Bontang IV		1993	1	2.8		
	Bontang V		1997	1	2.8		
	Bontang VI		1999	1	3.0		
	Sulawesi LNG	Medco Energi, Pertamina, Mitsubishi	2015	1	2.0	1	170,000
	Tangguh	BP, MI Berau, CNOOC, Nippon, LNG Japan	2008	2	7.6	2	340,000
MALAYSIA	Bintulu (MLNG Satu)	Petronas, Sarawak, Mitsubishi	1983	3	8.1	4	260,000
	Bintulu (MLNG Dua)	Petronas, Shell, Sarawak, Mitsubishi	1995	3	7.8	1	65,000
	Bintulu (MLNG Tiga)	Petronas, Shell, Sarawak, Mitsubishi, Nippon Oil	2003	2	6.8	1	120,000
	Bintulu Train 9	Petronas	2016	1	3.6		
	Kanowit FLNG	Petronas	2016	1	1.2		
NIGERIA	Bonny Island	NNPC, Shell, Total, Eni	1999	2	6.4	2	168,400
		Nigeria LNG (formed by above)	2002	1	3.2	1	84,200
		Nigeria LNG	2006	2	8.2		
		Nigeria LNG	2008	1	4.1	1	84,200
NORWAY	Snøhvit/Melkoya	Equinor, Total, Petoro	2007	1	4.2	2	280,000
OMAN	Oman LNG	Oman Govt., Shell, Total, Korea LNG	2000	2	7.1	2	240,000
		Mitsubishi, Mitsui, Partex and Itochu					
PAPUA NEW GUINEA	PNG LNG	Oman Govt., Oman LNG Union Fenosa, Osaka Gas, & Itochu	2006	1	3.7	2	240,000
		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		
	RasGas II- T4	QP, ExxonMobil	2005	1	4.7	6	840,000
	RasGas II- T5	QP, ExxonMobil	2007	1	4.7		
	Rasgas III – T6	QP, ExxonMobil	2009	1	7.8		
	Rasgas III – T7	QP, ExxonMobil	2010	1	7.8		
RUSSIA	Sakhalin Island	(Sakhalin Energy) Gazprom, Shell, Mitsui, Mitsubishi	2009	2	9.6	2	200,000
	Yamal LNG Siberia	Novatek, Total, CNPC, Silk Fund	2017	3	16.5	4	640,000
TRINIDAD & TOBAGO	Point Fortin Train 1	BP, Shell, CIC, NGC	1999	1	3.0	2	204,000
	Train 2	BP, Shell	2002	1	3.3	1	160,000
	Train 3	BP, Shell	2003	1	3.3	1	160,000
	Train 4	BP, Shell, NGC	2005	1	5.2	1	160,000
USA	Cheniere Sabine Pass	Cheniere Energy	2016	5	22.5	5	800,000
	Cove Point LNG	Dominion Energy	2017	1	5.3	7	695,000
	Cheniere Corpus Christi	Texas Cheniere	2018	2	9.0	3	480,000
	Cameron Hackberry	Sempra, Total, Mitsui, Mitsubishi	2019	2	9.8	3	480,000
	Elba Island Georgia	Kinder Morgan, EIG Energy	2019	10	2.5	5	535,000
	Freeport LNG, Texas	Freeport LNG	2019	2	10.2	3	483,000
YEMEN	Bal-Haf	Yemen LNG, Total, Yemen Gas, Hunt Oil, SK Group, Hyundai	2009	2	6.7	2	320,000

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