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Feature:

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critical for emissions control

Feature:

LNG derivatives
on the rise

Country Focus:

Indonesia, from LNG
exporter to importer

Project Spotlight:

Costa Azul LNG



NIGERIA'S T7: RESETTling THE NARRATIVE

After more than a decade of delay, the prospects for construction of Train 7 at the Nigeria LNG plant are improving. LNG's Nigeria content plan for the project has been accepted by the federal government and a final investment decision (FID) by the development consortium is due later this year. FID on Train 7 could herald a new era of expansion for LNG in Nigeria, as well as increased gas and LNG use within Africa's most populous country.

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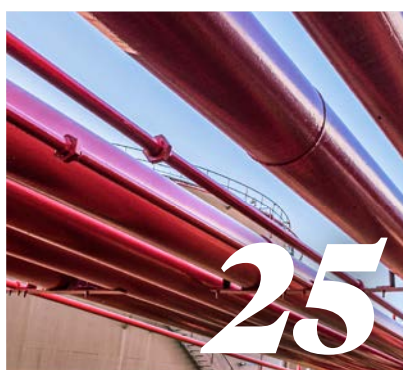
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LNG'S EXPOSURE TO GEOPOLITICAL RISK CAN ONLY RISE

Gas markets have always been politicised to some degree, and particularly so in the European arena, but never to the extent that oil markets have been globally. This is not because of the existence of Opec and the lack of a counterpart in the gas market, but because of the strategic importance of oil as the energy source for transportation. If the oil stopped flowing, economies would literally grind to a halt.

The geographic distribution of oil resources meant that many economically strong countries became dependent on the international supply chains bringing oil to their shores, sometimes leading to the adoption of foreign policies overtly designed to safeguard those supply chains. Meanwhile, the concentration of oil supplies in the Middle East exposed the world economy to the political and social instabilities of the region.

Gas trade was pulled into this complex geopolitical environment primarily by oil indexation. If oil prices rocketed as a result of a Middle Eastern conflict for example, then so too would gas and LNG prices regardless of the underlying supply and demand situation.

The erosion of oil indexation both in pipeline gas and long-term LNG contracts, as well as the growth in gas hub and spot LNG trade, has decoupled gas pricing to a large extent from oil. Witness the slump in spot LNG prices this year and its impact on European gas pricing, while Brent has largely stayed in a \$60-\$70/b range.

However, the LNG market is far from free of geopolitics, and it cannot escape further entanglement as the industry expands globally, creating international supply chains on a par with oil. This can already be seen in the two most important 'oil' issues of the day.

The US-China trade war threatens a slowdown in the global economy, which will affect gas consumption just as it will oil, but it is also an economic conflict between a fast-emerging major LNG exporter – the US – and what is likely

in the next five years to become the world's largest LNG importer – China. LNG has already become a trade weapon, with the imposition of tariffs on US LNG exports to China.

The second issue is the potential for conflict between the US and Iran over the latter's nuclear programme. Oil tanker seizures, attacks on shipping and the shooting down of drones all raise the stakes in a situation where the risk of closure of the Strait of Hormuz is real. According to BP data, 26% of all LNG cargoes passed through the strait in 2018, a significant proportion, particularly for those countries almost entirely dependent on LNG for their gas supplies, such as Japan, South Korea and Taiwan.

The expansion of LNG trade inevitably lengthens supply chains and starts to encompass less politically and financially-stable countries. It exposes gas and LNG trade to events far distant. Exporters have to deal with counter-parties with higher credit risk and to countries where policy interventions can be significant and unexpected. Over the past five years, for example, China has made multiple interventions affecting the seaborne coal market, creating short-term supply and demand shocks, particularly for coal exporters in Asia-Pacific.

The fact is that the geopolitical risk to which the LNG market is exposed can only rise with the growing importance of gas as an energy source. The geographical distribution of gas resources worldwide is less concentrated than for oil. However, the higher the proportion of gas in the primary energy mix, the more significant gas and LNG become as import dependencies requiring protection, the more likely they are to be used as trade weapons, and the more likely they will be the subject of, for example, extraterritorial political sanctions.

Growth in the number of LNG producers improves security of supply overall, but also the risk grows that somewhere in the world some element of supply will be affected by social, political or natural events, the effect of which will ripple through a more interconnected global gas market. Just as gas decouples from its entanglement with the geopolitics of oil, its increasing importance as a source of energy brings new challenges of its own. This is the inevitable price of success.

— NGW

CONTRIBUTORS



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After graduating from Oxford, Martin Daniel worked in the Economics Unit of the British Coal Corporation and then the Supply, Transport and Markets team at IEA Coal Research. He later founded the publication Global Private Power and worked for FT Energy and then for S&P Global Platts as editor of Power in Asia and International Gas Report. He is currently a freelance energy consultant.



WILLIAM POWELL

William has been reporting and commenting on Europe's gas markets for 20 years. He started in journalism at PH Energy Analysis (now ICIS Heren) in 1995, shortly before the UK devised the National Balancing Point – Europe's first gas hub. His subsequent career has included senior management and editorial positions at FT Energy, Petroleum Economist, Argus Media and Platts, where he latterly edited International Gas Report. His focus has been on regional markets and how they function. William also speaks Russian and has had several literary/academic translations published.



NIGERIA'S T7: RESETTling THE NARRATIVE

Neil Ford

After more than a decade of delay, the prospects for construction of Train 7 at the Nigeria LNG plant are improving. LNG's Nigeria content plan for the project has been accepted by the federal government and a final investment decision (FID) by the development consortium is due later this year. FID on Train 7 could herald a new era of expansion for LNG in Nigeria, as well as increased gas and LNG use within Africa's most populous country.

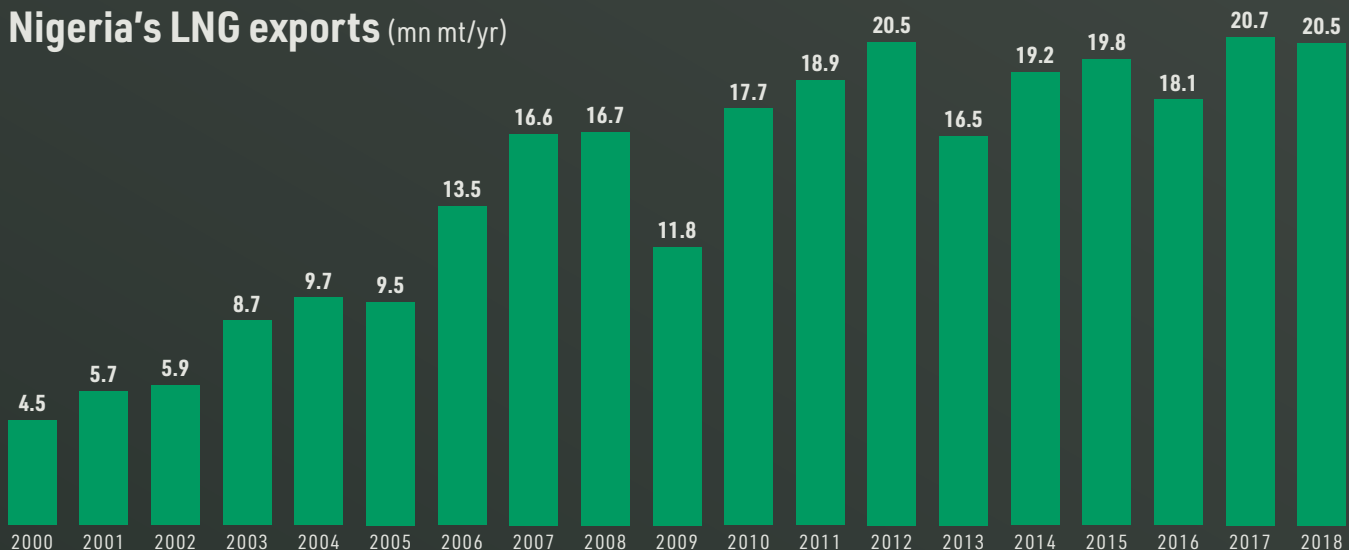
Nigeria LNG's (NLNG) Trains 1 and 2 have production capacity of 3.33mn mt/yr each, Train 3 has 3mn mt/yr and Trains 4-6 4.1 mn mt/yr, providing total capacity of 21.8mn mt/yr, according to International Gas Union data. Train 7 would add a further 8mn mt/yr capacity, an increase of 35%.

The first six trains were built in relatively quick succession, coming on-stream between 2000 and 2008, putting Nigeria firmly on the global LNG map. However, no new capacity has been added in the country since then, despite the floating of multiple projects, the existence of substantial proved gas reserves and significant gas flaring.

Anglo-Dutch oil major Shell estimates that Nigeria has proven gas reserves of 202 trillion ft³, and unproved reserves of 600 trillion ft³, so there is plenty of gas to feed additional LNG capacity.

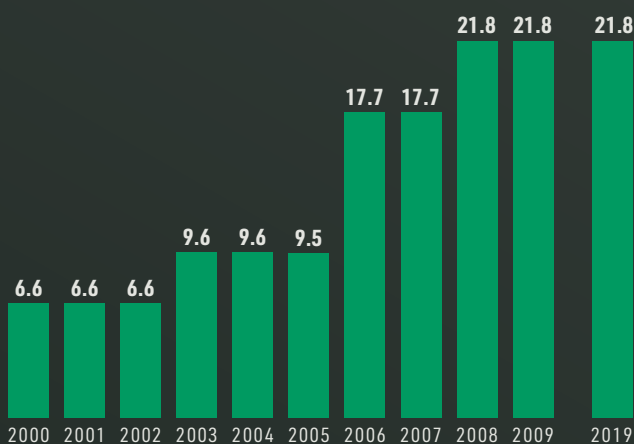
NLNG managing director Tony Attah said: "The history of the LNG industry in Nigeria is chequered ... We started our LNG industry 24 months after Qatar, but Qatargas has attained a production →

Nigeria's LNG exports (mn mt/yr)



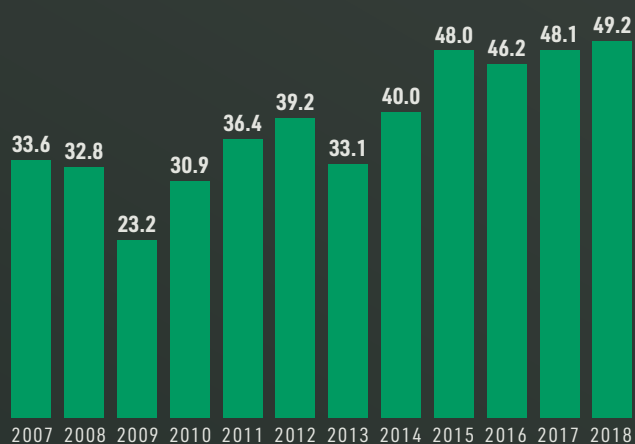
Source: BP Statistical Review of World Energy

Nigeria's LNG capacity (mn mt/yr)



Source: IGU

Nigeria's gas production (Bcm)



Source: BP Statistical Review of World Energy

capacity of 77mn mt/yr with an additional target of 30% LNG production in the immediate future. I believe it is time to reset the narrative."

The NLNG consortium says that it is aiming to take the FID on Train 7 in the fourth quarter of this year and hopes to bring it on stream in 2024. NLNG is owned by the state-owned Nigerian National Petroleum Corporation (NNPC) (49%), Shell Gas (25.6%), Total Gaz Electricité Holdings France (15%), and Eni International (10.4%).

LOCAL CONTENT

While many countries face a decision over whether to allocate gas reserves for their domestic or export markets, the situation in Nigeria is a little

different. Increased gas supplies to domestic consumers could create a political environment within which new LNG export capacity is developed.

Local content is key to the realisation of this prospect.

Attah said: "The Nigerian Content (NC) Plan ... has made clear and robust provisions to deepen Nigerian content in line with the Nigerian Oil and Gas Industry Content Development Act, significantly higher than what was achieved in the previous NLNG projects...This synergy will ensure that value-added opportunities for Nigeria are indeed maximised and the Train 7 project is delivered to meet international standards of quality and safety."

NLNG puts the total investment that the FID will trigger at almost \$12bn, including upstream →

development. The consortium says it is seeking \$7bn from financial markets to help finance the project. This process should be facilitated by the payment in July 2018 of the last instalment of the \$5.45bn shareholder loan taken out for the construction of previous trains, including Train 6.

More than 10,000 jobs will be created in the Train 7 construction phase, and the project should also benefit Nigerian companies as contractors.

In March, the Nigerian Content Development Monitoring Board (NCDMB) approved the Nigerian content of the NLNG Train 7 project at the existing Bonny Island site in the eastern Niger Delta. NLNG agreed in June 2017 to allow NCDMB to assess its plans, a deal that NLNG describes as an industry first.

“Local content ... is not a favour that a company does to a country or a people. It is purely business. It is about giving local companies an opportunity to deliver value through the value chain.” Simbi Wabote, NCDMB executive secretary.

NCDMB has praised NLNG's procurement policy, including a recent order for six new vessels by NLNG subsidiary Bonny Gas Transport, with local engineering companies benefitting from the contract. NCDMB said that NLNG has worked hard to identify the required capacity in the local supply chain. NLNG held a series of workshops with potential Nigerian contractors in Abuja, Port Harcourt and Bonny in order to secure more Nigerian content.

NCDMB executive secretary Simbi Wabote said: “It is very important to have clarity of what local content is about. Local content is not corporate social responsibility. It is not a favour that a company does to a country or a people. It is purely business. It is about giving local companies an opportunity to deliver value through the value chain.”

According to the NCDMB, non-cryogenic vessels, non-cryogenic valves, the condensate unit and protective coatings will be supplied by Nigerian companies under the Nigerian content plan, while 70% of control valves and

non-cryogenic pumps will be assembled in Nigeria. It is also hoped that Nigerian firms will have opportunities to bid for maintenance contracts.

MOMENTUM BUILDING

Although previous delays provide grounds for scepticism, momentum on the project finally appears to be building. In July 2018, NLNG awarded front-end engineering design (feed) contracts on the project to two consortia: B7 JV Consortium and SCD JV Consortium. B7 JV Consortium is made up of KBR, Technip and Japan Gas Corporation; while SCD JV Consortium comprises Saipem, Chiyoda and Daewoo. The next step will be the award of the engineering, procurement and construction (EPC) contract, the pricing of which will be determined by the feed process.

KBR worked on all existing trains at Bonny Island, while a consortium of KBR, Technip, Snamprogetti and JGC (TSKJ Nigeria Ltd) was previously awarded a feed contract for what were expected to be Trains 7 and 8, each with production capacity of 3.5mn mt/yr, in 2007. The years of delay saw NLNG change its approach and opt for a single additional train with 8mn mt/yr capacity.

A reminder of the previous failed attempts to get the project off the ground underlines the fact that development is by no means guaranteed. The timing is still uncertain. As recently as July 2018, NLNG expected to take the FID by the end of last year. However, now that the federal government in Abuja has finally swung its support behind the project progress is more likely.

Abuja may have been persuaded to sanction the project by the positive impact it will have on its own finances and the number of jobs it is likely to create locally. According to NLNG figures, in the two decades of its existence, it has generated more than \$100bn in income and paid over \$16bn in dividends to the state in the form of the NNPC, plus \$6.5bn in taxes and \$13bn for feed gas.

LEGISLATION DELAYED

Oil and gas sector development in Nigeria has been held up in recent years by the delayed passage of government legislation setting out sector regulation, including new terms of investment in the gas sector. The long-delayed Petroleum Investment Bill has been broken up by the government of President Muhammadu →

THE PIRACY PROBLEM

The Niger Delta has a long, well-documented problem with militant attacks, including on gas pipelines, but Gulf of Guinea pirate gangs have now begun to attack LNG and LPG carriers. There has been just one confirmed attack on an LNG carrier this year, but sources in Nigeria suggest more may have been unsuccessfully targeted on other occasions.

While there are more frequent attacks on oil tankers, with the aim of both robbing the crew and seizing oil, LNG attacks seem motivated purely by robbery. The Nigerian navy is providing support to oil tankers and LNG carriers exiting Nigerian waters, but the attacks have continued.

According to International Maritime Bureau (IMB) figures, Nigeria had twice as many

confirmed pirate attacks as any other country in the first half of this year, at 21. Crew members have been killed, robbed and taken hostage. According to the IMB, an incredible 92% of hostage takings, 89% of vessels fired upon and 73% of kidnappings at sea worldwide in the first half of this year took place in the Gulf of Guinea.

Abuja has this year allocated an additional \$195mn to pay for new equipment to fight piracy in the region, but the problem does not seem to be going away.

Buhari, with its constituent parts passing into law at different rates.

A few substantial investment decisions have now been taken as a result, including on two gas plants, each with production capacity of 300mn ft³/d, which will be developed by Shell Petroleum Development Company, and Seplat Petroleum and the state-owned Nigeria Gas Company respectively.

This could help unlock the development of the roughly dozen other LNG projects that have been planned in Nigeria over the past 15 years.

Successive governments prioritised domestic gas requirements over new export projects, but simultaneously failed to put the reforms in place needed to create a vibrant domestic gas industry. This included a failure to increase regulated gas prices to a commercial level to encourage upstream investors to sell their gas onshore rather than flaring it, and to tap non-associated gas reserves that have been identified but not yet developed.

A resolution of the uncertain investment regime coupled with a positive FID on Train 7 could trigger more interest both in developing Nigeria's untapped gas reserves and exploring for more gas.

AXXELA LOOKS TO INLAND LNG

Although none of the other LNG export projects proposed in Nigeria over the past two decades have been developed, plans for a small inland LNG plant have been announced, which has long-term potential to boost LNG use within Nigeria itself.

Transit Gas Nigeria, an offshoot of Nigeria's Axxela, signed a gas purchase order with the Nigerian Gas Marketing Company (NGMC) in April to pipe gas to Ajaokuta in Kogi State in the centre of the country. The Department of Petroleum Resources has already awarded an operating licence and the Federal Ministry of Environment has completed the required environmental and social impact assessment.

The volumes involved have not been announced, but LNG will be taken by truck from the plant to power plants and industrial customers in the northern half of the country. Customers will need to have their own LNG storage facilities.

In a statement, Axxela said: "The NGMC and Transit Gas have adopted a world class development approach in collaborating with a global team of experienced engineering, procurement and construction contractors, technology providers, and other professionals to ensure project delivery."

Axxela said that development would be fast tracked and completed by the end of next year, which seems ambitious. Moreover, Nigeria's thermal generating capacity is currently heavily concentrated in the Niger Delta, in the far south of the country, so the Ajaokuta project may initially be designed to meet industrial gas demand and then later power plants that have not yet been built and so may be a long way from actually being developed.

Axxela estimates that switching power generation from small-scale diesel generators to larger gas-fired plants will result in an average 40% reduction in generation cost. ●



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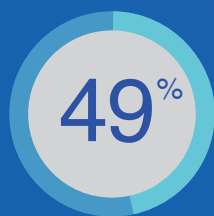
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LNG-FOR-COAL SWITCHING CRITICAL FOR EMISSIONS CONTROL

Martin Daniel

Global coal use is still growing. According to BP's Review of World Energy 2019, renewables are expanding at less than half the pace required to limit greenhouse gas emissions, and the same impact could have been gained from replacing around 10% of coal-fired generation by gas. The message is clear: to reduce emissions growth, the rate of gas-for-coal switching must accelerate, particularly in Asia, where LNG is best placed to address national gas deficits.

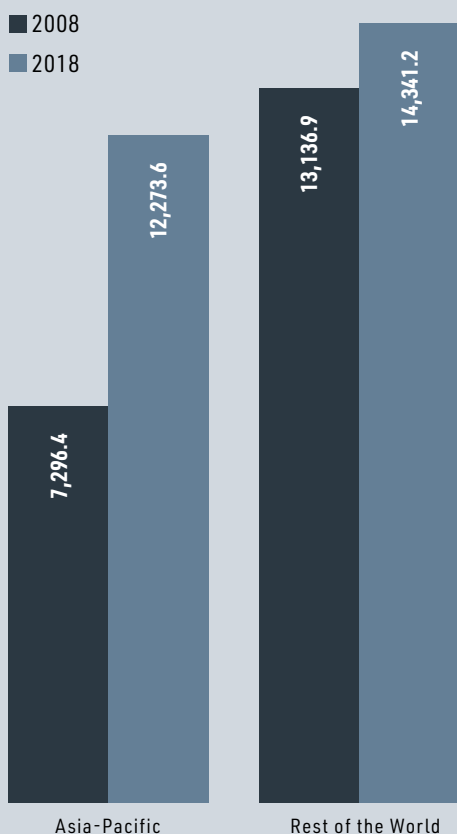
F For all its negative press, global coal use is still growing. Nowhere is this truer than the Asian power sector, which is also one of the key markets for LNG and the arena where the fortunes of the two fuels are most closely intertwined.

Gas had a stellar year in 2018, according to the BP Statistical Review of World Energy 2019. Global consumption was up 5.3% year on year, while demand in the Asia-Pacific region increased by 7.4%. The percentage growth in gas use was higher than for any other energy source apart from renewables, which started from a much lower base.

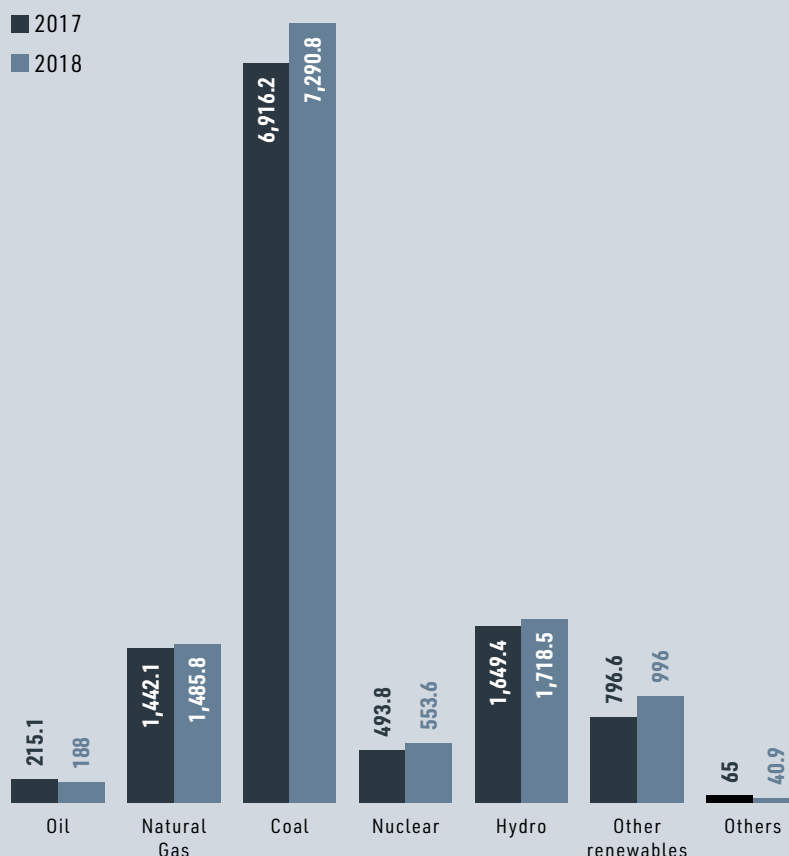
By contrast, global coal consumption increased only 1.4% year on year in 2018, according to BP, while Asia-Pacific demand was up 2.5%. Both the global and regional percentage growth figures were lower than for any other fuel. →

PHOTO: ISTOCK.COM/LOVETHEWIND

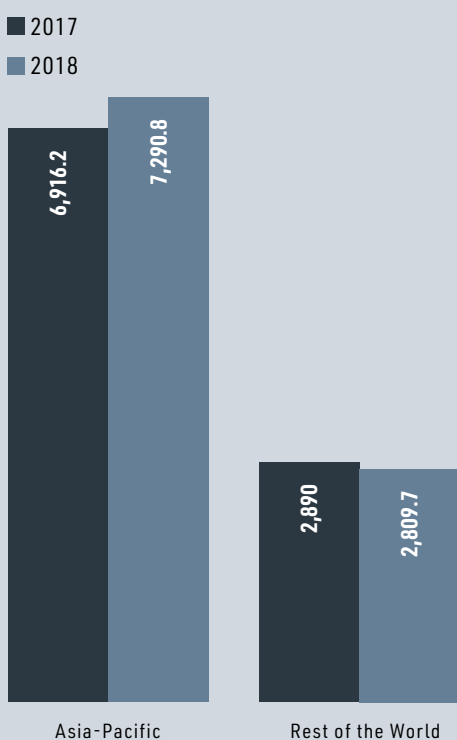
Electricity generation (TWh)



Asia-Pacific electricity generation by fuel (TWh)



Coal generation (TWh)



POWER SECTOR

Global coal use would have fallen – as it had each year from 2014 to 2016 – but for growing power sector demand. “The growth in coal consumption was more than accounted for by increasing use in the power sector,” BP observed.

However, coal is on the back foot even in this sector.

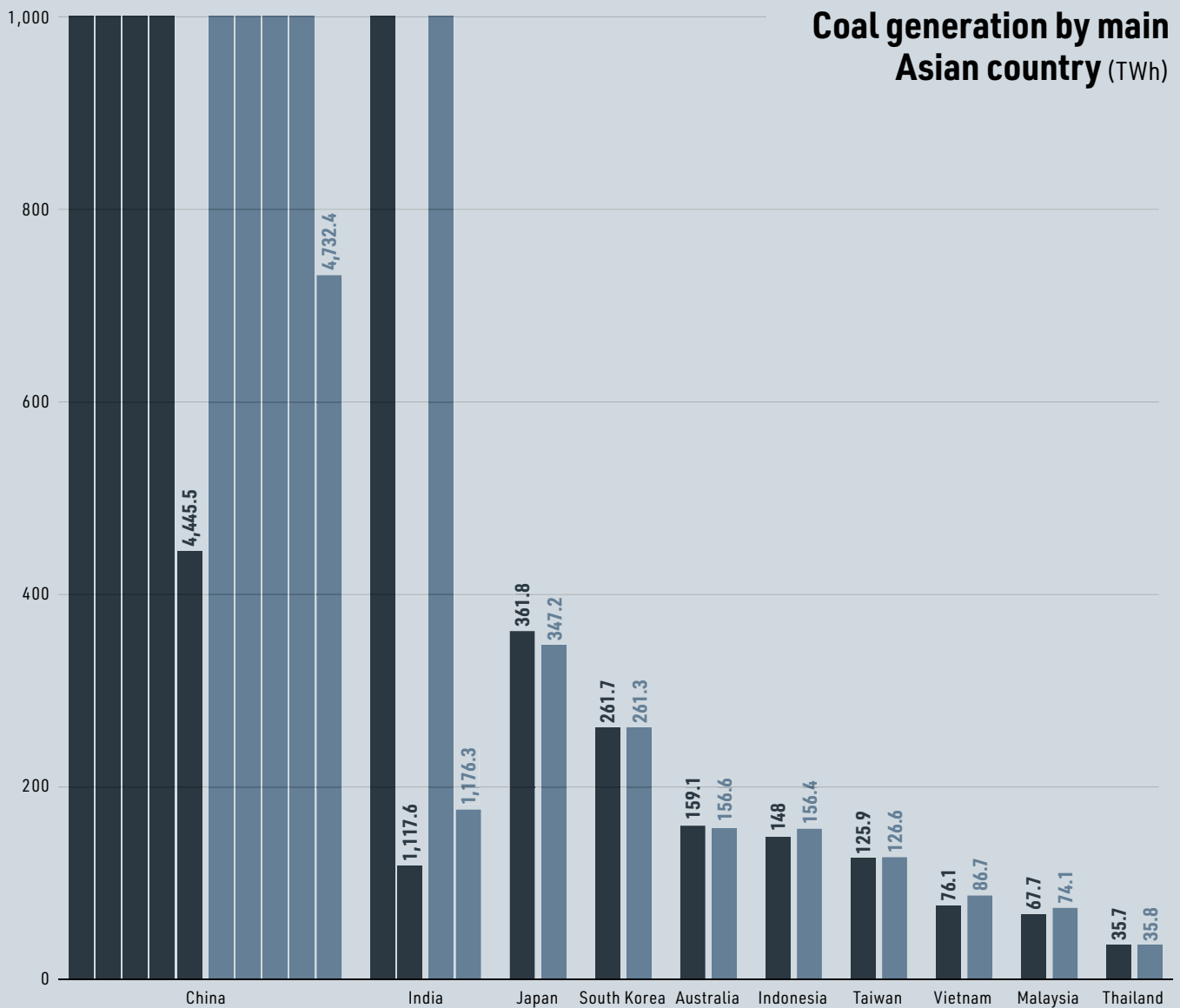
In May, the International Energy Agency (IEA) said investment in coal-fired power was down nearly 3% in 2018 at \$60 billion and at the lowest level since 2004. It added: “New coal-fired power plant capacity receiving final investment decisions [FIDs] declined by 30% to 22 GW, the lowest level this century.”

Coal-fired generator data published by Global Energy Monitor amplifies the point. In 2015, almost 106 GW of plant was commissioned worldwide, 91% of it in Asia. In 2018, the total plummeted to 50.3 GW, 95% of it in Asia. Meanwhile, 1,273 GW of coal-fired capacity was cancelled between 2010 and 2018, with a further 483 GW being shelved for the moment.

DOWN BUT FAR FROM OUT

However, coal’s woes should not be overstated. Coal use may be increasingly concentrated in the power sector, but this is where an increasing amount of energy use occurs. BP noted that in 2018 “global power demand grew by 3.7%, which is one of the strongest growth rates seen for 20 years, absorbing around half of the growth in primary energy.” →

Source: BP Statistical Review of World Energy



Source: BP Statistical Review of World Energy

And while coal-fired generation is increasingly concentrated in Asia, this is where most electricity growth is projected to occur. Asia-Pacific generation jumped 68.2% between 2008 and 2018 compared with the puny 9.2% increase registered in the rest of the world. As a result, the region accounted for 46.1% of global electricity output in 2018 as against 35.7% in 2008.

Most Asian electricity is generated from coal, which accounted for three-fifths of total output in 2018. At 7,290.8 TWh the figure was 374.6 TWh up on 2017, meaning coal produced 54% of the 695.4 TWh of additional electricity generated in Asia that year.

While investment in coal-fired plant may be declining, the amount of capacity commissioned since 2006 means the Asian coal fleet is not

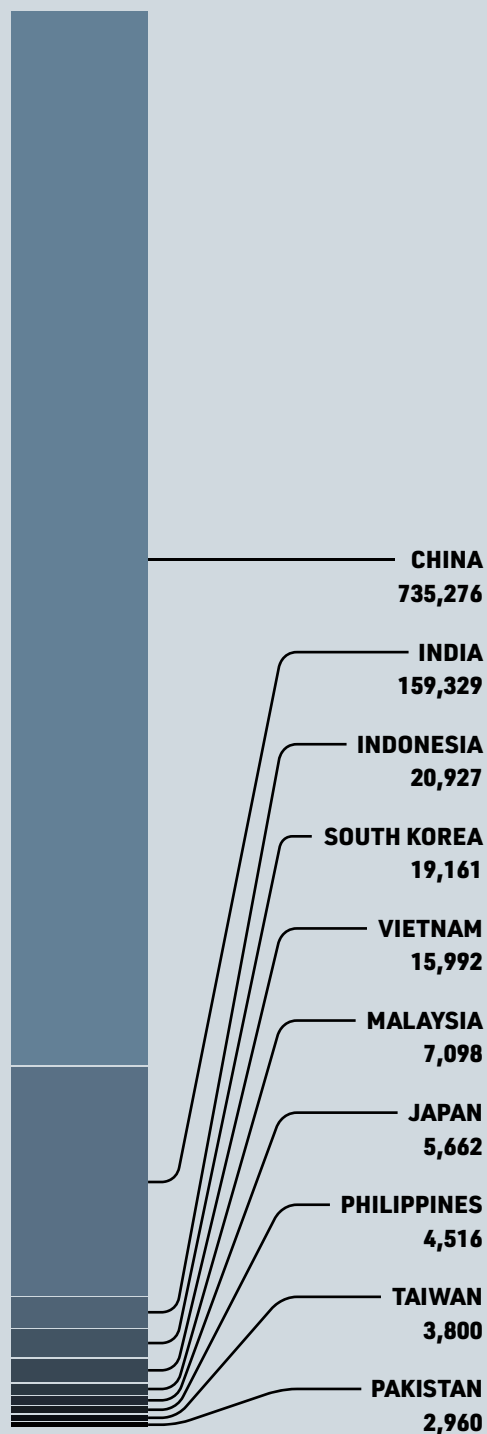
only large but new. According to Global Energy Monitor, almost 1,055 GW of coal-fired plant was commissioned between 2006 and 2018, more than 90% of it in Asia-Pacific and almost 70% in China alone.

As a result, more than half the 2,015 GW of global coal-fired plant operational in January 2019 was commissioned in or after 2006. The figure rises to three-quarters in China, India and Indonesia, while in Vietnam it exceeds nine-tenths. The continued growth in coal-fired generation in Asia is thus unsurprising.

IMPLICATIONS FOR EMISSIONS

The implications of the growth in overall and especially coal-fired generation for carbon →

Coal-fired plants commissioned in selected Asian countries 2006-2018 (MW)



Source: Global Energy Monitor (global coal plant tracker, January 2019)

emissions are flagged up by the BP Review. "Carbon emissions from the power sector are estimated to have increased by 2.7% in 2018, their highest rate of growth for seven years, accounting for around half of the growth in global carbon emissions."

BP added that "to maintain the level of carbon emissions from the power sector at its 2015 level, renewable generation would have needed to grow more than twice as quickly than it actually did: by over 1,800 TWh over the past three years, rather than its actual growth of a little over 800 TWh."

To put the increase in context, BP noted that the gap of "1,000 TWh is roughly equivalent to the entire renewable generation of China and the US combined in 2018."

BP went on to note that "the same outcome for carbon emissions could have been achieved by replacing around 10% of coal in the power sector with natural gas."

However, replacing 10% of power sector coal use with gas would not have been easy. Much of the low-hanging fruit has already gone, for instance through the closure of aging coal-fired plants in Europe. Admittedly, the 13.2% surge in US gas-fired generation in 2018 contributed towards a 5% drop in coal-fired output there. But cutting output from Asian coal plants would be more problematic.

Apart from the fact that electricity demand in the region is growing strongly, much of the Asian coal-fired fleet comprises large and relatively efficient units commissioned in the last 15 years. Most belong to state-owned entities, while almost all were financed with debt from state-linked banks that has yet to be repaid.

Added to this, coal-fired electricity costs less than gas in many Asian countries. Coal is widely available and often cheap, while carbon taxation and other government measures to penalise its use are for the most part limited – not entirely surprisingly given that in many jurisdictions the state would be the main loser if coal plants became stranded assets.

The limited availability of spare gas-fired capacity or fuel to operate it is also an issue in some countries, including India, Indonesia, Vietnam and parts of China. With few exceptions the replacement of existing Asian coal-fired generation is thus not a near-term option, while the expansion of LNG supply chains is the most obvious means of supporting coal-for-gas switching.

LONGER-TERM PROSPECTS

The picture may be different in the longer term. While new gas-fired projects have little hope of competing against existing coal-fired plants, they could be more competitive against new coal-fired plants, especially if carbon pricing takes off.

The decline in FIDs and capital spending on coal-fired projects has already been noted. By contrast, FIDs for gas-fired plants were double those for coal in 2018, according →

Status of coal-fired plants by region in January 2019 (MW*)

Region	Operating	Construction	Announced	Pre-permit	Permitted	Shelved	Cancelled 2010-2018
East Asia	1,086,187	144,937	18,520	41,849	25,695	283,725	462,876
South Asia	225,205	42,098	24,373	33,730	25,194	103,061	516,857
SE Asia	73,715	27,561	26,095	22,046	16,188	42,286	72,454
non-EU Europe	29,229	800	16,480	17,890	8,605	24,554	46,711
Africa and Middle East	52,642	10,940	30,550	6,810	5,750	20,178	32,236
Eurasia	85,370	1,102	1,080	4,660	0	2,210	14,468
EU28	152,415	6,590	3,100	5,780	0	0	71,739
Latin America	16,968	1,605	2,060	450	1,666	3,735	20,527
Canada/US	268,607	0	0	0	0	895	28,773
Australia/NZ	24,942	0	0	0	0	2,516	6,440
Total	2,015,280	235,633	122,258	133,215	83,098	483,160	1,273,081

*Includes units 30MW and above

Status of coal-fired plants in Asian countries in January 2019 (MW*)

Region	Operating	Construction	Announced	Pre-permit	Permitted	Shelved	Cancelled 2010-2018
China	973,609	128,650	16,820	29,595	23,535	278,125	437,810
India	220,670	36,158	11,230	24,226	22,344	87,716	491,347
Vietnam	17,387	9,705	10,140	13,040	9,430	5,200	30,750
Indonesia	29,047	11,466	9,255	3,110	2,860	16,240	19,485
Bangladesh	525	2,640	11,660	5,864	1,200	10,150	2,820
Japan	45,568	8,724	0	6,524	60	2,000	4,806
Pakistan	3,110	3,300	1,483	3,640	1,650	3,995	19,290
Thailand	5,457	750	3,450	56	0	4,070	5,100
Philippines	8,273	2,890	1,250	5,340	3,138	3,650	3,654
Cambodia	505	150	2,000	500	700	0	1,940
South Korea	37,064	5,429	0	0	2,100	500	7,000
Taiwan	19,007	849	0	0	0	1,600	12,400
Myanmar	160	0	0	0	0	11,800	9,425
Laos	1,878	0	0	0	0	1,326	0
Australia	24,442	0	0	0	0	2,516	6,440
Malaysia	11,008	2,600	0	0	0	0	2,100
Hong Kong, China	6,608	0	0	0	0	0	0
North Korea	3,500	200	0	0	0	300	0
Sri Lanka	900	0	0	0	0	1,200	3,400
World Total	2,015,280	235,633	122,258	133,215	83,098	483,160	1,273,081

*Includes units 30MW and above

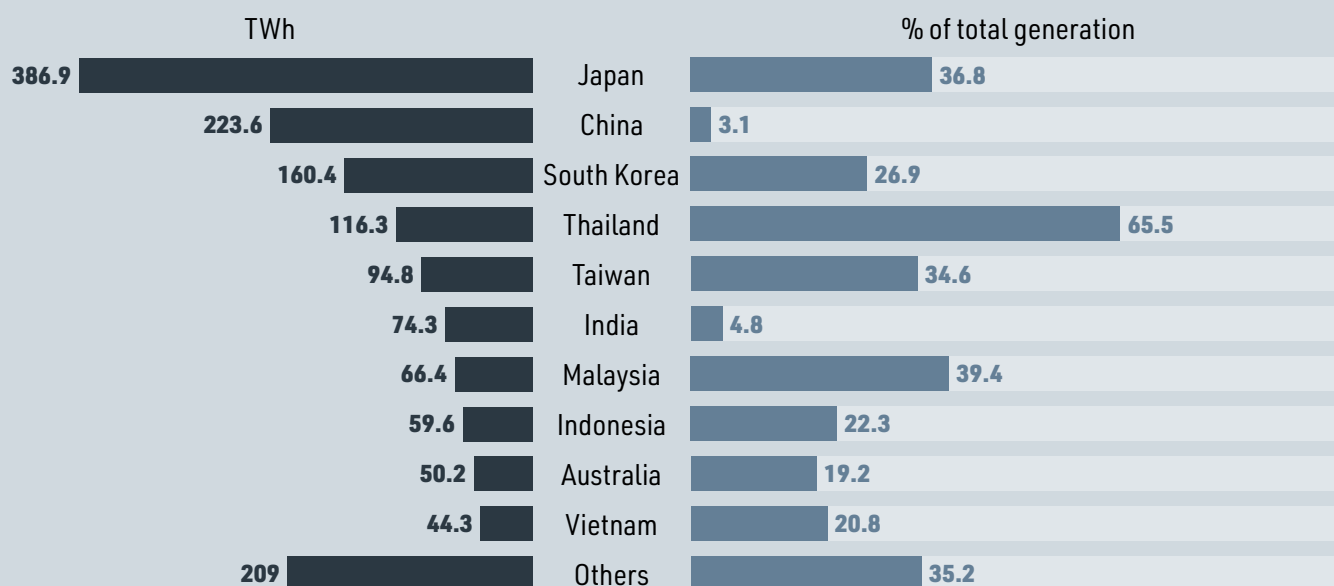
to the IEA. In particular, it observed that “FIDs grew in China by 70%, and for the first time more gas-fired power capacity was sanctioned than that of coal.”

How much gas-fired capacity is actually built in Asia will depend on a number of factors. Among the main questions are, how fast power demand grows; how gas fares against renewables in

meeting that demand; and how much demand is met by new coal-fired projects.

To take the last question first: declining FIDs and capital investment mean the amount of coal-fired plant commissioned annually in Asia will continue declining in coming years. But the amount will still be significant. Apart from plant currently under construction or approved, it is →

Asia-Pacific gas-fired generation



Source: BP Statistical Review of World Energy

likely to include at least some of the currently shelved capacity.

Take China, for example. Some 128.65 GW of coal capacity was under construction at the start of 2019, while a further 69.95 GW has been approved. On top of that 278 GW has been shelved, some of it at an advanced stage of construction when work stopped. Given that many of these plants are supported by provincial or other local entities if not Beijing, the resumption of work on much of the plant is possible, albeit in cases unofficially.

Beyond this pipeline of identified coal-fired projects it is certain that more coal-fired plant will be implemented in Asia in the longer term. But it is not certain how much will be built and where. This will depend in large part on how government policies and carbon pricing evolve across the region.

RENEWABLES AND GROWTH

The surge in Asian renewable capacity is also set to continue, but here too considerable uncertainty surrounds the scale of future installations. The location and pace will, as now, be influenced by national regulations and the price of solar and wind equipment. But it will also be increasingly affected by factors including national and regional grid developments, and the availability and price of land suitable for the installation of projects.

The biggest uncertainty, however, is future electricity demand growth. The power sector's consumption of an increasing share of energy supplies is expected to continue; not just in line with the growth and shifting mix of economic activity, but also as electricity displaces rival fuels in, for instance, the domestic heating and vehicle markets.

Apart from affecting the overall growth in electricity demand these changes will affect consumption patterns. This will in turn help determine which generating technologies and fuels are the main beneficiaries. In particular, more variable diurnal and seasonal power demand will favour shoulder fuels such as gas rather than baseload generation such as coal.

In this context it is worth noting BP's observation that "much of the surprising strength in energy consumption in 2018 may be related to weather effects. In particular, there was an unusually large number of hot and cold days across many of the world's major demand centres last year, particularly in the US, China and Russia, with the increased demand for cooling and heating services helping to explain the strong growth in energy consumption in each of these countries."

Given that such weather effects are often blamed – fairly or not – on carbon emissions from coal, there is a certain irony that one of their main impacts may be the need for greater intermediate and peak load generation, and thus greater gas use. ●



LNG DERIVATIVES ON THE RISE

Ross McCracken

While Singapore, Japan and China all hope to create gas hubs that provide a dominant regional pricing point, LNG derivatives are providing a more immediate solution for growing price risk management needs in the LNG market. The idea that an Asian gas hub similar to Henry Hub in the US or the NBP or TTF in Europe must emerge may in fact be misguided. LNG is a bulk commodity traded wholesale and is more analogous to crude oil than traditional pipeline gas.

A report published in July by price reporting agency S&P Platts, New Horizons – the forces shaping the future of the LNG market, charts the rapid rise in LNG derivatives volumes. Trade in LNG derivatives grew by 256% in 2018, following growth of 295% in 2017, albeit from a low base.

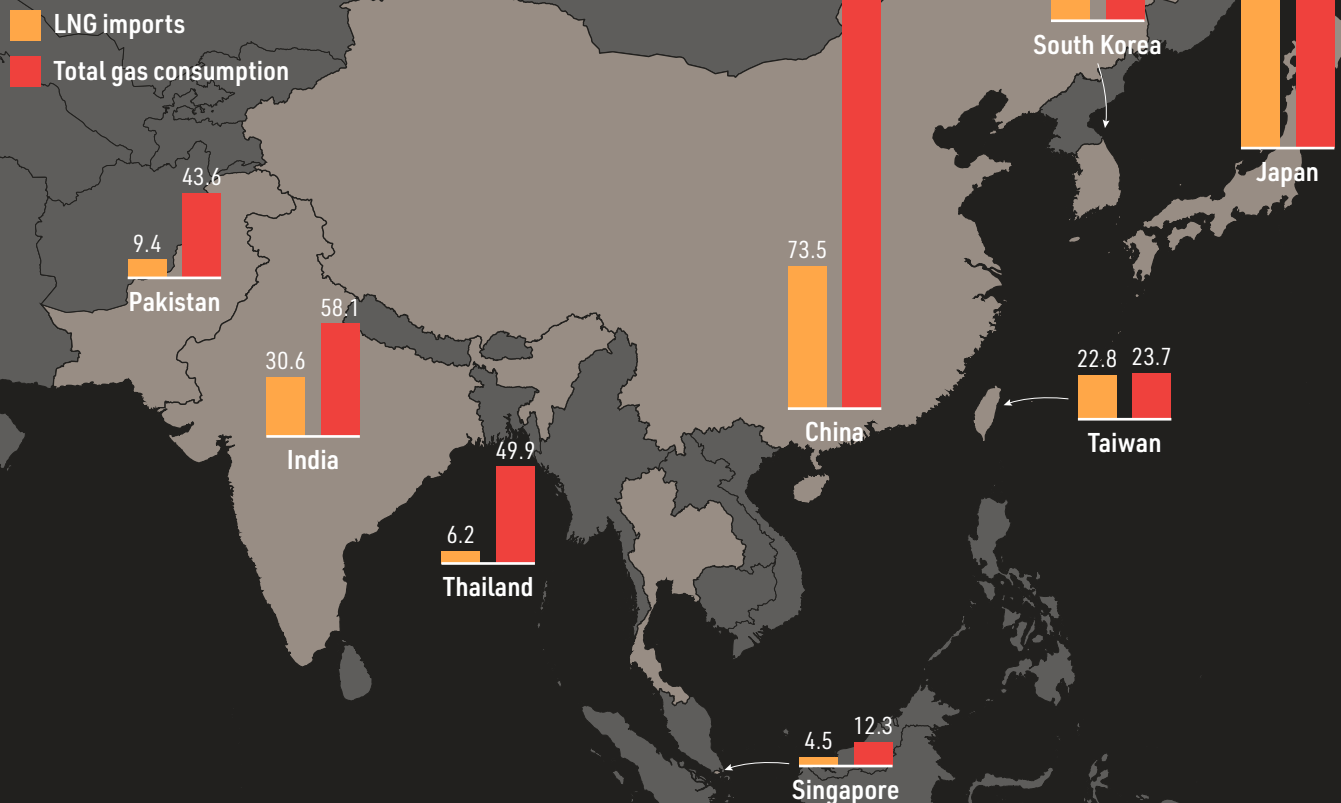
According to broker and exchange data reported by Platts, May saw a new record with 46,349 lots traded, equivalent to about 158 LNG cargoes, followed by 42,763 lots traded in June.

Almost all of this trade took place on the Intercontinental Exchange (ICE), where contracts are settled against the Platts Japan-Korea Marker (JKM) LNG price assessment for spot cargoes delivered into north Asian markets. The Chicago Mercantile Exchange also offers a JKM-settled derivative, but this appears to be attracting much less interest.

Trade in LNG derivatives is growing not just in volume but in range. Trade in the Summer 2020, Q2 2020, Q3 2020 and Calendar Year 2020 and →

PHOTO: UNSPLASH.COM - JEZAEI MELGOZA

Asian gas trade dominated by LNG (bn m³)



Source: BP Statistical Review of World Energy

2021 contracts made up 12.5% of total trade volume in June, according to Platts.

This indicates a growing forward curve which allows both physical and financial LNG traders to take and exit trading positions further forward with less risk that doing so will move the market substantially. Increased liquidity is also likely to see bid/offer spreads narrow, so that the cost of trading LNG derivatives falls.

RISK MANAGEMENT NEEDS

The Platts report noted that the total volume of JKM derivatives traded in 2018 amounted to the equivalent of 36mn metric tons, “just over a third of physical short-term and spot transactions.”

A report by GIIGNL, the International Group of LNG Importers, published earlier in the year estimated that 25% of all physical LNG volumes traded in 2018 were delivered on a spot basis – defined as cargoes delivered within three months

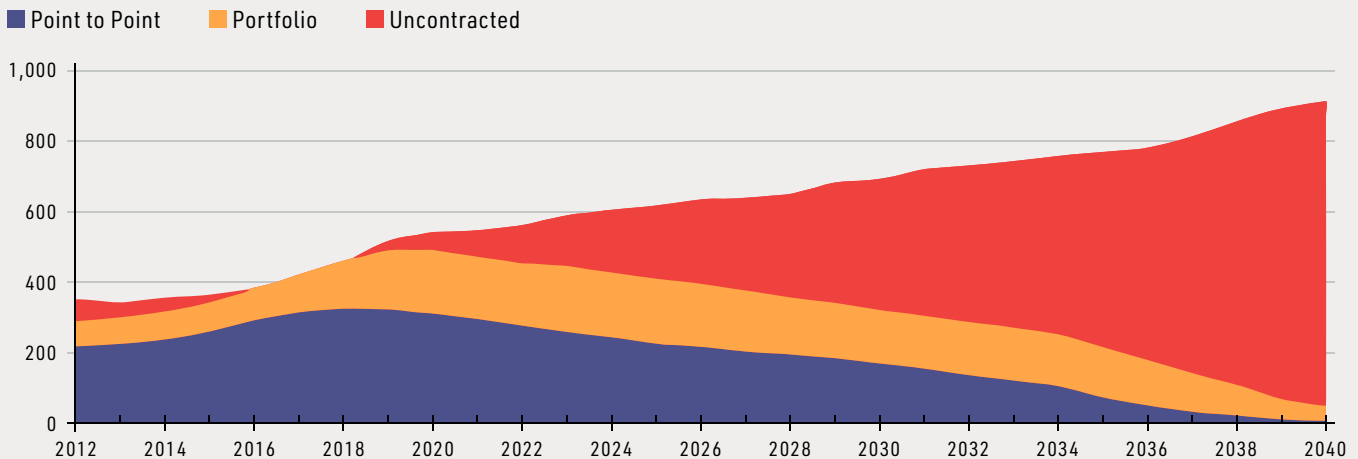
of the transaction date – and that a further 7% were delivered on a short-term basis.

At 32% combined, this was a significant jump from 27% in 2017. GIGNL attributed the increase to the start up of new US and Russian LNG production and to the growth of portfolio players, which aggregate both supply and demand-side contracts and optimise LNG trade between them. In addition, rising Chinese demand saw the diversion of cargoes to the Chinese market with Australia overtaking Qatar for the first time as a supplier of flexible LNG.

Rising spot market trade requires new price risk management tools, which allow traders to hedge sales and purchases. They need a contract that accurately reflects spot market prices which they can enter and exit easily and at relatively low cost.

In the US and Europe, LNG traders can hedge risk via exchange-traded derivatives contracts on gas hubs such as Henry Hub, the UK’s National Balancing Point (NBP) or the Dutch Title Transfer →

Forecast growth in uncontracted LNG supplies (bn m³)



Source: Asian LNG Trading Hubs; Myth or Reality, Columbia Center on Global Energy Policy, May 2018

“The Chinese market is insufficiently liberalised to support the development of a regional gas hub, while concerns about market access, the continuity of energy policy and availability of independent arbitration also detract from its suitability.”

Facility (TTF). These are markets they are either selling into, in the case of the European hubs, or which they are selling out of, in the case of Henry Hub. These markets have plenty of liquidity providing confidence that positions can be entered into or exited when the trader needs. However, no such hub exists in Asia, which consumes the vast majority of the world's LNG – 75% in 2018.

ASIAN GAS HUB

Rising liquidity in LNG derivatives has important implications for the evolution of an Asian gas hub. It suggests the Asian gas market will develop differently to the US and Europe, even if the emergence of a dominant Asian gas hub appears to make sense as a counter point to its US and European equivalents.

This should not be surprising because the Asian gas market is much more fragmented

than the gas markets of the US and Europe, spanning multiple unconnected national markets as different stages of liberalisation and with very different regulatory regimes. The concept of an 'Asian' gas market only really makes sense if thought of in terms of LNG trade because it is LNG that can be arbitrated between Asian national markets, as well as between the Atlantic and Pacific basins. In Europe and the US, LNG is an adjunct to existing markets based around pipeline supply.

There are nonetheless three main contenders hoping to fill the role of Asian gas hub – Singapore, Japan and China.

Singapore has a cluster of trading companies, a well-developed financial community and an open liberalised market. It could provide independent regulation and arbitration and non-discriminatory third-party access to infrastructure, but it is a small market in physical terms. It has no domestic gas production to speak of and consumed 12.3bn m³ of gas in 2018, sourced primarily by pipeline from Indonesia, as LNG and a smaller proportion by pipeline from Malaysia.

Japan also has strong advantages but also some important disadvantages, first among which is that its gas market, while large, is not well integrated. Pipelines connect import points with local markets rather than forming a national gas system. In addition, the Japanese market is not expected to grow over the long term as the expansion of renewable energy sources and the return of nuclear reactors eats into gas' share of power generation.

Japan also has no significant gas production of its own and no international interconnections for →

pipeline gas trade. The Japanese market is going through a process of liberalisation, and liquid gas hubs have historically emerged after rather than before liberalisation, but this may not be enough to foster anything more than localised gas trade at the wholesale level.

China offers much more in terms of both interconnections and market growth. Gas demand, including for LNG, is rising rapidly and the country is expected to overtake Japan as the largest market for LNG imports globally. Chinese LNG imports grew by 38.8% in 2018.

It also has multiple international interconnections, receiving pipeline gas from Myanmar, Central Asia and by the end of this year, if the Power of Siberia pipeline is completed on time, from Russia. It is also a major producer of gas in its own right; China produced 161.5bn m³ of gas in 2018, while consuming 283bn m³, importing 73.4bn m³ as LNG and 47.9bn m³ by pipeline, according to BP data.

However, the Chinese market remains dominated by large state companies and third party-access to infrastructure is limited, not just at LNG terminals but inland. The Chinese market is insufficiently liberalised to support the development of a regional gas hub, while concerns about market access, the continuity of energy policy and availability of independent arbitration also detract from its suitability.

“For portfolio players, a regional benchmark is a good solution because it provides a point of basis price risk for multiple growing markets.”

DERIVATIVES SOLUTION

The lack of an obvious candidate creates a vacuum which LNG derivatives hope to fill, but there is more to their potential for success.

LNG is the glue which binds fragmented Asian gas markets together and the primary means of price transmission. Access to domestic gas infrastructure, such as import terminals, storage

and pipelines is not necessary for a commodity delivered by ship because there is no system balancing requirement. LNG carriers are the LNG market's transportation system and the market for LNG carriers is open.

Even if the end markets lack liberalisation, there is sufficient diversity of buyers from multiple national markets to create active competition in wholesale LNG trade in Asia.

There is also no problem with a lack of a specific physical delivery point as Henry Hub, the NBP and TTF show – they are all systems rather than individual points for delivery.

As LNG supply becomes more flexible and less tied to oil indexation, and as markets like Japan liberalise their domestic markets, creating direct price risk between local and international markets for importers, the need to hedge LNG sales and purchases grows.

For portfolio players, a regional benchmark is a good solution because it provides a point of basis price risk for multiple growing markets.

Oil market similarities

The expectation that an Asian gas hub will emerge is essentially an exercise in pattern building; if they exist in the US and Europe then one will emerge in Asia.

However, that has not been the case in the oil market. The dominant US oil contract is West Texas Intermediate and the dominant international one Brent, while the Asian counterpart, Oman/Dubai, has never seen the emergence of futures trade to the same degree as in the US or Europe, despite many attempts to create such contracts.

LNG trade is arguably more analogous to crude oil trade than it is to pipeline gas trade, as LNG is delivered in large cargoes. It is trade of a large bulk commodity wholesale, rather than the sale of a commodity to end users, just as crude is sold to refiners and other users rather than, for example, car owners.

Asian gas markets – Japan, South Korea, Taiwan – are dominated by LNG trade. The newer participants – China, India, Pakistan and Bangladesh – import or will import enough LNG to make the Asian price of LNG a key element of domestic pricing.

This along with the overall growth of the LNG market and increased flexibility of supply increases the need for more effective price risk management and it would appear that, for the moment, JKM derivatives are making a strong bid to fulfil that need. ●



COUNTRY FOCUS:

INDONESIA, FROM LNG EXPORTER TO IMPORTER

One of the earliest LNG producers, Indonesia's future appears to be as a net importer of the fuel. State oil and gas company Pertamina forecasts a potential domestic gas supply deficit of 2.5-4.0bn ft³/d (26-41bn m³/yr, 19-30mn metric tons a year LNG) by 2030. The company aims to develop an international LNG portfolio to meet this demand, investing in both new gas production and regasification capacity at home, as well as LNG production abroad.

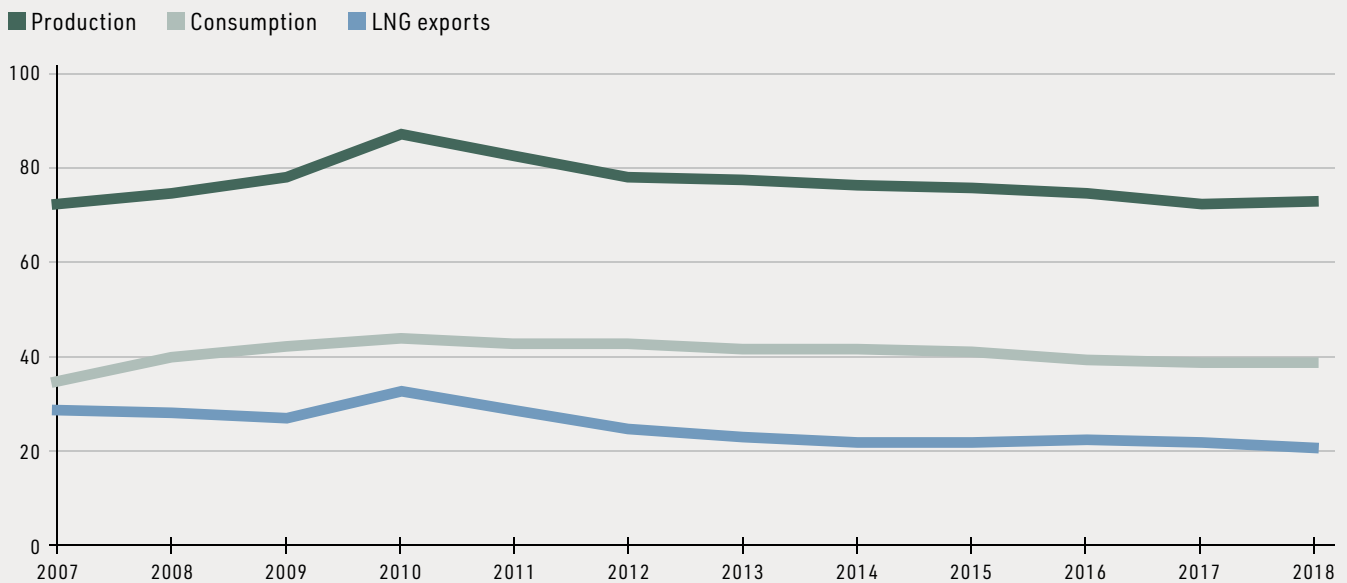
Indonesia was one of the earliest countries to enter the LNG market, establishing its first production facility at Arun in 1975, which gradually expanded to 12.5mn mt/yr capacity. Then came Bontang in 1977 with capacity of 5.4mn mt/yr from two trains. The output was sold on long-term contract to Japanese utilities. Another two trains were added at Bontang in 1983, Train 5 in 1990, T6 in 1995 and T7 in 1998.

However, reduced feedstock gas as a result of upstream decline and the diversion of gas for domestic use has seen the oldest LNG trains fall out of use. The Bontang plant now has operational capacity of just 11.5mn mt from Trains 5-8. Arun LNG was converted to LNG imports in 2014 also owing to the decline of available feedstock gas.

Tangguh LNG, developed by UK oil major BP, was the country's next major LNG project, starting up in 2009, with total capacity of 7.6mn mt/yr. It attracted a more diverse set of buyers and minority investors reflective of the growing →

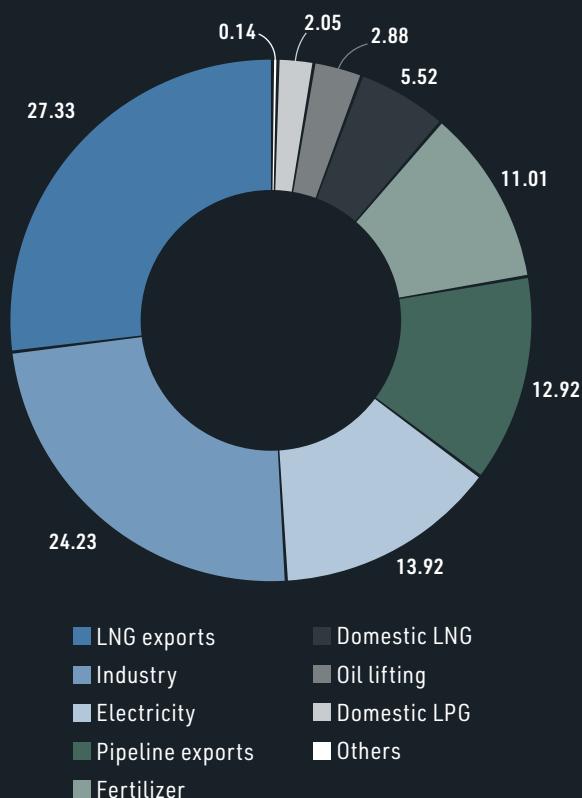
PHOTO: UNSPLASH.COM - JEZAEEL MELGOZA

Indonesia gas production and consumption (bn m³)



Source: BP Statistical Review of World Energy

Indonesian gas use 2017 (%)



Source: Laporan Akuntabilitas Kinerja Instansi Pemerintah Kementerian Energi dan Sumber Daya Mineral 2017

global LNG market. Tangguh supplies contract LNG to Chinese, South Korean and Japanese buyers as well as to US portfolio player Sempra LNG.

The country's third LNG plant is Donggi-Senoro, which is relatively small by comparison with just one LNG storage tank and nameplate capacity of 2mn mt/yr, supplying on contract Japan's JERA and Kyushu Electric, as well as South Korea's Kogas. Donggi-Senoro started up in 2015.

NEW CAPACITY

Plans for expansion come from the small 0.5mn mt/yr Senkang plant, where construction has been held up over negotiation of a sales and purchase agreement with state electricity company PLN, a third train at Tangguh and the much-delayed Abadi project.

BP decided in mid-2016 to expand Tangguh LNG's capacity by 3.8mn mt/yr, with the new train expected on-stream in the middle of 2020.

The 9.5mn mt/yr Abadi project is being led by Japanese operator Inpex (65%), but was set back in 2016 when the government demanded an onshore development, forcing the project partners to formulate and resubmit a new plan of development. The new development plan was submitted in June and approved in July.

Inpex, which has still to take a final investment decision on the project, now estimates that the project will come on-stream in the latter half of the 2020s. There have also been media reports, not confirmed by Shell, which owns the other 35% interest, that its stake in the project may form part of its current asset disposal programme. →

Indonesian LNG plants and regasification terminals



Source: IGU

However, net LNG exports in future look set to be eroded by growing domestic gas demand and further reductions in output from Bontang, unless upstream decline can be addressed.

In November last year, Indonesia's Special Task Force for Upstream Oil and Gas (SKK Migas) forecast that Bontang's production would drop 14% this year to 133 cargoes, down from an estimated 156 cargoes in 2018. SKK Migas estimated that output from Tangguh and Bontang together would reach 274 cargoes in 2018, of which 229 would be exported, with the remainder going to the domestic market.

DOMESTIC DEMAND

The flipside to LNG development in Indonesia has been not just the decline of upstream feedstock gas for LNG production but the increased use of its own LNG domestically. Indonesia's gas production in 2018 was 73.2bn m³, according to BP data, slightly lower than the 74.8bn m³ produced a decade earlier in 2008. Over the same period, gas consumption has barely changed at 39.0bn m³ and is lower than a peak of 44.0bn m³ in 2010. However, Indonesia's LNG exports have

fallen from 27.8bn m³ in 2000 to just 20.8bn m³ in 2018.

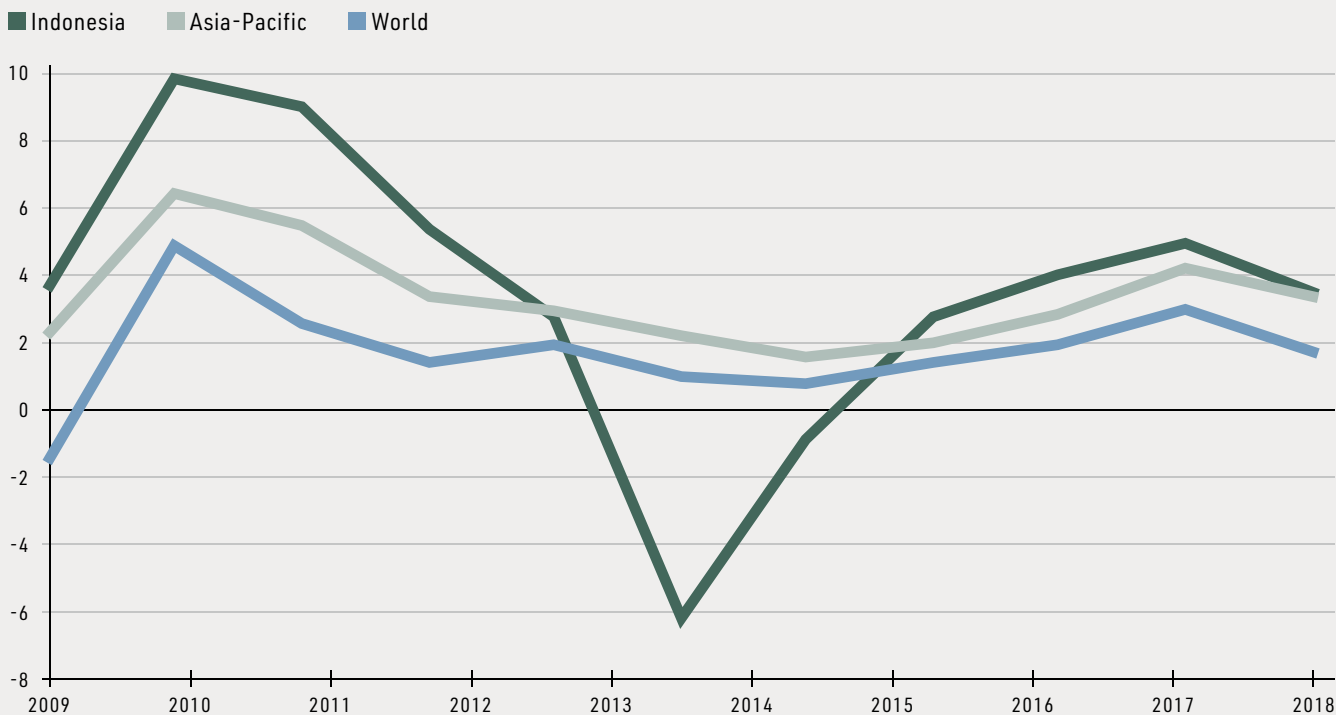
As of 2018, Indonesia had four regasification terminals. The first, a floating storage, regasification unit (fsru) with capacity of 3.0mn mt/yr, became operational at Nusantara in 2012. This was followed by another fsru project, Lampung LNG (1.8mn mt/yr) in 2014, the onshore Arun Regas (3.0mn mt/yr) in 2015 and a further fsru at Benoa (0.3mn mt/yr) in 2016. All bar Arun serve Java. As a result, since 2014, Indonesia's capacity to import LNG has grown faster than its capacity to export.

DEMAND EVOLUTION

Indonesia's geography, demographics and energy policy will play a major part in determining its future gas use. The country has approximately 9,000 named islands of which 922 are permanently settled. The main islands are Sumatra, Java, Kalimantan, Sulawesi and New Guinea. The country's largest gas reserves are on or off the islands of Natuna, Papua and Maluku.

It is the fourth most populous country in the world with around 270mn people, of which about 57% live →

Primary energy consumption (% increase)



Source: Asian LNG Trading Hubs; Myth or Reality, Columbia Center on Global Energy Policy, May 2018

on Java. The population is relatively young with 0-14 year olds making up just over 25% of the population, according to the World Population Review.

Despite dips in 2014 and 2015, primary energy consumption has risen by an average 3.5% a year over the last decade, higher than the average for Asia-Pacific of 3.3% and for the world of 1.7%. Primary energy consumption is dominated by coal (33.2%) and oil (45%) with gas making up just 18% and renewables, including hydro, 3.8%.

According to the government's 2014 National Energy Policy, gas will make up 22% of primary energy consumption in 2025 and 24% in 2030. This will be driven by increased industrial demand, fertilizer production and coal-to-gas switching in pursuit of lower greenhouse gas emissions.

However, despite significant gas resources, boosting gas use in Indonesia faces major distribution challenges because of the distances between production sources and demand centres, as well as inadequate distribution infrastructure on land. Transportation costs raise the end-user price of gas, which limits demand. Low regulated domestic gas and electricity prices have also contributed to a lack of field development, which, unless reformed, are also likely to limit the capacity to import LNG.

DEMAND GROWTH

Nonetheless, gas use for power generation is expected to grow. In May, the Asian Development Bank announced the first drawdown of funds for the 1,760 GW Jawa-1, which will be Indonesia's largest combined-cycle gas turbine plant. It is located in Cilamaya, West Java and will be fuelled by LNG from Tangguh LNG.

In 2017, gas accounted for 24.8% of power generation and while its share in percentage terms is not expected to increase, gas-fired electricity generation is forecast to rise from 57.1 TWh in 2018 to 103.5 TWh in 2027, according to PLN's electricity supply business plan 2018.

Installed gas-fired generation capacity is expected to rise from 16.5 GW in 2018 to 30.8 GW by 2027. In addition, PLN plans to build three fsrus in Northern Sumatera, Muara Tawar Jakarta and Gorontalo, which are part of a commitment to provide secure gas supplies to independent power producer projects.

Given Indonesia's archipelagic nature, LNG appears to be the means by which gas use, sourced both domestically and internationally, can grow, albeit with the rate of growth heavily dependent on domestic pricing reform. ●



PROJECT SPOTLIGHT: **COSTA AZUL LNG**

Energia Costa Azul (ECA) LNG is being developed by US company Sempra Energy as part of a portfolio of North American LNG plants. It is unique because of its combination of location – Mexico’s Pacific Coast – and access to US shale gas for feedstock.

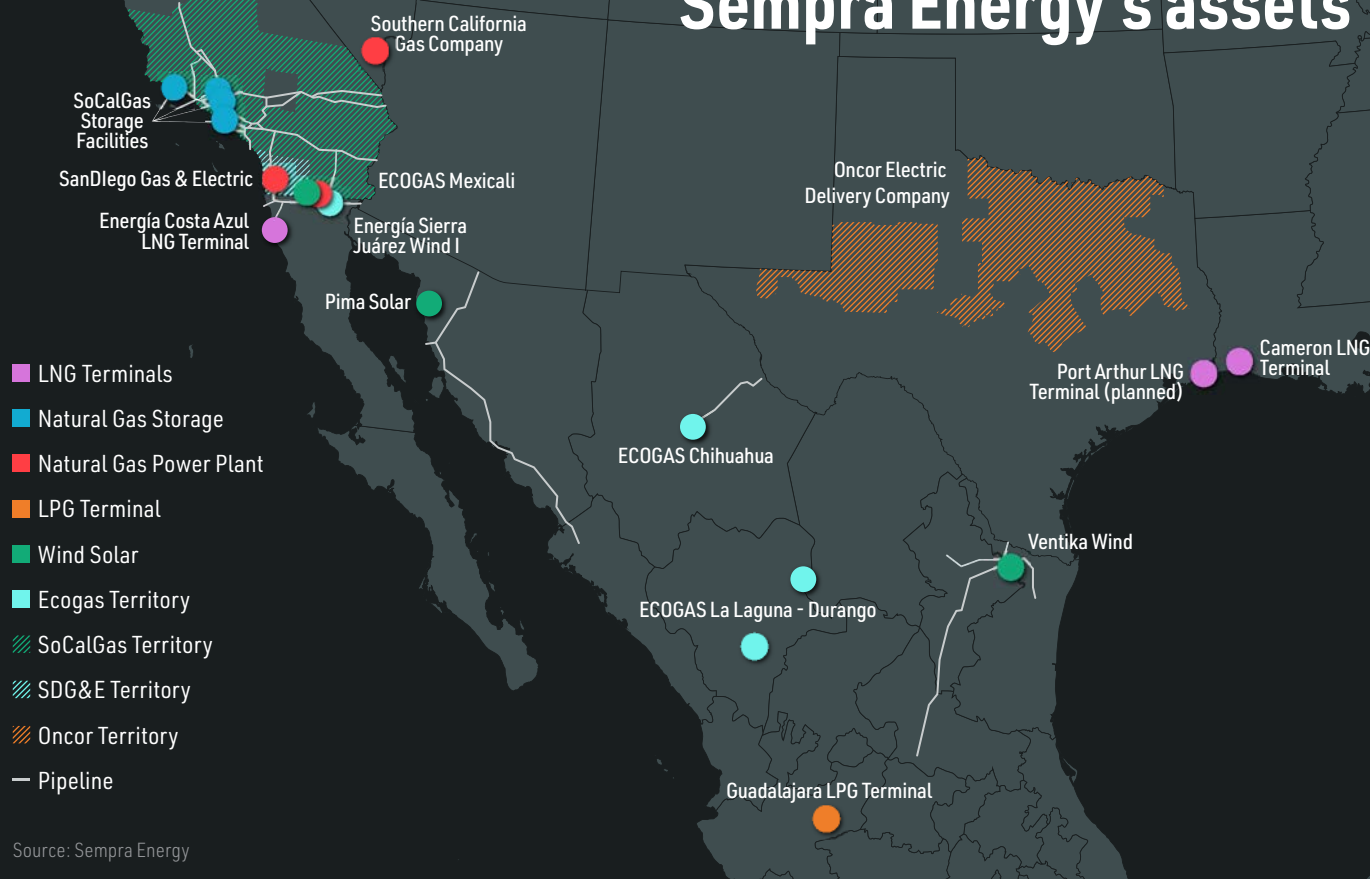
Located about 15 miles north of Ensenada, Baja California, it will have an immediate and permanent freight advantage over US LNG plants in the Gulf of Mexico (GOM) when it comes to accessing high growth Asian LNG markets as its cargoes will not have to pass through the Panama Canal. Round trip tolls for Panama Canal transits are \$1mn. Yet it will still be able to access cheap and plentiful US Permian basin shale gas via pipelines exporting US shale gas to Mexico.

According to a study published by the Oxford Institute for Energy Studies in March, Outlook for Competitive LNG Supply, US Gulf Coast LNG projects face additional logistics costs of \$1.5/mn Btu to supply Asia, compared with projects sited in Mozambique, Qatar or Sakhalin in Russia. This means they have to focus heavily on reducing upstream gas feed stock and liquefaction costs to be competitive. Costa Azul will have to do both, but cheap freight costs are an important differentiator.

Costa Azul LNG is also a brownfield expansion of an existing LNG import terminal rather than a greenfield project, which will reduce costs substantially. The ECA import terminal was originally designed to provide competition in →

PHOTO: ISTOCK.COM/PASSIONSTUDIO

Sempra Energy's assets



Baja California to imported US gas. Its redevelopment as an LNG export plant would represent another step in making the north Mexican gas system effectively an extension of the US gas system.

Costa Azul already has one marine berth and breakwater, two LNG tanks of 160,000 m³ each and nitrogen injection systems. The liquefaction project would add natural gas reception, treatment and liquefaction capabilities, as well as the ability to load rather than unload LNG cargoes.

However, while a good export point in terms of its Pacific coast location, Costa Azul is located in a zone of high seismic activity. The import terminal's internal steel tanks had to be attached to the base of the external concrete tank using a series of metal straps capable of resisting extremes of temperature. A special type of concrete also had to be developed for the capping beam supporting the interior tank. Any new development of the site will require similar measures. This will add to costs, but on balance the brownfield development should be competitive.

FEEDSTOCK GAS

US gas exports to Mexico have rocketed since 2010 as both production and export pipeline

capacity have increased. Last year, US gas exports to Mexico hit 1.69 trillion ft³ a rise of more than 500% on 2010's 333bn ft³, according to US Energy Information Administration data.

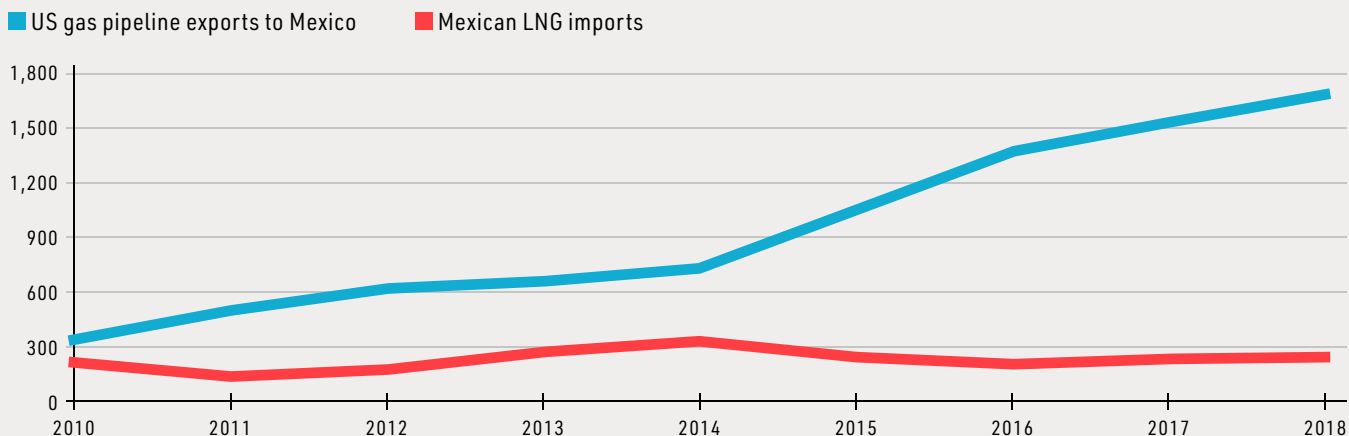
This surge saw Mexican LNG imports peak in 2014 at 9.3bn m³ (328bn ft³, 6.88mn metric tons). In 2018, Mexico imported 5.1mn mt/yr of LNG, up on 2016 and 2017 levels, but still well below 2014's peak. In 2018, the price of US pipeline gas averaged \$3.3/mn Btu, compared with \$4.65/mn Btu in 2014.

The cap on LNG import needs left Mexico with excess LNG import capacity, promoting the idea of converting Costa Azul, the most northerly of the country's three LNG import terminals – Altamira (2006, 5.4mn mt/yr), Costa Azul (2008, 7.5mn mt/yr) and Manzanillo (2012, 3.8mn mt/yr) – to an LNG export plant. The site is already connected by a 45-mile pipeline to the pipelines spanning the northern border of Baja California and the US.

Existing LNG projects using US pipeline gas have a gas supply cost of roughly 1.15 times Henry Hub, which the OIES calculates equates to \$3.52/mn Btu in 2025.

New GOM LNG projects are targeting much lower gas costs based on the expansion of

US shale impacts Mexican LNG imports (bn ft³)



Source: EIA, BP

Permian basin gas production linked to the → recovery of shale oil and gas condensate and a lack of evacuation capacity for the associated gas. ECA LNG will face competition for gas from Mexican consumers. A big differential between US export prices to Mexico and gas prices available closer to US production sources could prove a competitive disadvantage.

FID

Sempra received two key authorisations earlier this year that have allowed it to progress its development plans for Costa Azul. The approvals from the US Department of Energy (DOE) covered exports to countries that do not have a free-trade agreement with the US and allow the export of 636bn ft³ a year (about 13mn mt) of LNG.

The final investment decision (FID) will need binding customer commitments, permits, further export authorisation from the Mexican and US governments and financing, Sempra cautioned at the time. FID is currently expected late this year, with the plant scheduled to come on-stream in 2023.

Phase 1 consists of a 2.5mn mt/yr single train development, while Phase 2 will add two further trains and one LNG storage tank to reach the development's planned capacity of 11.4mn mt/yr.

According to the environmental impact assessment submitted to the US authorities by Sempra, the two Phase 2 trains will each have capacity of about 4.5mn mt/yr, while the new storage tank will have capacity of up to 160,000 m³. It will also include gas-fired generation and emission control facilities, new ground flare equipment, piping

and utility tie-ins to ECA's existing regasification terminal and a marine off-loading facility, as well as a heavy haul road for the construction stage.

TechnipFMC and Kiewit were selected in June 2018 as the engineering, procurement, construction and commissioning (EPC) contractors for the project, subject to reaching a definitive agreement on the EPC contract.

BUYER INVESTORS

In November last year, Sempra announced that its subsidiaries IEnova and Sempra LNG had signed heads of agreement (HOAs) with affiliates of France's Total, Japan's Mitsui & Co and Tokyo Gas for Phase 1, subject to reaching definitive agreements. The HOAs covered potential purchases of 0.8mn mt/yr by each of the buyers.

In addition to the ECA LNG Phases 1 and 2, Sempra Energy is developing the Port Arthur LNG export project in Texas and Cameron LNG Phase 1 and 2 export projects in Louisiana. Cameron LNG Phase 1 is currently under construction and Total and Mitsui are two of Sempra Energy's joint-venture partners in the project.

Sempra Energy and Total also announced in November last year a framework agreement for co-operation in the development of North American LNG export projects. The memorandum of understanding (MoU) contemplates Total potentially contracting for up to 9mn mt/yr of LNG offtake across Sempra Energy's LNG export development projects. Total, which already has 16.6% equity in Cameron, may also acquire an equity interest in ECA LNG. ●



TECHNOLOGY: **COMPRESSOR EFFICIENCY IMPROVEMENTS**

LNG equipment manufacturers are seeking to improve the efficiency of compressors to reduce LNG production costs and improve environmental footprints. They are also having to adapt to new plant configurations, while at the same time maintaining safety.

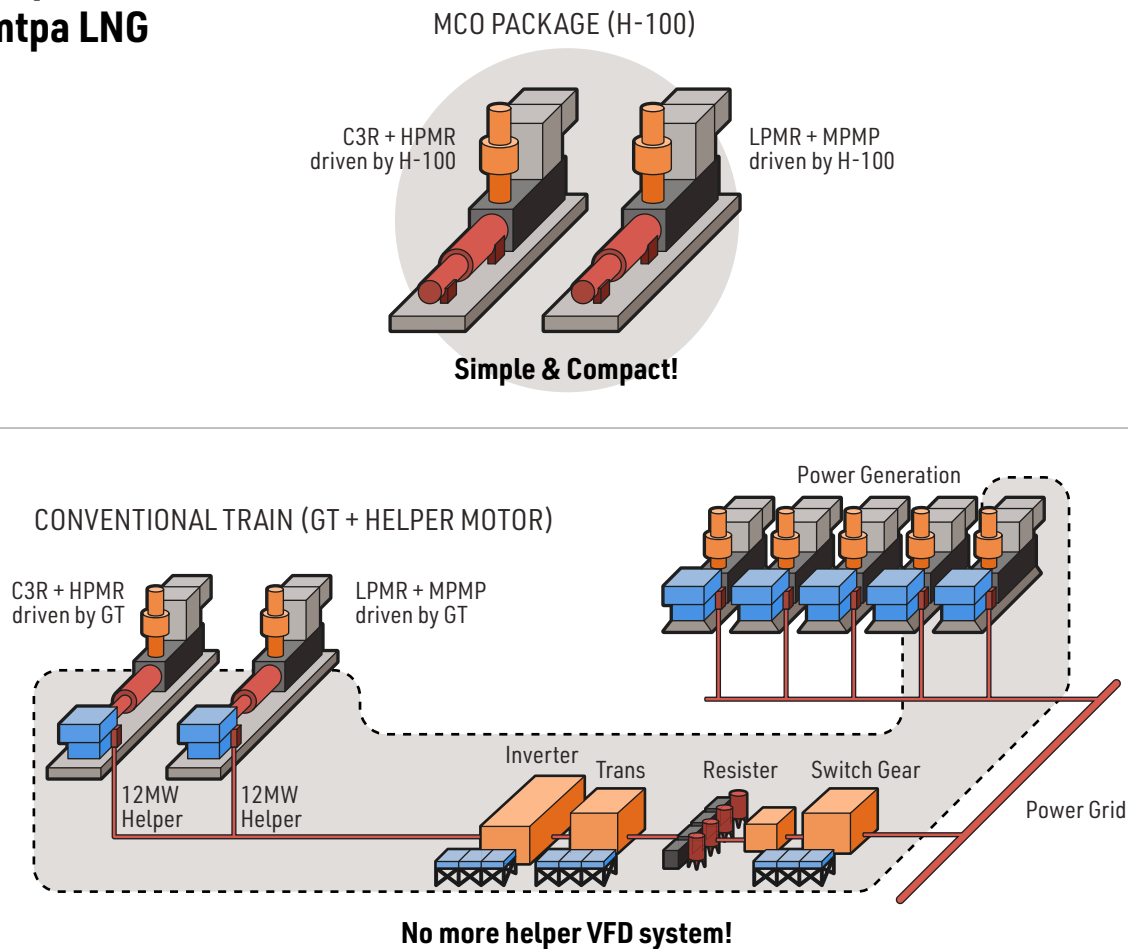
Greater computer power is proving an important aid in developing new designs. Engineering firms use computational fluid dynamics (CFD) to test aerodynamics in LNG plants, with the results used to produce scale models that can more accurately predict the efficiency of commercial scale compressors at relatively low cost and more quickly than in the past.

Aerodynamic improvements are key to maximising LNG production because a 10% increase in compressor efficiency equates to a 10% rise in LNG output, as well as reduced energy input and therefore emissions from the liquefaction process.

It is particularly important to test pre-cooling compressors as it is difficult to handle high →

PHOTO: ISTOCK.COM/PANWALKER68

MR compressor train for 6 mtpa LNG



Source: Mitsubishi Heavy Industries

volumes of throughput at low temperatures. Picocoulomb probes are used to measure pressure and identify a lack of operating range.

The desire to cut costs has also seen manufacturers reduce the exit diameter size of the impeller – or rotor. A variety of changes are being made to create more efficient impellers, including the use of vanes both upstream and downstream.

In addition, seals can also be used to reduce the number of internal linkages, while refrigeration compressors are equipped with injectors to keep the process within a single unit. Reducing the size of the compressor can increase the maximum allowable working pressure and improve plant operation.

NEW CONFIGURATIONS

Efforts to reduce the size of compressors and other equipment are also being driven by floating LNG (FLNG) projects where space is at a premium. Single casing compressors are usually

used on FLNG vessels for easier maintenance. The technology used on FLNG vessels must also take sea motion into account.

The open-source CFD toolbox OpenFOAM is already used to counter rollover accidents – when stratified LNG can be homogenised, resulting in potentially explosive LNG vapour being released. OpenFOAM is used to simulate rollover accidents, so mitigating measures can be taken.

According to an article published in the Journal of Loss Prevention in the Process Industries in mid-July, there have been at least 24 LNG rollover incidents in the industry's history.

Advances are also being made in compressors used on LNG vessels. In March, Samsung Heavy Industries awarded Atlas Copco a contract to supply eight heavy-duty centrifugal gas compressors and eight oil-free gas screw compressors for use on four LNG carriers to be supplied to Celsius Tankers from October.

The screw compressors will feed WinGD X-DF two-stroke, low pressure, dual-fuel engines. →

“The desire to cut costs has also seen manufacturers reduce the exit diameter size of the impeller.”

Atlas Copco said this is the first ever oil-free gas screw compression technology, which is designed to allow longer maintenance intervals in comparison with oil-flooded compressors.

VARIABLE SPEED DRIVES

At the end of June, the Oman LNG plant awarded GE Power a contract to provide a variable speed drive system (VSDS) to improve the efficiency and speed of its three compressor trains. The VSDS, which incorporates a high voltage motor, is intended to improve compressor train performance by removing bottlenecks in the system.

An 18-MW two-pole motor will replace the existing 7.5-MW motor, but the drive system “can be easily integrated into the existing plant layout with faster execution time,” GE says.

It added: “Similar footprint and less necessary auxiliary requirements provide flexibility to the plant layout and enable smooth plant integration with its existing compressor string, which in turn reduces the associated infrastructure costs and facilitates a faster execution time.” There are 150 GE Power VSDS operating around the world.

KITIMAT TO GO ALL ELECTRIC

Operators are also starting to adapt compressors to reduce the carbon emissions produced by LNG plants in an effort to position the technology as part of the climate change solution rather than the problem.

Most recently, in July, Chevron announced that it and partner Woodside Petroleum would apply to the British Columbia environmental assessment office in Canada to change their plans for the expansion of the Kitimat LNG scheme. The joint venture plans to

turn Kitimat into an “all-electric plant,” with all power sourced from hydroelectric plants.

A total of 700 MW of electric motor drives will power the compressors, pumps, fans and liquefaction, although back-up diesel generators will be retained at the plant, the capacity of which will be expanded to 18mn metric tons a year (mt/yr). Chevron says that the switch would mean the plant will emit less than 0.1 mt of carbon equivalent for every ton of LNG produced, giving Kitimat the lowest carbon emissions/mt of LNG of any large LNG scheme in the world.

The US firm says that the average LNG plant emits 0.3 mt of carbon equivalent/mt of LNG produced. The project is not expected to come on stream until 2029 at the earliest. The decision to change the project scope may require a new federal environmental assessment, but indicates project developers’ awareness that both low costs and low carbon emissions increasingly are factors which have to be balanced to gain acceptance for new LNG projects.

The Canada LNG project, which is expected on-stream in 2023/24, will use a combination of hydro power and gas turbines to drive its compressors. Phase 1 of the project will have two trains of up to 6.5mn mt/yr each.

ARCTIC LNG

The expansion of the LNG industry globally is leading more countries to develop their own full supply-chain capabilities, which should gradually introduce more competition into the LNG equipment market.

In February, Germany’s Siemens signed an agreement to supply Russian firm Novatek with three feed gas and six boil-off compressors for the three trains of its Arctic LNG 2 project in west Siberia, the final investment decision on which is due this quarter. Siemens, which supplied compressors to Novatek’s Yamal LNG plant, said it will use new technological solutions on the project, but did not specify what they were.

Novatek says that it wants to create an ‘LNG Center of Excellence’. Equipment for one of the feed gas and two of the boil-off compressors in the Siemens contract will be manufactured in Russia. Apart from the obvious benefits in terms of employment and GDP, this would reduce Russia’s dependence on imported technology and equipment vulnerable to sanctions. ●



CONFERENCES & EVENTS

AUG

LNG & Natural Gas Markets Asia

August 29-30

Singapore

spglobal.com/platts/en/events/apac/

lng-natural-gas/summary

SEP

World Energy Congress

September 9-12

Abu Dhabi, United Arab Emirates

wec24.org

South America Energy Week

September 10-11

Buenos Aires, Argentina

energycouncil.com/event-events/

south-america-assembly-southern-edition/

6th London Gas & LNG Forum 2019

September 11-12

London, UK

energystreamcmg.com/forums/

forums-seminars/6th-london-gas-lng-forum-2019

Gastech Exhibiton & Conference 2019

September 17-19

Houston, USA

gastechevent.com

OCT

CWC World LNG & Gas Series Morocco Summit

October 2-3

Marrakesh, Morocco

cwc-moroccogas.com

OCT

Tanzania Oil & Gas Conference

October 2-3

Dar es Salaam, Tanzania

cwctog.com

4th International Green & Smart Shipping Summit

October 8-9

Rotterdam, Netherlands

gssummit.org

LNGgc

October 8-10

London, UK

energy.knect365.com/lnggc-london

China LNG & Gas

October 16-17

Beijing, China

chinalngsummit.com

European LNG Infrastructure Development Summit

October 22-22

Barcelona, Spain

lngevent.com

North America Gas Forum

October 21-23

Washington DC, USA

energy-dialogues.com/nagf

NOV

CWC World LNG Bunkering Summit

November 5-6

Hamburg, Germany

cwc-lngbunkeringsummit.com

PHOTO: ISTOCK.COM/SEZER66



NOV

EAGC – European Autumn Gas Conference 2019

November 5-7
Paris, France
theeagc.com

Oil & Gas Vietnam (OGAV 2019)

November 13-15
Vung Tau City
oilgasvietnam.com

Mozambique Gas Summit & Exhibition

November 20-21
Maputo, Mozambique
mozambique-gas-summit.com

2nd Gas & LNG Middle East Summit

December 2-3
Muscat, Oman
gasoman.com

CWC 20th Annual World LNG Summit & Awards Evening

December 3-6
Rome, Italy
world.cwclng.com

Frankfurt Gas Forum

December 11-12
Frankfurt, Germany
energystreamcmg.com/forums/forums-seminars/7th-frankfurt-gas-forum-2019

DEC

JAN

LNG Bunkering Summit 2020

January 29-30, 2020
Amsterdam, Netherlands
oilandgasiq.com/events-lngbunkering

American LNG Forum

February 4-5
Houston, United States
americanlngforum.com

FEB

International Gas Union, Research Conference 2020, Gas Innovations for a Sustainable Future

February 24-26, 2020
Muscat, Oman
IGRC2020.com

6th International LNG Congress

March 2-3, 2020
Brussels, Belgium
lngcongress.com

MAR

6th CWC China LNG & Gas International Summit & Exhibition

March 4-6, 2020
Shanghai, China
chinalnggas.com

PHOTO: ISTOCK.COM/AKE115058

EIB MULLS NEW LENDING STRATEGY

The European Investment Bank is planning to cut all further lending to nearly all fossil-fuel projects from the end of next year, according to a leaked document intended for the board's discussion in September.

Following a consultation it began in January, it is proposing to phase out support to energy projects reliant on fossil fuels: oil and gas production, infrastructure primarily dedicated to natural gas, and power generation or heat based on fossil fuels. These types of projects – perhaps the largest of which is the Southern Gas Corridor – will not be presented for approval to the bank's board beyond the end of 2020. They will have to look elsewhere for funding.

But the bank expects to “support connections to new sources of low-carbon gas, or the adaptation of existing infrastructure towards a credible, imminent use of a high blend of low-carbon gases.”

It will continue to support the development of electricity networks, including the interconnection target agreed for 2030 and European projects of common interest. But it will look to prioritise investments that increase network flexibility, it said.

High efficiency gas-fired combined heat and power production will be eligible for support, as will efficient gas boilers included within building renovation programmes. These investments support the energy transition path, it said. But it will no longer support upstream oil or gas production. “This reflects the prioritisation of the EIB and does not say anything about the importance of EU energy policy goals, including limiting import dependency,” it said, in its response to comments raised during consultation.

Despite the recent increase in investment in renewable energy, the EU is still largely dependent on fossil fuels for transport, industry and heating and, in many EU member states, for power generation. “This highlights the considerable challenge the EU faces in meeting the long-term targets of the Paris Agreement,” it said, explaining its decision to direct money to support alternative energy systems.

In her July 16 speech to the European parliament on her election as the next president of the European Commission, Ursula von der Leyen said the “EIB would become Europe's climate bank, raising the present quarter of its total financing spent on climate investment to at least half by 2025.”

UK RATING AGENCY AFFIRMS LNG CAN BE FORCE FOR GOOD

FTSE Russell rating agency, a wholly-owned subsidiary of the London Stock Exchange Group (LSE), has kept Russian independent Novatek on its FTSE4Good Index following its June 2019 index review, the gas producer and exporter said July 5.

The positive news follows the LSE's recategorisation of oil and gas companies as ‘non-renewable energy’ companies with effect from July 1, lumping them together with coal producers; and the creation of a ‘renewable energy’ group that includes formerly ‘alternative energy’ companies.

The FTSE4Good Index Series is designed to identify companies that demonstrate strong environmental, social and governance (ESG) practices measured against globally recognised standards. FTSE4Good indexes are used by a wide variety of market participants to create and assess responsible investment funds and other products.

Meanwhile, UK charity National Trust announced in early July plans to divest fossil fuel shares by 2022 as the companies have failed to make sufficient progress towards meeting the Paris Agreement goals; although at total value of £45mn (\$56mn), it is a less than 5% of its £1bn portfolio, according to Financial Times data.

Collective divestments from these stocks by 1,000 institutions worldwide however total \$8 trillion, the FT said. The list of sellers includes the Norwegian sovereign wealth fund, one of the world's largest, that was built up from sales of oil and gas over decades.

LNG WILL DRIVE CANADIAN GAS GROWTH: CERI

With the US export market all but lost to Canadian gas producers, domestic demand and the country's nascent LNG export industry will be relied upon to drive demand growth through the next 20 years, the Canadian Energy Research Institute (Ceri) says in a new outlook report released July 23.

Domestic demand – almost, but not quite, offsetting the decline in net exports to the US – will increase by →

2.5bn ft³/day between now and 2039, Ceri says, with 47% of that growth coming from the power generation sector as it moves off coal and 35% coming from the industrial sector, which includes oil sands. Over the next six years or so, Canadian production will remain relatively flat at around 17bn ft³/day.

But it is LNG that will drive Canadian natural gas production sharply higher in the second half of the next decade, when the prospect of LNG exports from both coasts attract more growth-oriented investments to the moribund Canadian upstream gas industry, the outlook report says.

"Such a scenario will lead to a consistent increase in production until 2029, to levels slightly over 25bn ft³/day," Ceri says. "Post-2029, production will stabilise through the remainder of the study period." Demand from the LNG sector, it says, will account for 30% of total Canadian natural gas production in 2039.

By 2029, the report says, an incremental 7.1bn ft³/day of western Canadian gas production will be supporting LNG exports from the Woodfibre LNG, LNG Canada and Kitimat LNG projects on the west coast and at least one – either Bear Head LNG or Goldboro LNG – on the east coast.

US REGULATOR CREATES LNG DIVISION

The US Federal Energy Regulatory Commission (Ferc) said July 23 it will create a new division and open a regional office in Houston to deal with the growing number of applications to build and operate LNG export facilities.

The new Division of LNG Facility Review & Inspection (DLNG) will be part of the commission's Office of Energy Projects and will consist of 20 existing Ferc staffers in Washington and eight additional staffers who will be based in the new Houston regional office.

"As the demand for US LNG and the number and complexity of project applications has grown, the commission has experienced a similar growth in the need for Ferc to expand its oversight in this program area," commission chair Neil Chatterjee said. "Much of the work related to these LNG projects, and the expertise it requires, is based in and around Houston."

In April 2018, Ferc had 13 staff dedicated to working on LNG engineering and review issues. That number now stands at 20. They help complete engineering reviews, co-ordinate safety reviews with the federal Pipeline and Hazardous Materials Safety Administration and the Department of Transportation, and prepare engineering analyses for inclusion in environmental documents.

Postings seeking candidates for the Houston office, starting with the division director, will be made shortly, Ferc said.

PAKISTAN EX-PM CHARGED WITH CORRUPTION IN LNG DEAL

Ex-prime minister of Pakistan Shahid Khaqan Abbasi was arrested by National Accountability Bureau (NAB) July 18. He was charged on a multi-billion-rupee case, related to the award of a Qatari LNG import contract.

Abbasi, who is a senior member of the Pakistan Muslim League (PML-N), succeeded Nawaz Sharif when the latter was dismissed by the supreme court in 2017 and sentenced to seven years in prison late last year for corruption.

One of Sharif's alleged crimes was his misuse of authority in awarding the contract for an LNG terminal to 15 companies in a non-transparent manner.

PML-N confirmed the arrest of Abbasi and called it a "politically motivated" action by rival party Tehreek-e-Insaf (PTI) (Pakistan Movement for Justice).

The NAB said Abbasi was charged on involvement in a corruption scandal in Qatari LNG import deals during 2013 to 2017 when he was the petroleum minister. Pakistan State Oil and Qatargas signed in 2016 a 15-year sale and purchase agreement for 3.76mn mt/yr at a price of 13.36% of Brent oil.

Pakistan imported 9.4bn m³ (6.9mn mt) of LNG in 2018, of which more than three-fifths came from Qatar, according to BP's Statistical Review of World Energy.

The NAB also signed July 18 the warrants for the arrest of another PML-N leader, Miftah Ismail, and of a former managing director of Pakistan State Oil, Sheikh Imranul Haque.

The judge who found Sharif guilty was himself dismissed July 12 on blackmail charges, leading to calls for Sharif's release, according to local media reports. →

DUTCH-UK GAS PIPE READY FOR REVERSE FLOWS

Built and operated by Dutch transporter Gasunie to help meet UK security of supply, the Balgzand-Bacton Line has only been able to carry gas from the Netherlands to the UK. But at the end of 2017, its wholly-owned subsidiary BBL Co announced it would make gas transportation in both directions possible from the autumn of 2019.

There had been pressure to act earlier, but whether there was not enough demand to justify the cost, given the abundance of gas available under Dutch soil, or whether the Netherlands did not want any more UK North Sea gas in the country, lowering prices, nothing happened.

Now a dozen or so years since start-up, and after engineering work at either end, BBL is now able to flow gas in both directions. There is no compression yet built at Bacton on the Norfolk coast, so reverse-flow capacity will depend on the strength of demand from consumers on the continent. The operator says a little over a third of the forward flow will be available in reverse: a maximum of 7 GWh/h (about 5.5bn m³/yr), compared with 20.6 GWh/h in forward flow.

As with the bi-directional Interconnector UK pipeline which links Belgium and the UK, the direction of flow through BBL will depend largely on the prices at either end of the line each day, flowing towards the higher-priced market as long as the difference between the two is sufficient to cover the cost of transport.

BBL did not explain how it would manage the pressure drop to allow reverse flow, or where the gas would come from to pressure up the line and so allow forward flow to resume.

This makes the Netherlands stronger as a gas hub, able to source pipeline gas from the UK as well as Norway, and hence able to transit more gas to neighbours as well. The Netherlands Title Transfer Facility is already the most liquid gas hub in Europe.

The timing of the change is significant, as the Netherlands is losing a major source of gas – the giant Groningen gas field – faster than expected, while output from other fields collectively is declining. The government is seeking to cut output from the nitrogen-heavy Groningen field altogether, although the state mining supervisor SODM has ruled that annual production of 12bn m³ would be safe. The

decision to reverse flow was taken after the decision to cut Groningen output.

One industry source told NGW that reversing the BBL flow was not directly connected to the output reduction of the Groningen field, but to declining domestic production in general. The reversal was planned and is part of the policy of the Dutch government, even before Groningen became an issue, to secure gas supplies in the future and to remain an international gas hub despite the depletion of domestic reserves, he said. “But you could say that the process has speeded up,” he concluded.

There is also a risk that the Dutch gas balance might worsen. The field’s operators – Anglo-Dutch Shell and US ExxonMobil, equal partners in the NAM joint venture – might decide that it is not worth operating the field for such small amounts of gas after 2022, given that it will close completely anyway by 2030 at the latest. They could decide to meet their gas sales commitments from other sources including LNG; and wind up operations at their 60-year-old venture sooner.

The two majors are also part-owners of GasTerra, the exclusive marketer of Groningen gas as well as a buyer and seller of other gas, each with 25%. The government owns the other half of the company. GasTerra sells gas and it is the role of the wholly state-owned transporter Gasunie to ensure that the customer receives gas of the correct specification.

OFFSHORE HAS TURNED A CORNER: RYSTAD

Offshore project sanctioning could hit a total of \$123bn in 2019, consultancy Rystad Energy estimated July 18.

Should financing commitments reach that level it would represent a record in recent years, outstripping the \$78bn approved in 2014. “This is yet another signal that the offshore industry has turned a corner,” Rystad said.

Saudi Aramco’s recent announcement of \$18bn worth of project commitments associated with the Marjan and Berri expansion projects took the year to date total past \$50bn. The Hail and Ghasha Sour Gas projects, Lula’s Oeste FPSO in Brazil, and the feed gas systems to develop the Atum and Golfinho assets on the Area 1 LNG project off Mozambique are also expected to be sanctioned this year. →

"With offshore free cash flows at nearly record highs, E&P's are betting big on new projects," said Rystad's vice president of oilfield service research Matthew Fitzsimmons. "Offshore project sanctioning in 2019 looks ready to reach heights not seen since the \$100 barrel of oil."

Seventy four offshore projects were sanctioned with a commitment of \$78bn in 2014. However, the collapse of oil prices saw sanctioning bottom out at just \$37bn in 2016.

Despite Rystad's enthusiasm, the consultancy admits that for the offshore industry to reach \$123bn of potential project commitments in 2019, over \$86bn of onshore and offshore commitments in the second half of the year will require an oil price of at least \$40 per barrel to breakeven.

A further \$16bn worth have a breakeven price of \$60, and are "at high risk of not receiving funding at the time of their sanctioning decisions this year"

TURKEY CONFIRMS GAS PLANS

Turkey has confirmed its plans for the natural gas sector. According to the country's 11th national development plan 2019-2023, approved by the Turkish parliament July 18, the country is committed to improving its gas transmission network, increasing security of supply and extending the gas distribution grid.

More specifically, the plan states the commitment to continue with the development of the Tuz Gollu underground gas storage facility, and the expansion of the North Marmara/Silivri gas storage facility in order to increase the country's gas storage capacity to 10bn m³, and for the purchase of a new floating, storage and regasification unit (FSRU) and the expansion of onshore facilities to increase LNG import capacity.

The Tuz Gollu facility has capacity of 600mn m³ and daily withdrawal capacity of 20mn m³; while the North Marmara/Silivri gas facility has a storage capacity of 2.8bn m³ and a withdrawal capacity of 25mn m³/day. Both are operated by Turkey's state gas importer and transmission operator Botas, which also operates one of the country's two FSRU units at Dordyol on Turkey's east Mediterranean Coast, which has an LNG storage capacity of 263,000 m³ and a daily regasification capacity of 20mn m³/d of regasified LNG.

No information was given in the plan as to the anticipated capacity of the new FSRU unit.

NOVATEK CFO GIVEN RUSSIAN CITIZENSHIP

President Vladimir Putin granted Russian citizenship on July 22 to Mark Gyetvay, the long-serving CFO of Russian gas producer Novatek, according to a decree published on the Kremlin's website.

Gyetvay has worked as Novatek's head of finance since 2003 and the deputy chairman of its management board since 2010. The Kremlin has issued citizenships and various awards to a number of Western nationals at leading Russian companies over the years, as a show of gratitude for their services to Russia.

Gyetvay's US citizenship became an obstacle after US nationals were barred from helping to arrange financing for Novatek and other major Russian oil and gas companies in 2014 under Washington sanctions. This restricted his role in negotiating funding for the \$27bn Yamal LNG project, completed in 2017.

GREECE CLEARS IGB CONSTRUCTION

The Greek Regulatory Authority for Energy (RAE) has approved the construction of the Greek section of the Greece-Bulgaria Interconnector (IGB), the project's operator ICGB said July 19. According to ICGB, the venture has secured a licence for independent natural gas system (INGS), permitting building work on the pipeline and its auxiliary facilities to begin.

"The obtaining of this licence represents tremendous progress as it is the final step towards securing the regulatory regime of the IGB project and ensuring successful start of the construction of the pipeline on the territory of the Hellenic Republic," the company said in a statement.

The 182-km IGB gas link is due online in 2020 and is expected to transport up to 3bn m³/yr to Bulgaria mainly from Greek LNG terminals and the Southern Gas Corridor (SGC) network. ICGB is a 50:50 joint venture between Bulgaria's state-owned Bulgarian Energy Holding (BEH) and IGI Poseidon, which in turn is 50% owned by Greece's government-run Depa and 50% by Italy's Edison, a division of French giant EDF. →

EC APPROVES BOSNIA-CROATIA GAS LINK STUDY

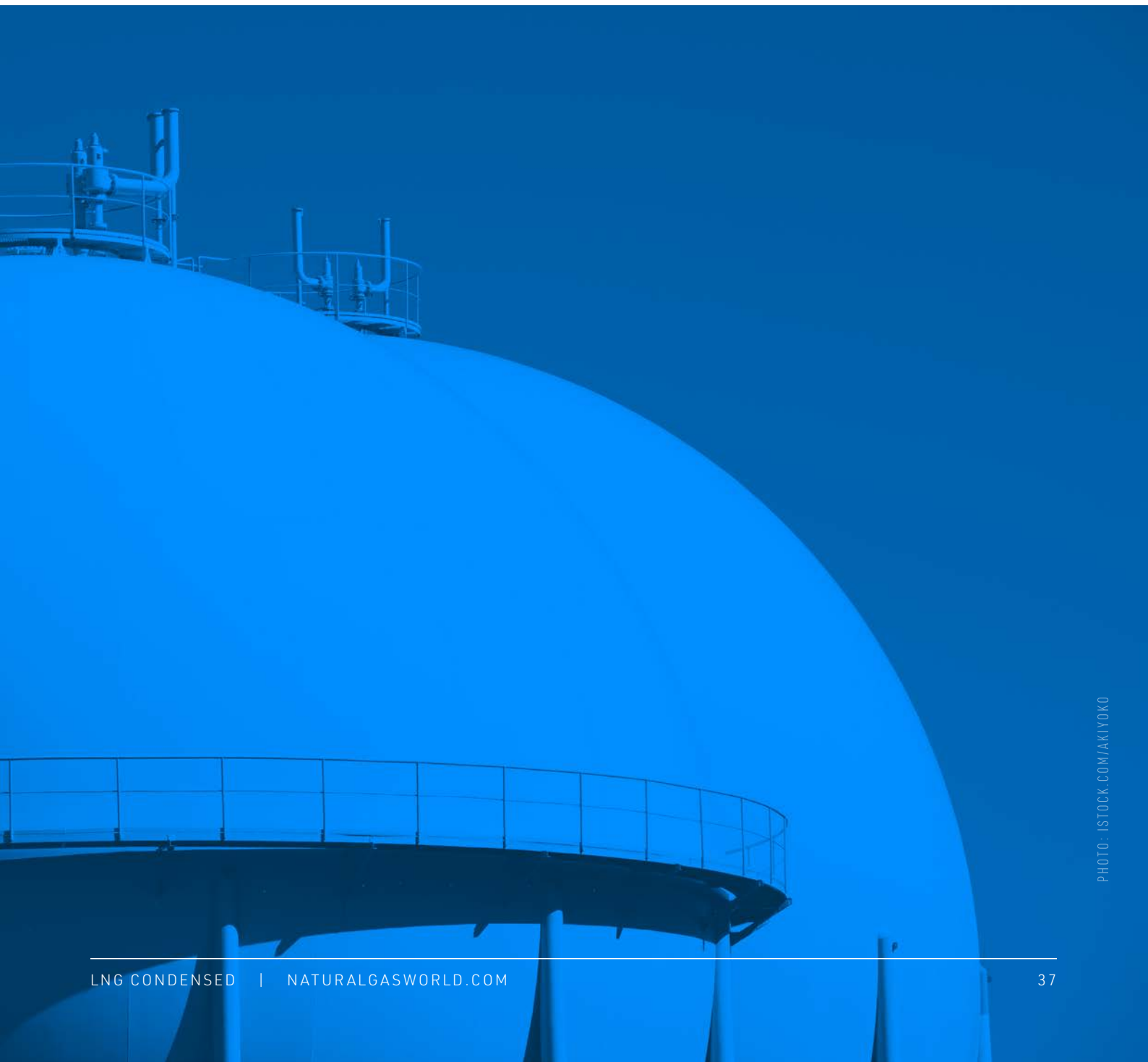
The European Commission (EC) has approved the launch of a feasibility study on a proposed gas link between Bosnia and Croatia, Bosnian state gas supplier BH-Gas said July 18.

The planned pipeline would run from Zagvozd in southern Croatia to the southern Bosnian city of Mostar. Due online in either 2023 or 2024, it would allow Bosnia to tap gas supplies from the LNG import terminal under construction

on the Croatian island of Krk. That would help Bosnia wean itself from near total dependency on Russian gas.

The EC will issue a €1mn (\$1.1mn) grant to fund the study, which will be undertaken by a consortium led by UK-based Mott MacDonald over the coming year. BH-Gas will start work securing planning clearance for the pipeline. Croatia has already obtained similar permits for its section of the project.

Construction of the Krk LNG terminal began in April. The facility is slated to start operations in late 2020, with import capacity ramping up to 5.6mn mt/yr. Hungary recently expressed an interest in buying a stake in the Croatian state-owned project. ●



ENI FARMS OUT INDONESIAN BLOCK TO NEPTUNE

Italy's Eni has signed an agreement to sell 20% stake in East Sepinggan area offshore Indonesia to privately-held Neptune Energy, it said July 26.

Eni will continue to be the operator of the area which is offshore East Kalimantan and includes the Merakes development and Merakes East discovery. The agreement is subject to the necessary regulatory approvals. Eni announced the final investment decision for the Merakes development in December 2018.

Eni and Neptune Energy are already partners in the Muara Bakau area, which includes the Jangkrik field, in the Kutei Basin, offshore East Kalimantan, where Eni is the joint venture operator with 55%, Eni said.

The Merakes development project, included in the East Sepinggan area, consists in the drilling and construction of subsea wells with a dedicated transportation system in 1,500 metres of water and connected to the Jangkrik floating production unit (FPU). The gas production will be shipped to the Bontang LNG plant using also all the other existing facilities of the Jangkrik field as well as the East Kalimantan transportation network. This new production will also contribute to the life extension of the plant, Eni added.

WINTERSHALL FARMS OUT ARGENTINE BLOCKS

Wintershall Dea has farmed out a stake in the giant Vaca Muerta shale play in Argentina to US major ConocoPhillips but retains the operatorship, the German independent said July 25.

The Aguada Federal and Bandurria Norte blocks in Neuquen hold significant unconventional oil and natural gas resources in the prospective Vaca Muerta shale formation, it said, without disclosing the deal's value.

"ConocoPhillips' extensive know-how developed across unconventional operations in US shale plays complements Wintershall Dea's technological expertise and decades of local experience. We are excited about this new partnership as it will allow us to expedite the

development of the two blocks," said board member Thilo Wieland, responsible for Latin America. Wintershall Dea has already successfully conducted pilot projects in both blocks. Production testing is ongoing.

The transaction is expected to close in 2019, subject to approval by the relevant authorities. As part of the transaction ConocoPhillips will acquire a 45% interest share in the Aguada Federal block. Wintershall Dea as the operator will retain a 45% share in the block (97 km²). The remaining 10% is held by Gas y Petroleo del Neuquen.

ConocoPhillips will also acquire a 50% share in the nearby Bandurria Norte block (105 km²). Wintershall Dea will retain the other 50% and will remain operator of the block.

In addition to Aguada Federal and Bandurria Norte, Wintershall Dea holds shares in the blocks San Roque and Aguada Pichana Este, within the promising Vaca Muerta fairway. As domestic shale gas production rises, Argentina is moving from imports of LNG to exports, but there are onshore infrastructure bottlenecks limiting shale gas deliveries to the coast.

TOTAL STRIKES LNG SUPPLY DEAL WITH BENIN

Total has clinched deals with authorities in the West African nation of Benin on LNG supplies as well as the construction of an LNG import terminal, the French major said on July 24.

Under agreements with the Benin government and state-owned energy utility SBEE, Total will supply up to 0.5mn mt/yr of LNG to the country for 15 years starting in 2021. It will also build and operate a floating storage and regasification unit (FSRU) off the coast, and a pipeline linking the facility with power generation in Maria Gleta.

"This project is in line with Total's strategy to develop new gas markets by unlocking access to LNG for fast-growing economies," Total's head of gas, Laurent Vivier, said. "We are very pleased to have been entrusted by the Benin authorities to develop LNG imports and support a broad adoption of natural gas in the country."

Benin is largely dependent on Nigeria and Ghana for its energy needs, while the government is advancing new gas-fired power projects to build up domestic →

electricity supply, including a new 127-MW station in Maria Gleta.

Benin energy minister Dona Jean-Claude Houssou praised Total for “its willingness to support the revitalisation of the energy sector, which is at the heart of the government’s action plan ... I would like to highlight the government’s efforts to restore Benin’s energy independence, which is the foundation of the country’s ambitious economic and social development,” he said.

NOVATEK STARTS UP NEW GAS FIELD

Russia’s Novatek reported July 24 the commercial launch of the South-Khadyryakhinskoye gas field in the prolific Yamalo-Nenets region in Western Siberia. The project is capable of flowing 1bn m³/yr of gas, Novatek said.

“The South-Khadyryakhinskoye field is near the company’s infrastructure, which allowed us to quickly start gas production and optimise the field’s capital costs,” Novatek’s chairman Leonid Mikhelson said, noting that the deposit’s gas would be sold domestically, rather than be liquefied for export.

South-Khadyryakhinskoye was discovered in 1990 and was acquired by Novatek in late 2017 from a joint venture between Spain’s Repsol and Russia’s Neftegazholding. It held 28bn m³ of gas resources under Russian classifications at the end of last year, according to Novatek.

Novatek bought a number of small-sized gas fields in Yamalo-Nenets in 2017 to arrest production decline ahead of the launch of the Yamal LNG terminal at the end of that year. Yamal LNG was largely to thank for a 13.1% rise in the company’s hydrocarbon output in the second quarter.

US PRICES TO STAY LOW TO 2030: REPORT

US natural gas prices can be expected to remain under \$3/mn Btu well into the next decade as shale gas supplies continue to drive exports and feed growing domestic demand, McKinsey Energy Insights says in its

2019 North American Gas Outlook, released July 23.

North American natural gas demand will reach 125bn ft³/day by 2030 from about 95bn ft³/day this year, with 20bn ft³/day of that growth coming from pipeline and LNG exports. The share of natural gas in the North American power mix will increase by 5bn ft³/day, driven largely by coal plant retirements, but renewables can be expected to start pushing gas out of the decarbonising power sector after 2025.

“North America is endowed with abundant gas resources, which will play a major role in the energy mix domestically and provide security of supply through LNG exports to Europe and Asia,” McKinsey partner Dumitru Dediu said. “We see over 1,000 trillion ft³ of gas resources – which is sufficient to meet demand for the next two decades – at cost economics well below \$3/mn Btu.”

Over the medium term – between now and 2025 – the benchmark US price at Henry Hub can be expected to average between \$2.50/mn Btu and \$2.75/mn Btu, the McKinsey report forecasts, while over the longer term, post-2025, the benchmark will range between \$2.25/mn Btu and \$2.75/mn Btu.

On the supply side, production from the Appalachian basin in the US northeast will increase by about 55bn ft³/day and will supply about 40% of the North American market by 2030, displacing imports from Canada and domestic Rockies supply in Midwest markets.

Associated gas production, primarily from the Permian basin, is expected to increase by 12bn ft³/day by 2030, when it will be supplying 25% of the North American market. Permian production growth will limit flows south of Appalachian gas and support Gulf Coast LNG developments, the report says.

FREEPORT LNG ENTERS FINAL START-UP PHASE

The first train of the Freeport LNG export terminal in Texas has entered its final stage of commissioning, one of its developers US-based McDermott International reported July 22.

Feed gas has been introduced to the 5mn mt/yr train, which McDermott is developing alongside local partners Chiyoda International and Zachry Group.

“We are extremely proud of the Freeport LNG project team for reaching this major milestone at this unique LNG production facility,” said McDermott’s →

senior president for North, Central and South America, Mark Coscio.

The launch of Freeport LNG's first train was originally scheduled for mid-2018, but was pushed back because of construction delays. The US Federal Energy Regulatory Commission (Ferc) anticipates the facility's start-up in September, while the second and third train are due to enter service in the first half of next year. The watchdog recently gave the green light for development of a fourth train that would boost the project's overall capacity to 20mn mt/yr.

RUSSIA TO EXPAND EUROPEAN MARKET SHARE USING LNG: WOODMAC

Russia is likely to look towards LNG as the means for expanding its share of the European gas market over the long term, according to a Wood Mackenzie report published on July 22.

Europe's appetite for gas imports is set to climb from an estimated 310bn m³ this year to 400bn m³ in 2035, the Edinburgh-based research house wrote, on the back of declining indigenous production. Some 350bn m³ of this supply will come in the form of piped Russian deliveries and LNG imports (including from Russia). The remaining 50bn m³ will be piped from North African and Central Asian countries.

Surging LNG supplies will compete for market space with piped Russian gas, Kateryna Filippenko, WoodMac's principal analyst for global gas supply, explained.

"Russia will try to increase piped gas exports to Europe, but a mix of market, regulatory, political and corporate challenges will prevent new pipeline construction beyond Nord Stream 2 and TurkStream," she said.

As such, Moscow is likely to turn to LNG as the means for capturing more market share, according to Wood Mackenzie. These supplies of super-chilled gas are less likely to prompt opposition from Europe than increased piped Russian exports, given their flexibility.

Russia is looking to expand its LNG exports to 120-140mn mt/yr by 2035. New Russian LNG ventures will be cost-competitive against both new pipelines and rival LNG projects elsewhere, WoodMac wrote.

"Opting for additional LNG rather than new pipeline projects will mean less direct tax revenue for the government and a potential revision of Russia's traditional export approach. And more work needs to be done encouraging co-operation between the country's leading oil and gas companies to support this," Filippenko said.

"But LNG will ensure alignment with a range of governmental strategic goals and broaden Russia's reach into new markets. It will allow it to monetise giant gas reserves in an optimal way, while derisking against European decarbonisation and diversification efforts."

ENI STARTS ON MOZAMBIQUE LNG

Italian Eni has started installation work on the hull of the 3.4mn metric tons/year Coral Sul floating liquefied natural gas (FLNG) treatment and liquefaction unit that will be moored offshore Mozambique, it said July 22.

The hull is expected to be launched in 2020, in line with the planned production startup of the Coral South Project in 2022 and it will be the first FLNG vessel ever to be deployed in the deep waters of the African continent. The Coral field has reserves of 450bn m³.

The vessel, which will be 432 metres long and 66 metres wide and weigh about 220,000 mt, will be able to house up to 350 people in its eight-storey accommodation module. The facility will be anchored at a water-depth of around 2,000 metres by means of 20 mooring lines.

Construction work on the Coral Sul FLNG started in 2018 and is ongoing in seven operational centres across the world.

Drilling and completion activities for the six subsea wells that will feed the liquefaction unit will begin in September 2019 and be carried out by the Saipem 12000 drilling rig and completed by the end of 2020.

Alongside the LNG infrastructure under construction, the Coral South project also includes a number of initiatives aimed at enhancing the overall capabilities of the local workforce. These include specialised training activities for over 800 Mozambicans, who will eventually be employed during the operational phase of the project. Eni is also engaged in a broad programme of social, economic and health care initiatives, to support →

long-term, diversified and sustainable development of local communities.

Between 2011 and 2014, Eni discovered supergiant natural gas resources in the Coral, Mamba Complex and Agulha reservoirs, holding estimated 2.4 trillion m³ of gas in place.

US PROJECT OPERATOR LINES UP FINANCE

US export project developer Venture Global LNG has found financial backers for its \$5.8bn, 10mn metric tons/yr Calcasieu Pass terminal, it said July 18.

The issue was oversubscribed, attracting over \$10bn in binding commitments from international lenders in North America, Asia and Europe. The money will go on the construction and commissioning of the Calcasieu Pass facility and the associated TransCameron pipeline.

Venture said it was "incredibly proud that the world's leading project finance institutions have responded with such a validation of the quality of our structure and partners with outstanding terms and a significant oversubscription. The company has now secured more than \$8.6bn of capital and is continuing full construction and fabrication activity at Calcasieu Pass."

The facility will employ "highly efficient mid-scale, modular, factory-fabricated liquefaction trains," Venture said. "Calcasieu Pass has received all necessary permits, including Federal Energy Regulatory Commission authorisation and Non-FTA export authorisation from the US Department of Energy. Building work on the site is in full swing, the company said.

However, it has not yet formally yet announced a final investment decision. Global LNG is also developing the 20mn mt/yr Plaquemines LNG project and the 20mn mt/yr Delta LNG project, both in Plaquemines Parish, Louisiana.

US REGULATOR APPROVES GULF LNG PROJECT

The US Federal Energy Regulatory Commission (Ferc), in a notational order handed down late July 16, has approved Kinder Morgan's proposed 10.85mn mt/

yr Gulf LNG Liquefaction project on the site of an existing import terminal near Pascagoula, Mississippi. A total of 131 environmental conditions are attached to the approval.

The export terminal – which will be operationally integrated with the existing import terminal – is underpinned by a US department of energy authorisation issued in 2012 allowing for the export of up to 547.5bn ft³/yr of gas, in the form of LNG, over 25 years to countries with free trade agreements with the US. Non-FTA export authorisations are pending.

When Kinder Morgan applied to Ferc in 2015, it asked that the project be approved no later than June 17, 2016. At that time, the cost of the project was estimated at \$8bn for two trains, with the first train expected to be in service by 4Q 2020, followed a year later by the second train.

Kinder Morgan's web site offers no updated cost estimate or construction timeline, nor any information on whether a final investment decision has been taken on the project.

And a Kinder Morgan spokeswoman, in an email to NGW, said that while the company was pleased with Ferc's approval, «there are still multiple factors that need to be met before reaching a final investment decision needed to begin this project.»

TOTAL EYES \$500MN DRIFTWOOD INVESTMENT

France's Total has pledged to invest a further \$500mn in the planned Driftwood LNG export plant in Louisiana, moving the project closer to realisation, said operator Tellurian July 10.

The oil and gas major closed a deal July 10 with Houston-based project developer Tellurian establishing Total as a joint venture partner at Driftwood. Under the deal the French company will also buy 1mn mt/yr of supplies from the facility.

A sales and purchase contract has also been agreed, under which Total will buy an additional 1.5mn mt/yr of offtake from Tellurian. These volumes will be acquired free-on-board, at a price based on the Platts Japan Korea Marker.

The investment agreement at Driftwood LNG follows a deal struck earlier this year under which Total will buy \$200mn of Tellurian common shares. According to Tellurian, Total's overall outlays at Driftwood LNG →

should reach \$907mn, if the project gets a positive final investment decision, expected this year.

"The Tellurian team thanks Total for their leadership and we look forward to beginning the largest privately-funded US infrastructure project," Tellurian CEO Meg Gentle said in a statement, saying the Total deal valued Driftwood LNG at \$13.8bn. "We intend to finalise the agreements with the remaining partners and make FID in 2019."

At full capacity Driftwood LNG will export up to 27.6mn mt/yr of LNG, which Gentle said would help reduce an oversupply of gas in the US. It will come from the Permian basin, where gas is flared as there is not enough pipeline capacity to take it to the coast.

CANADA'S WOODFIBRE LNG RECEIVES FACILITY PERMIT

Canada's Woodfibre LNG, a subsidiary of Indonesia's Pacific Oil & Gas (PO&G), said July 3 it had received its LNG facility permit from provincial regulator the BC Oil

and Gas Commission (BCOGC), one of the last permits it needs before starting construction on its 2.1mn mt/yr LNG export facility at Squamish, north of Vancouver.

"This is a positive step forward as we work to build the cleanest LNG export facility in the world," Woodfibre LNG CEO David Keane said. "This permit is a large piece of our puzzle, and with it in place, we are working towards a final decision to proceed with this project this summer."

The project has already received three major environmental assessment approvals, including a first-of-its-kind environmental approval from the Squamish First Nation, on whose traditional territory the C\$1.8bn project will be built.

In June, PO&G said it had signed British major BP as a foundation buyer for the Woodfibre LNG project, agreeing a 15-year sales and purchase agreement with the company for 0.75mn mt/yr of LNG.

It is also in talks with BP's Canadian subsidiary to provide transportation and balancing services for the liquefaction terminal's gas supply, and on June 28, closed its previously announced acquisition of Montney producer Canbriam Energy.

The terminal will be supplied by the Eagle Mountain-Woodfibre gas pipeline project, a 47-km extension of the existing FortisBC gas transmission system. ●



PHOTO: ISTOCK.COM/AKIYOKO

POLAND RECEIVES FIRST US TERM LNG DELIVERY

Poland received its first cargo of US LNG under a long-term agreement with Cheniere, state controlled PGNiG said July 26. Signed in November 2018, the contract will total some 39bn m³ of natural gas over 24 years.

PGNiG CEO Piotr Wozniak said at the welcoming ceremony: "Two years ago, in this place, together with our partners from Cheniere we greeted the first ever delivery of American LNG to Poland and to this part of Europe. The cargo, purchased as part of a spot transaction, came from Cheniere. Today [July 26] we are also meeting with our American partners and with today's delivery we are launching the first long-term contract for the purchase of LNG from the US."

PGNiG said its portfolio of contracts with US suppliers exceeded 9bn m³/yr, more than it imports from Russia. This "strengthens Poland's energy security," but also gives it the opportunity to actively participate in LNG trading on the global market.

PGNiG also imports LNG from Qatar. Its contract with Cheniere is ex-ship but those with Venture Global are free on board US Gulf Coast, giving it freedom to sell the LNG to the highest bidder. It also has a term contract with Qatar Petroleum, for 2mn mt/yr until 2034, under which deliveries are already coming.

Cheniere has one of the largest liquefaction platforms in the world, consisting of the Sabine Pass and Corpus Christi liquefaction facilities on the US Gulf Coast, with expected aggregate adjusted nominal production capacity of up to 45mn mt/yr operating or under construction. Cheniere is also pursuing liquefaction expansion opportunities and other projects along the LNG value chain.

ROTTERDAM SEES SURGE IN H1 LNG IMPORTS

The Dutch port of Rotterdam registered a 93.9% increase in LNG imports in the first half of 2019, thanks to a surge in supplies arriving from the US, the port authority said on July 25.

Rotterdam's Gate terminal took ashore 3.8mn mt of LNG in the six months, up from 1.98mn mt a year earlier. In its half-year report, the port authority attributed the growth to a smaller price differential between European and Asia LNG markets, which has caused US and other Atlantic Basin supplies to the former to soar.

"Given the transport costs, exports of LNG to Asia are therefore less appealing than exports to Europe, particularly for market players in the Atlantic basin," it said.

Gate terminal is owned by Dutch gas operators Gasunie and Vopak, and is one of the largest inlets for LNG supplies into Europe. It is equipped with three 180,000-m³ storage tanks and can regasify up to 9mn mt/yr of LNG.

BANGLADESH ORDERS SECOND MAJOR CCGT PLANT

A consortium of Dutch-registered GE Capital Global Energy Investment and Strategic Finance and local Unique Hotel & Resorts, both of Bangladesh, agreed with government entities July 24 to build a \$520mn, 584-MW combined-cycle power plant at Meghnaghat. GE will provide the engineering, procurement and construction services and build it on a turnkey basis for \$350mn, using its 9HA turbine.

The consortium, Unique Meghnaghat Power (UMPL), will bring the power plant online within 36 months and run it on either locally produced natural gas or re-gasified LNG (RLNG). Unique Hotel & Resorts has 64.98%, GE 30% and Strategic Finance 4.95% of the consortium.

State-run Bangladesh Power Development Board (BPDB) will pay around \$0.0369/kWh for power produced by local gas, or \$0.068/kWh if it is produced from RLNG. In either case the gas will be supplied by state-run Titas Gas Transmission and Distribution Company.

The government picked the consortium under the 'Speedy Supply of Power and Energy (Special Provision) Act 2010' bypassing the usual tendering process.

It is the second such deal involving a similar type of power plant in the same location. A consortium of local Summit and US GE inked deals with government entities in March this year to build a 583-MW combined-cycle power plant. →

EPIK HIRES WOODMAC FOR OZ GAS ANALYSIS

South Korean LNG developer Epik said on July 24 it had hired Edinburgh-based Wood Mackenzie to analyse the southeast Australian gas market.

Epik, which is looking to advance the Newcastle Gas Dock LNG import project in New South Wales (NSW), said the report by WoodMac would provide detailed insight into the competitiveness of LNG imports into the area, pricing trends and demand forecasting. Qualified parties interested in booking future capacity at Newcastle GasDock will be provided with a summary of the report and other project information in August.

Epik plans to build a 170,000 m³ floating storage and regasification unit (FSRU) capable of covering over 80% of gas demand in NSW – a project earmarked to cost \$400-430mn. In April it recruited Australia's Watpac to design, engineer and construct the onshore infrastructure. It also hopes to leverage its strategic pact with South Korea's Hyundai LNG Shipping to help realise the venture.

Epik expects to place an order for the FSRU newbuild with a shipyard after regulatory clearance, probably early next year.

TOTAL PICKS UP 50% STAKE IN ADANI'S INDIA TERMINAL: PRESS

French major Total has bought a 50% stake in Dhamra LNG Terminal, a unit of Adani Ports and Special Economic Zone (Apsez), a part of Adani group, which is building an LNG import terminal at Dhamra in the eastern Indian state of Odisha, Businessline reported July 24.

Last October, Total and Indian private conglomerate Adani Group announced they will jointly develop LNG terminals and fuel retail outlets in India. The two firms set a target of developing various regasification terminals, including the proposed Dhamra LNG terminal on the east coast of India. However, the joint statement did not say anything about how large a stake Total will buy in Dhamra terminal.

The 5mn metric tons/year Dhamra terminal is expected to come online in 2021 at a cost of Indian rupees 52bn (\$720mn).

Recently, Times of India reported that Total is close to buying 30% stake in Adani Gas, another Adani group entity that operates city gas projects in various Indian cities.

PAKISTAN PLANS TO HIKE LNG IMPORTS THIS YEAR

Pakistan is looking to add around 400mn ft³/day of regasified LNG to its gas distribution system by end of the year, the petroleum division of the energy ministry said July 22 on Twitter.

The government wants to secure the contracts for this additional supply by the end of this calendar year, it said. Recently, state-owned Pakistan LNG floated a tender seeking to contract supply of 240 LNG cargoes over the next ten years. The company is seeking two cargoes of 140,000 m³ every month, which would be delivered on an ex-ship basis to Port Qasim, Karachi.

Pakistan has two import terminals located at Port Qasim. The south Asian nation started importing LNG in 2015 with the commissioning of the Exquisite FSRU. Pakistan commissioned its second FSRU in late 2017. The petroleum division of the energy ministry said the two LNG terminals are supplying about 1,100mn ft³/d of regasified LNG to customers downstream.

The petroleum division did not disclose from where it will source the LNG, but said that the US and Australia are going to be the next major suppliers to the LNG market.

At present, Pakistan has a long-term LNG contract with Qatar. In 2016, Pakistan State Oil and Qatargas signed a 15-year agreement for supply of 3.76mn mt/yr at a price of 13.36% of Brent. Pakistan LNG also has a long-term deal with Eni, which commits the Italian company to supply 0.75mn mt/yr.

KOGAS, ENERGY CAPITAL VIETNAM SIGN VIETNAM LNG, POWER MOU

Korea Gas Corporation (Kogas) and Energy Capital Vietnam (ECV) have entered into a memorandum of understanding that provides the framework for the development of a privately-funded LNG regasification →

terminal, storage, gas supply system and 3,200 MW gas-fired power project near Mui Ke Ga, Binh Thuan province, Vietnam, EVC said July 23.

"The MoU contemplates Kogas and ECV working together to optimise their efforts to meet the significant LNG demand growth forecast for Vietnam. The scope of the MoU covers matters relating to cooperation and collaboration for the project," EVC said.

EVC CEO David Lewis said both companies will look to leverage each other's strengths to bring low-cost LNG to Vietnam and help address critical energy security needs.

Meanwhile, ECV has awarded KBR a contract to provide feasibility services and refine cost estimates for the project including detailed analysis of optimal design combinations. Completion of the study is expected to be achieved in Q3 2019, EVC said.

EVC is a Vietnam-focused project development and asset management company with offices in Dallas, Texas and Ho Chi Minh City.

CHINA'S JUNE LNG IMPORTS UP 14% YOY

China imported 4.53mn metric tons of LNG in June, up 14% year-on-year, customs department's data published July 23 showed. Compared month-on-month, June imports were up over 2%.

During the first six months of the year, China imported 28.37mn mt of LNG as against 23.81mn mt during the same period last year, an increase of 19.2%.

If the trend seen in the first half of the year continues, Asia's biggest economy will end up with another record year. Last year, the country imported a record 54mn mt of LNG.

According to a report published July 23 by consultants Wood Mackenzie, China will become the world's biggest LNG importer by 2022, overtaking Japan. By then, LNG imports in Japan are expected to decline 12% to 72.8mn metric tons/year compared with 2018, while China's import volume rises 37.5% to 74.1mn mt/yr.

"While LNG demand is declining, Japanese imports will remain above 70mn mt/yr through much of the 2020s. It will remain the second largest LNG consumer in the world until at least 2040, with demand still exceeding 60mn mt/yr. As such, Japan still provides ample opportunities for LNG sellers, particularly as existing contracts expire," said senior analyst Lucy Cullen. "The decline in Japanese imports will be driven

by competition from coal, nuclear and renewables in the power sector and slow macroeconomic growth."

Despite losing this leadership position, Japanese buyers will continue to take a lead in contracting innovation with developments such as hybrid deals, coal indexation, joint procurement and carbon neutral cargoes, the report stated. As several long-term contracts wind down from the early 2020s and with gas and power market liberalisation underway, this innovation will provide buyers more leverage and opportunities in future contracting discussions.

However, WoodMac believes that despite sustained low LNG spot prices, Japan's electricity market does not favour coal to gas switching on a wide scale.

"The country remains well-contracted in LNG to the early 2020s as US and Australian supplies ramp-up. As a result, the average cost of gas for Japanese utilities remains well above spot price and coal is still the cheapest form of electricity generation after nuclear and renewables on a short-run marginal cost basis," the report said.

Under Japan's 5th Strategic Energy Plan (2018), the government aims to decrease gas and coal generation (down to 27% and 26% shares, respectively) and offset with greater low-carbon nuclear and renewable generation.

"The tide appears to be turning with increasing restrictions on financing and building coal. As such, we expect this policy target and such a robust share of coal in the generation mix will be increasingly difficult to sustain. This would improve the outlook for LNG," added Cullen.

On the nuclear front, Japan restarted five plants in 2018 alone. With the next restarts scheduled for mid-2020 and 2021, this will put downward pressure on LNG import requirements in the early 2020s. Although nuclear outages remain a risk in this period if anti-terrorism measures are not met on time.

"We assume 15 reactors will be back online by 2030, accounting for 12% of power generation, much lower than the official target of 20-22%. While nuclear restarts generally dampen gas generation, our lower nuclear number implies a more optimistic view of LNG demand compared to the government," commented Cullen.

In line with its pursuit of a low-carbon future, Japan is also targeting 22-24% of its 2030 generation mix to come from renewables (including hydro). While WoodMac forecasts aggressive additions of wind and solar capacities, further investment will also be needed on power grid infrastructure to cope with this level of renewable generation.

"Japan will just miss its ambitious 2030 target with renewable generation (including hydro) comprising just over 20% of the 2030 mix," said Cullen. →

INDIA'S JUNE LNG IMPORTS UP 5%

India's LNG imports in June increased year-on-year for the third month in a row, according to data published July 22 by Indian oil and gas ministry's Petroleum Planning and Analysis Cell (PPAC).

India imported LNG equivalent to 2.73bn m³ of pipeline gas (about 2mn metric tons), up 4.9% compared with the same month of the previous year. During the first three months of this financial year (Q1 2020), cumulative imports were 7.92bn m³, up 5.9% year-on-year. India's financial year runs from April to March.

During the last financial year, India imported 27bn m³ of LNG, up 2.6% compared with the year before. This was the highest ever imports during a fiscal year.

PAKISTAN EASES FSRU IMPORT RULES: PRESS

The Pakistani government has exempted import of new floating storage and re-gasification units (FSRUs) from duties and taxes, the Express Tribune reported July 19, according to a Federal Board of Revenue (FBR) statutory regulatory order (SRO) for waiving taxes and duties.

The decision should allow Engro Elengy Terminal Pakistan to replace the existing unit, Exquisite, with a new one with additional capacity. The LNG terminal presently in operation has a handling capacity of 690mn ft³/day, whereas the new FSRU would have capacity of 790mn ft³/d, the newspaper said.

With domestic gas production stagnant, Pakistan has been relying on LNG to meet growing gas demand. Pakistan started importing LNG in 2015 with the commissioning of the Exquisite, located at Port Qasim. Pakistan commissioned its second FSRU in late 2017.

The south Asian nation is now planning to set up a third terminal at Port Qasim. The Economic Coordination Committee of Pakistani cabinet July 3 approved the resolution of the Port Qasim Authority board to allow amendment in its master plan to accommodate the prospective third LNG terminal at Port Qasim near Karachi.

At present, the two LNG terminals are supplying about 1,100mn ft³/d of regasified LNG to customers

downstream. Of this, the power sector is consuming 790mn ft³/d and the fertiliser industry 180mn ft³/d, an official told the newspaper.

INFRASTRATA EYES ROLE IN UK FSRU

Natural gas storage project developer InfraStrata is weighing up whether to take part in the development of an LNG floating storage and regasification unit (FSRU) in Cumbria, northern England. The company said July 9 it had signed an exclusivity agreement with Cayman Islands-based Meridian Holdings, which is developing the proposed import project in Barrow-on-Furness.

InfraStrata now has three months to study the venture's feasibility and conduct due diligence before the exclusivity deal expires. If satisfied, it will look for investors and financiers for help with the project.

Should a deal go ahead, InfraStrata will issue 25mn new shares to Meridian, along with an additional 75mn, if a final investment decision (FID) is reached. A cash payment worth 100mn shares would also be made when the purchase is closed.

"We are very pleased to enter into this exclusivity agreement with Meridian Holdings. The UK gas market is witnessing a significant shift in its supply stack and LNG is set to form an important part," InfraStrata CEO John Wood said in a statement.

InfraStrata said a project like the Cumbria FSRU would typically require a £250-400mn (\$312-500mn) investment and take three to four years to implement. Barrow-in-Furness is landing-point for Morecambe Bay gas and so has a major connection to the national gas grid.

JAPANESE LNG IMPORTS CONTINUE TO FALL

Japanese imports of LNG fell by 8.2% year on year in the first half of 2019, data released by the finance ministry July 18 showed in July.

The largest importer of LNG imported 38.6m metric tonnes of LNG in January-June, compared to just over 42m mt over the same period last year. June volumes were down 6% year on year at 5.2m tonnes. →

Japanese imports of LNG have declined since a peak in 2014, with nuclear output rising as plants shuttered for checks in the wake of the accident at Fukushima come back on line. Mild weather and high inventories have also been cited as factors in falling demand.

The fall in LNG imports in the first half of 2019 also came as overall trade dropped amid global uncertainties. Total imports fell by 1.1%; exports by 4.7%. That slowdown helped trim energy demand across the board. Oil and coal imports also declined in January-June.

Imports from Qatar, the world's largest exporter of LNG, fell by 7.7% in the first six months of the year. Imports of LNG from Russia, which is pushing to boost exports to Asian markets, fell by 5%.

The average price of spot LNG imports into Japan contracted in June 2019 was \$5.5/mn Btu, down from \$9.3/mn Btu in the same month a year ago, the country's trade ministry (Meti) said July 10. Compared with May, the price was up 1.85%.

Meti prices are 'delivered ex ship' in Japan, or else are converted into such a 'DES' equivalent.

Meti also published July 10 official average arrivals-based price. The latest figures show that June arrivals' average value was \$7.5/mn Btu, up from \$5.3/mn Btu for May 2019. Compared with June 2018, the average arrivals-based price was down almost 16%, Meti said.

IMPORTS SOAR AT KLAIPEDA LNG

Lithuania's sole LNG terminal has achieved record utilisation rates in recent months as LNG is cheaper now than Russian gas supplies, according to operator Klaipeda Nafta.

The terminal in Klaipeda regasified 2.43 TWh of natural gas in June, almost twice as much as in the same month last year and enough to cover 96% of Lithuanian demand, Klaipeda Nafta said in a statement on July 8. Import volumes in April and May were also higher, by 28.3% and 21% year on year respectively.

The facility received 6.42 TWh of gas in the first six months of the year, data published earlier by Klaipeda Nafta shows, up from 4.52 TWh in the first half of 2018. It earned €37.4mn (\$42mn) in sales revenues in the period, up 14.7% yr/yr.

"Demand for the Klaipeda LNG terminal's capacity continues to be supported by favourable conditions on the international market," Arunas Molis, Klaipeda Nafta's

head of LNG operations explained. He said for several months, regasified LNG has been cheaper than gas "imported via remote long-distance pipelines."

According to Klaipeda Nafta, the terminal's capacity is fully booked for the next gas year (October 1 2019 - September 30 2020).

Klaipeda LNG was launched in 2014, enabling Lithuania to tap alternative supplies to those offered by Russia's Gazprom. It can bring ashore up to 4bn m³/yr of gas, or around 44 TWh, but its use has steadily dropped in recent years as Gazprom has lowered prices to protect its market share. The terminal imported just 9.2 TWh of gas last year, down from 12.6 TWh in 2017 and 14.6 TWh 2016.

Klaipeda LNG is likely to post strong performance in July, as repairs take place on the main pipeline that carries Russian gas to Lithuania.

ZEEBRUGGE LNG OFFERS CAPACITY EXTENSION

Belgian import terminal operator Fluxys LNG is free to finalise new long-term contracts for the facility up to 2044, it said July 1. The Belgian federal energy regulator Creg has approved the reduced tariff and the LNG services agreement proposals for unloading slots and additional storage services at the Zeebrugge LNG terminal, said Fluxys.

CEO Pascal De Buck said the approval was "a milestone for Fluxys Belgium as we will secure stable return from the Zeebrugge LNG terminal up to 2044. Creg's approval allows us to turn binding interest from the market into new long-term contracts worth roughly €1bn (\$1.1bn)."

The head of Creg, Laurent Jacquet, said tariffs will see "a marked decrease for all terminal users who unload and store LNG, and inject natural gas into the transmission system." With the costs covered after over 30 years' operation, Creg has "established a solid and stable framework for regulatory supervision in the future. These favourable conditions consolidate Zeebrugge's position as an access point for LNG deliveries to Europe," said Creg.

Today's long-term contracts for unloading at the Zeebrugge LNG terminal expire horizon 2028. During a subscription window held from 30 April to 24 May 2019 unloading slots and additional storage services at the Zeebrugge LNG terminal were offered over subsequent periods up to 2044. ●

NOVATEK INKS DOMESTIC LNG EQUIPMENT DEAL

Russian independent gas producer Novatek and state Atomenergomash have agreed to co-operate on domestic gas liquefaction technology, they said July 10. As well as saving money by avoiding imports, trains manufactured in Russia will also help insure their projects against the risk of external threats such as sanctions on some kinds of imported goods.

The memorandum notes progress made on making some components of an LNG train, such as coil-wound heat exchangers and medium-tonnage cryogenic pumps, and now sets out their respective obligations to design, manufacture and test high-tonnage cryogenic pumps, Novatek said.

According to the memorandum, the two will work on installing pumps, heat exchangers and other equipment for Novatek's LNG projects at Atomenergomash's facilities.

"This memorandum is important for the development of the Russian gas industry and the implementation of our new LNG projects using domestic technologies and equipment," said Novatek's Alexander Fridman.

"Atomenergomash has already fabricated and shipped heat exchangers and cryogenic pumps for Yamal LNG's Train 4 using Novatek's patented "Arctic Cascade" gas liquefaction technology. This equipment is unique for the Russian manufacturing industry. We are interested in creating a domestic industry producing high-tonnage equipment for LNG production, thereby reducing capital costs and increasing our global competitiveness. This entails maximising the involvement of the Russian scientific and industrial capabilities."

The statement did not quantify the high-tonnage capacity that is projected, but at 900,000 mt/year, the fourth Yamal LNG train is a lot smaller than the 5.5mn metric tons/year that the first three trains produce, at nameplate, and more in practice. The patented technology is based on a "two-stage liquefaction process that capitalises on the colder ambient temperature in the Arctic climate to maximise energy efficiency during the liquefaction process," the company said in March 2018, announcing the patent.

TOKYO GAS UNIT WINS TAIWAN TERMINAL FEED WORK

Tokyo Gas Engineering Solutions Corporation (TGES), a unit of Tokyo Gas, has been awarded a front end engineering design (Feed) contract by Taiwan's CPC Corporation for an expansion project of its LNG receiving terminal at Yung An, Tokyo Gas said July 25. TGES will carry out the Feed in 2019.

The receiving terminal has been in operation since 1990 and has been expanded twice in the past. Tokyo Gas said gas demand in Taiwan is expected to grow rapidly in coming years as it promotes gas-fired power plants to meet environmental concerns.

The Yung An LNG receiving terminal's present capacity is 9mn metric tons/year and is located in Yongan Township, Kaohsiung.

TECHNIPFMC BAGS ARCTIC LNG 2 EPC CONTRACT

TechnipFMC has been awarded a 'major' engineering, procurement and construction (EPC) contract by Novatek and its partners for the Arctic LNG 2 project located in the Gydan peninsula in West Siberia, Russia, it said July 23. For TechnipFMC, a 'major' contract is over \$1bn; the consolidated contract value to TechnipFMC for Arctic LNG 2 is \$7.6bn.

This development will consist of three LNG trains, each with a capacity of 6.6mn metric tons/year, which will be installed on three gravity-based structure platforms, it said.

TechnipFMC will execute this project under a lump sum and reimbursable basis. It will cover the EPC of the three LNG trains and associated topsides, which will be manufactured on a modular basis in Asian and Russian yards, it said.

Novatek said July 22 it had finalised key partnerships at the Arctic LNG-2 development, bringing the project one step closer to a final investment decision (FID).

In a statement, the company said it had closed the sales of stakes in the planned LNG export terminal to →

Chinese companies CNPC and Cnooc and Japanese operators Mitsui and Japan Oil, Gas and Metals National Corp. (Jogmec). Earlier this year CNPC and Cnooc agreed to share a 20% interest in the project, while Mitsui and Jogmec signed deals to together take 10%.

Meanwhile, TechnipFMC said it had landed record new business in the second quarter, although it suffered a dip in profits. In addition to the Arctic 2 deal, it also secured a major contract at Anadarko's Mozambique LNG development. The firm's total backlog of orders climbed more than 75% since year-end to \$25.8bn.

"This was a very strong quarter for TechnipFMC," the company's CEO Doug Pferdehirt commented. "The unprecedented level of order activity demonstrates that we are winning, with an intense focus on project selectivity and commercial differentiation."

Net income fell to \$97mn in April through June, down from \$105.7mn a year earlier, despite a surge in revenues to \$3.4bn, from \$2.9bn. This result included \$18mn in foreign exchange loss and a charge of \$140.2mn of "increased liability payable to joint venture partners included in interest expense," it said.

SAIPEM CAUTIOUSLY WELCOMES UPTURN

A series of final investment decisions "significantly contributed to the high level of contract awards" and lifted Italian engineering giant Saipem into the black for the first half of the year, the company said July 25. It made a "limited" profit of €14mn (\$15.3mn), a strong improvement compared with the first half of 2018, when it recorded a loss of €323mn.

Revenues were up, at €4.519bn, from €3.798bn in H1 2018, while its operating profit was €262mn, reversing a H1 2018 loss of €74mn.

It won contracts worth €9.5bn as of June 30, 2019, and net debt is down, allowing Saipem to cut 2019 guidance to below €800mn, around €200mn less than the original guidance.

CEO Stefano Cao expressed satisfaction with "the positive results recorded in the first half of 2019, despite a scenario that does not yet show clear signs of recovery."

He said the results stemmed from "the profound organisational and management transformation and from our firm strategic stance to anticipate the

energy transition," with solutions that respected the environment and had small carbon footprints.

He said that the Mozambique LNG contract was the biggest in its history. «This is a success, which will also offer important opportunities to our supply chain,» he said. An FID for that was announced mid-June, but the \$8bn engineering, procurement and construction contract, of which \$6bn is Saipem's, was announced July 5.

High volatility in the price of oil and the ongoing low level of spending by oil companies will probably continue in the second half of 2019, he said.

The order backlog at the end of June allows the management to forecast revenues for 2019 of around €9bn, with an adjusted pre-tax margin in excess of 10%. Capital expenditure is forecast at around €500mn.

In April the company formally closed its dispute with Gazprom over the aborted South Stream project, but that payment had been booked in 2018. Another contract, however, awarded in Brazil some years ago, is being scrutinised for possible illegalities.

PETRONAS HIRES MHB FOR OFFSHORE GAS PROJECT

Malaysian state-owned Petronas has hired Malaysia Marine and Heavy Engineering (MHB) for engineering, procurement, construction, installation and commissioning work at the Kasawari sour gas project off the shore of Malaysia's Sarawak region.

MHB's contract covers the development of 47,000 metric tons (mt) of central processing platform (CPP), 8,600 mt of wellhead platform (WHP) and a flare structure. It will also build two bridges connecting the CPP to the WHP and the flare structure, and a 85-km pipeline between the CPP and the existing E11R-A platform.

"This award is a representation of continued trust in our capability in providing offshore solutions and producing the desired results," MHB CEO Wan Mashitah Wan Abdullah Sani said in a statement announcing the contract on July 23. "Our aim is to deliver all projects efficiently, without compromising on safety and quality."

MHEE did not disclose the contract's value.

Petronas is yet to take a final investment decision at Kasawari, with delays linked to wrangling between the company and local authorities over project terms. Gas from the field is earmarked as feedstock for Petronas' 30mn mt/yr Bintulu LNG hub. →

CHEAP GAS HITS TOTAL'S Q2 PROFITS

Low gas prices in Europe (-36%) and Asia (-26%) knocked a quarter off French Total's adjusted operating profit for its integrated gas, power and renewables business in the second quarter of this year, compared with Q2 2018, it said July 25. The profits stood at \$429mn. Operating cash flow though was 77% up, as the Yamal LNG and Ichthys projects had ramped up in the intervening period. Total sold twice as much LNG as it did in Q2 2018.

The company's output is now tilted in favour of gas, with 1,549,000 barrels of oil equivalent/day of gas and 1,407,000 boe/d of oil to give a total 2,957,000 boe/d overall. This time last year, it was just over half oil (1,400,000 out of a total 2,717,000 boe/d in Q2 2018).

Overall the picture was similarly weak, with adjusted operating profit for the group down 19% on Q2 2018, at \$2.9bn, and net income down 26% at \$2.8bn. However, the return on equity was above 11% and its debt gearing is 20.6%.

CEO Patrick Pouyanne blamed volatile markets, as all the major indicators were down on Q2 2018. Brent crude was down 7%, Henry Hub down 11%, and the UK National Balancing Point and the Japan Korea Marker were both down 44%, showing the close relationship between the two.

Looking ahead, the company is planning to sell another \$5bn of assets in the next year or two, mainly from the upstream; and it is continuing its move into LNG with the purchase of Anadarko's African assets. Its sale of mature UK assets has also lowered its average breakeven price.

LNG TIDE LIFTS NOVATEK'S Q2 RESULT

Russia's Novatek reported revenues of rubles 218.5 (\$3.4) bn in the second quarter and normalised pre-tax earnings (Ebitda), including those from joint ventures, of rubles 115.8bn. These were up 11.6% and 14.3%, respectively, on Q2 2018.

The increases in total revenues and Ebitda were largely due to the production launch at the second and third LNG trains at Yamal LNG in the second half of 2018, it said.

The profit was boosted by the sale of a 10% stake in Arctic LNG 2 project in March for rubles 308.6bn and

the recognition of non-cash foreign exchange effects on foreign currency denominated loans.

Excluding these effects, shareholders earned roubles 64.3bn in the second quarter, up 18.4% on Q2 2018. Capital expenditure rose to rubles 31.2bn, or by 41.5%, in the second quarter of 2019, mainly owing to the development of Arctic LNG 2 and the LNG construction centre in the Murmansk region, as well as the North-Russkoye field and crude oil deposits of the East-Tarkosalinskoye and the Yardeyskoye fields.

Total natural gas production, including the company's proportionate share in the production of joint ventures, for the second quarter rose 15.2%.

Novatek sold 18.8bn m³ of gas, up 23.9% on Q2 2018, owing to LNG sales volumes purchased from the joint ventures Yamal LNG and Cryogas-Vysotsk. Novatek did not comment however on the profitability of the sales: LNG wholesale prices have hit long-term lows in Asia and Europe on a continuing wave of oversupply.

NATURGY SEES FRUITS OF STRATEGIC PLAN IN H1

The first half of the year has been marked by progress in investment in renewables and power grids, while cost savings have come in above expectations, said Spanish energy firm Naturgy July 24.

Naturgy has also accelerated the delivery of its efficiency plan and expects to deliver savings of at least €150mn (\$165mn) by year end, exceeding its initial commitment of €100mn for 2019. The company reiterates its total commitment of €500mn efficiencies by 2022.

It reported an 8% rise in pre-tax earnings to €2.277bn, mainly supported by the improvement in the infrastructure businesses and the efficiencies across its businesses. Its adjusted pre-tax profit was €2.15bn and net income was €592mn.

CEO Francisco Reyes said the company was responding to the political and economic challenges the sector faced. "The world is changing, and our business is doing it at an even faster pace, so the transformation we are carrying out in Naturgy is mandatory and reinforces our global competitiveness," he said. The company has "a new commercial policy that has allowed us to improve our margins and reduce our risk," he said.

Its Gas & Power segment saw pre-tax earnings (Ebitda) of €695mn, "thanks to a strong performance of the gas, power and services sales, as well as the international →

power generation. On the other hand, international LNG and Europe power generation were negatively affected by lower sales and margins during the period." The company was also fined \$19.5mn by the regulator for prices charged for its sales of wholesale electricity in previous years.

The company's international business grew, but it also made some disposals, including its Moldovan business and an agreement to sell transmission assets in Chile. Across the border it has entered into an asset swap in Argentina, improving its competitive position in the region where it operates.

Investments during the first six months of the year amounted to €700mn, which have been mainly allocated to renewable projects. Since the beginning of the Strategic Plan 18-22, Naturgy has invested €2bn, 70% in renewables and power grids, in line with its ambition for greater electrification.

As of June 30, 2019, net debt reached €14.8bn, 3% less than December 31, 2018, thanks to a strong focus on cash flow generation.

It faces regulatory threats at home, notably the price controls for its gas and electricity distribution businesses that will apply in a few years. Naturgy said it would try to ensure that the new framework continues to recognise a "reasonable and predictable remuneration in the long term, both for investments already executed as well as for future ones." It owns gas distributor Nedgia.

As well as some debt repayment, Naturgy has completed the first €400mn tranche of its share buyback program, and will launch another of the same size unless it sees an acquisition opportunity, it said.

OZ LNG LTD TO MOVE HQ TO USA

Australia-listed Liquefied Natural Gas Limited (LNG) July 22 said it is moving its headquarters to the US and will proceed to list on the Nasdaq stock exchange following regulatory and judicial approvals and an affirmative shareholder vote.

"After continued evaluation by the board and management team and given the company's confidence in raising new capital to fund our business and marketing efforts, we believe a US re-domiciling is in the company's best interest. This listing change is expected to benefit LNG and its shareholders by properly positioning and valuing the company for future success," said LNG chairman Paul J. Cavicchi.

Timing of the proposed re-domicile transaction, including a shareholder vote, will depend upon the length

of regulatory processes in the US and Australia and on availability of court dates in Australia, the company said.

"LNG is committed to transparency and regular communication during the re-domicile process. This will ensure that all shareholders, retail and institutional, Australian, US and elsewhere, are able to make fully informed decisions," said LNG CEO Greg Vesey. "At this stage we anticipate that a re-domicile transaction could be completed in late 2019 or early 2020."

LNG is developing the 8.8mn mt/yr Magnolia LNG project in Lake Charles, Louisiana. In October 2018, LNG said it expected to take a final investment decision on Magnolia "in the first part of 2019." But during a May 22 conference call with investors, Vesey suggested that the current global LNG glut, the simmering trade dispute between the US and China and low spot prices for LNG have combined to make meeting that time frame unlikely.

In June, the company had agreed an updated lump-sum turnkey engineering, procurement and construction (EPC) contract with the KBR-SKE&C joint venture (KSJV) that will direct construction of the Magnolia LNG project. Founded in 2002 and headquartered in Sydney, Australia, LNG has its principal offices in Houston.

OSAKA GAS INVESTS IN AG&P INTERNATIONAL HOLDINGS

Japan's Osaka Gas, in conjunction with the Japan Bank for International Cooperation (JBIC), has made an equity investment in AG&P International Holdings, a part of Philippines-based AG&P Group, it said July 22 without offering any financial details. An official from AG&P that NGW spoke to did not disclose the precise number, but said that the investment could be to the tune of \$100mn.

The Japanese utility has also entered into a collaboration agreement specific to AG&P International Holdings and its natural gas value chain.

"With this investment and entry into a collaboration agreement, there will continue to be synergy from the project development know-how and engineering skills that the AG&P Group has in LNG businesses as well as the knowledge that Osaka Gas has accumulated domestically for LNG and gas pipelines," it said.

Osaka Gas and AG&P plan to develop an LNG terminal, power plant and LNG supply businesses to create a natural gas value chain in southeast Asia and other countries.

AG&P in a separate statement said that the capital raised by the stake sale will be used to →

execute its multiple initiatives worldwide, including the development and roll-out of city gas distribution business in India and LNG import terminals, such as its pending terminals in Karaikal, India, among others.

"In addition to providing growth capital, Osaka Gas will also work with AG&P in other areas, including technical support, such as providing technical collaboration for AG&P's major city gas initiatives in India where AG&P is commencing its build-out of 12 concessions that cover many millions of people across a wide swathe of south India and Rajasthan. Given over 110 years of Osaka Gas's heritage, we are extremely eager to see this clean energy made available quickly and safely to the citizens of India who live in these geographic areas," said Katz Sato, head of south and east Asia business development for Osaka Gas.

Osaka Gas has been gradually expanding its business in southeast Asia. The company is already present in Singapore, Thailand, and Indonesia. Last month, Osaka Gas and Sojitz Corporation agreed to form a joint venture to supply natural gas to industrial customers in Vietnam. This new venture also marks the third country, following on Singapore, and Thailand, for their engagement in natural gas supply work overseas.

TOJO WINS EPC CONTRACT AT INDIAN LNG PROJECT

Japan's Toyo Engineering has landed a contract for a new LNG regasification plant on India's west coast. Toyo said July 12 it had been selected to serve as the engineering, procurement and construction (EPC) contractor for the plant on a turnkey basis.

The project, situated at the port of Chhara in India's Gujarat state, is operated by India's state-owned oil and gas company Hindustan Petroleum and private developer Shapoorji Pallonji. It is slated to start up in early 2022, with an initial import capacity of 5mn mt/yr. This will rise to 10mn mt/yr under a planned expansion.

Toyo has worked on several Indian LNG projects in the past, including Petronet's Dahej import terminal, also in Gujarat, and the nearby Mundra plant developed by Gujarat State Petroleum.

"Toyo-India will develop sales for further orders as a top runner in the construction of LNG regasification facilities," the Japanese contractor said in a statement. Earlier in July, Japan's IHI secured an order to supply two 200,000-m³ LNG storage tanks for the Chhara project.

MCDERMOTT WINS VACA MUERTA LNG CONTRACT

US engineering firm McDermott said July 19 that it has secured a contract for pre-front end engineering and design (Feed) work at Argentine oil and gas company YPF's planned Vaca Muerta LNG export facility.

The work will build on a conceptual study McDermott was commissioned to carry out on the project last year. Work will begin immediately, with the contract award to be reflected in McDermott's backlog for the second quarter.

"The award of this pre-Feed project is a testimony of McDermott's technical expertise in LNG and our successful partnership with YPF over the years," said McDermott's senior vice president for North, Central and South America Mark Coscio in a statement. "Our experience as the EPC contractor for the Peru LNG Facility in which YPF was involved – combined with McDermott's modularisation capabilities – were key factors that made us uniquely qualified to win and execute this contract."

The Vaca Muerta LNG terminal will export gas produced at fields within Argentina's prolific Vaca Muerta shale formation. It will boast an initial liquefaction capacity of 5mn mt/yr, rising to 10mn mt/yr under a potential second stage.

VINCI WINS CANADIAN LNG TANK ORDER

A subsidiary of France's Vinci Construction announced July 17 that it has secured a contract for the engineering, procurement and construction (EPC) of a 225,000 m³ LNG storage tank in Canada.

Vinci Construction Grands Projets said that the order awarded to its joint venture with Vinci-group sibling Entrepouse Contracting is worth C\$400mn (\$306mn). The identity of the customer was not specified.

"The strong co-operation between Entrepouse Contracting and Vinci Construction Grands Projets has a unique track record of construction in harsh climates," Entrepouse's managing director Gael Cailleaux said, according to the statement. "We are proud to bring our proven LNG tank expertise to Canada."

Vinci Construction has built 14 LNG tanks over the past decade, including at the Yamal LNG terminal in the Russian Arctic and the Wheatstone terminal in Australia. ●

MCDERMOTT BAGS FEED WORK FOR OMANI LNG BUNKERING FACILITY

US-based McDermott International announced July 15 it had landed a contract for front-end engineering design (FEED) services at the Sohar LNG bunkering project on the northern coast of Oman.

The project's developers are France's Total and state-owned Oman Oil. Under the contract, McDermott will plan out mid-scale onshore LNG facilities and prepare a competitive tender for the plant's engineering, procurement, supply, construction and commissioning.

"This award is a reflection of McDermott's 60-year history of delivering innovative LNG solutions worldwide, beginning with our tank storage solutions in the 1950s, to our liquefaction capabilities today," McDermott's senior vice president for the Middle East and North Africa, Linh Austin, said in a statement.

McDermott will start work immediately and will include the contract in its order backlog for the second quarter.

The LNG bunkering sector is poised for rapid growth as shippers adapt to stricter caps on fuel sulphur levels under IMO 2020 rules. In a report published July 11, Zion Market Research estimated that the market would grow to more than \$12.1bn in size by 2024, up from less than \$400mn in 2017.

Total signed a memorandum of understanding (MoU) with Oman's government on developing the Sohar bunkering plant in May last year. The facility will be supplied with feedstock from the Shell-operated Block 6, located onshore, and consist initially of one 1mn mt/yr LNG liquefaction train.

ITALY'S NETWORK OF GAS FILLING STATIONS GROWS

Italian gas transmission system operator Snam and the country's biggest filling-station operator IP have agreed to build a series of 26 natural gas refuelling plants along highways. They will come into operation next year.

The new openings comprise the first phase of the 2018 framework agreement between IP and Snam to build up to 200 new methane stations in Italy. The initiative is part of the companies' commitment to promoting sustainable mobility, they said.

Italy already leads Europe in terms of gas-fuelled transport, with 1mn vehicles and around 1,350 service stations.

Snam and IP have jointly identified the fuelling stations with IP branded fuel, at which they will install methane supply for cars (CNG, compressed natural gas). Two of these stations (in Veneto and in Emilia-Romagna) will also supply LNG for heavy goods vehicles.

The new stations add to the 46 existing methane stations on the IP network, demonstrating a concrete contribution to the construction of infrastructure supporting the country's transition to sustainable mobility, the companies said. The investment in new LNG stations in particular represents an important step for the network's ability to support heavy transport.

The agreement with IP is part of Snam's commitment to boosting the growth of the Italian distribution network of CNG and LNG, through direct investments and agreements with other operators.

Snam4Mobility, a 100% subsidiary of Snam, has delivered six plants and contracted over 70 under a plan that provides for an overall construction of around 300 new CNG and LNG stations in the coming years. In its strategic plan to 2022, Snam plans to spend €200 (\$222) mn on infrastructure for gas and biomethane-fuelled transport.

SPANISH FERRY REVAMPED TO USE LNG

Spanish ferry company Balearia announced July 25 that its second LNG-retrofitted passenger ship would shortly begin operations.

The Abel Matutes vessel completed a five-month overhaul in early July, during which time it was fitted with dual-gas engines and two 178-m³ LNG storage tanks. According to Balearia, the ship will start operating along a route between Huelva in southwest Spain and two ports in the Canary Islands on July 28. →

Abel Matutes is 190 metres long and can transport up to 900 people. It is the second of Balearia's vessels to undergo LNG retrofitting, with similar work on its sister ship Napoles completed earlier this year. The European Commission has helped fund these upgrades with grants. In April, Balearia CEO Adolfo Utor warned that these environmental benefits would carry a financial cost.

Balearia now has four LNG-powered vessels in service, and aims to expand this to a fleet of nine by 2021, including six retrofits and three newbuilds.

WORLD'S LARGEST LNG BUNKERING TAKES PLACE IN SINGAPORE

Titan LNG July 10 said it has successfully completed the world's largest LNG bunkering operation in Singapore. Marine contractor Heerema's new LNG fuelled crane ship Sleipnir was supplied with over 3,000 metric tons of LNG.

"I'd like to thank Pavilion Gas and SLNG for the support in Singapore and Anthony Veder and Bernhard Schulte Shipmanagement, our shipping partners, that completed this Dutch-Singaporean project. Titan LNG looks forward to supplying Heerema with more LNG in the future to fulfil our mission of lowering harmful emissions of the marine and industrial sector," Titan LNG CEO Niels den Nijs said.

Titan LNG chartered the Coral Fraseri for this delivery, the newest addition of the Anthony Veder small scale LNG pool of vessels. The ship loaded in Singapore at the SLNG terminal where Titan LNG sourced the fuel from Pavilion Gas, the Singaporean gas and LNG supplier. The Coral Fraseri followed the Sleipnir offshore and performed a ship-to-ship operation to cool down and fill the tanks, Titan LNG said.

"Not only is the Sleipnir the world's largest and strongest vessel, it is also first of its kind as far as sustainability goes. Sustainability is an integral part of HMC's identity, embedded in our daily work practices. But we intend to do far more than that. It shows that we act sustainable because we want to," said Koos-Jan van Brouwershaven, CEO Heerema.

Titan LNG believes that business case for LNG-fuelled vessels remains very compelling and hurdles are coming down for the widespread adoption of this

cleaner fuel. "The economics have worked out well for early adopters of LNG as a marine fuel, using ECA and IMO 2020 compliant fuel compared with the price of heavy fuel oil currently," it said.

GAS IN TRANSPORT MANIFESTO: NGVA EUROPE

Industry association Natural Gas Vehicles Europe published in July a manifesto for the use of transport, including five core policy recommendations. The body says natural and renewable gas use in transport can contribute to decarbonization and improved air quality. Aimed at the new influx of European legislators following elections and appointments in May, the gas in transport manifesto outlines NGVA Europe's vision to 2030 and 2050 and its main policy priorities for the mobility sector.

The five key policy recommendations are:

- Decarbonisation – to introduce a methodology that accounts for the CO₂ emission savings from renewable gas to establish an equal footing among technologies when considering their overall climate impact.
- Gas fuelling infrastructure – to speed up the implementation of the alternative fuels infrastructure directive, maintaining a technology neutral approach. To maintain natural and renewable gas (in the form of CNG and LNG) as alternative fuel sources – in line with the EU's decarbonisation goal.
- Energy taxation – to apply preferential taxation for gas as transport fuel linked to its contribution towards low emission mobility and support a faster market penetration.
- Integrating a growing rate of renewables in the market – to recognise the potential of renewable gas in the gas market legislation, by creating the right conditions to underpin future production dedicated to the mobility sector.
- Emission standards evolution and air quality – to consider the specificity of natural gas as a clean fuel when establishing future emissions standards. →

According to the NGVA manifesto, the European mobility market has the potential to expand tenfold by 2030 to reach a fleet of 13 million units, in particular providing a low emissions option for heavy-duty transport. This expansion will be accompanied by a large increase in renewable gas production, which the NGVA says could rise from 1.8bn m³ today to 45bn m³ by 2030.

The manifesto says that a 45% reduction in carbon dioxide can be achieved using 30% renewable gas in transport and that on a well-to-wheels basis, full carbon neutrality can be reached in transport with 80% use of renewable gas.

The manifesto notes that some EU countries have reduced excise duty levels or established exemptions for natural gas as a fuel, but that these need to be harmonised across the EU. Long-haul trucks travel across multiple countries and harmonisation would improve hauliers' financial planning.

CHINA'S JEREH LANDS RUSSIAN LNG REFUELLING STATION CONTRACT

Chinese oil and gas company Jereh announced July 23 that it has won a contract to build and install 10 LNG refuelling stations in Russia, an order which the company said was the largest in the Russian LNG refuelling sector to date.

Jereh will provide integrated services for the project covering modular design, procurement, manufacture, as well as commissioning. Total refuelling capacity is estimated at 1mn litres a year. The 10 stations are to be delivered in September and go into operation in October, the company said.

According to Jereh, the increase in interest in LNG refuelling reflects a Russian government decision to subsidise the domestic use of LNG in transport, a policy put in place in 2018. Fuel cost savings for heavy truck owners are estimated at about 50% compared

with diesel, but a lack of refuelling stations has limited growth in LNG road transport use.

Jereh's customized design integrates the fuelling station and control room into two 20-foot containers, providing a compact system which is easy to transport.

Project manager Wang Fei said, "We own a self-developed process that targets integrated design and are able to provide shorter delivery period, lower financial input with less space occupation. Equipped with leading modular manufacturing capability, global sourcing platform and international project management system, Jereh guarantees our client a truly turn-key engineering project."

ARGENTINA SLASHES IMPORT DUTY ON LNG TRUCKS

Argentina has reduced to between 2% and 5% import tariffs for trucks powered by Compressed Natural Gas (CNG), LNG and biogas/biomethane, and associated components, through Decree 440/2019 as published in the Official Gazette. The decree brings into effect the 'Thirty-eighth Additional Protocol' pertaining to Argentine Standard Agreement No. 00014/2008, which set the previous tariff at 35%, the Natural Gas Vehicle Association reported in July.

Decree 415/91 imposed a tariff of 35% on automobiles and light utility vehicles (up to 1500kg load capacity), buses, trucks, tractor trucks for semi-trailers, chassis with engine (including those with cabins), trailers and semi-trailers, and car bodies and cabins.

Decree 440/2019 also determines limits upon imports: a global quota of 800 trucks, 200 gas engines for trucks and 200 chassis with a gas engine of minibuses. This decree covers import operations carried out up to December 31, 2021.

The aim of the new regulation is to increase activity in the natural gas mobility sector, eventually leading to the development of a domestic commercial vehicle manufacturing sector. The government also recognised both fuel cost and environmental benefits from using natural gas and LNG as a fuel compared with conventional fuels. ●

PHOTO: FLICKR.COM/RADOSŁAW NAGIERA



AFFINITY ARRANGES FIRST LNG FREIGHT DERIVATIVES SWAP

UK shipbroker Affinity Shipping announced on July 17 it has arranged the first LNG freight derivatives trade settled against the London-based Baltic Exchange's LNG spot assessments.

The trade was made between France's Total Gas & Power and Swiss-based commodities trader Glencore and handled over-the-counter by Affinity's financial products unit. As the LNG market grows and becomes more liquid, traders are seeking to hedge risks linked to charter rates.

"With liquidity increasing in the LNG market in recent years, freight has come under the spotlight as participants look to manage their exposure to vessel spot rates," said Affinity's head of LNG derivatives Benjamin Gibson in a statement. "Using the Baltic Exchange's rate assessments we are able to help clients benchmark their freight exposure and develop a forward market for hedging price risk."

Charter rates – a key component of spot LNG trade – soared from an average of \$50,000/day in the first half of last year to \$200,000/day in November, as a result of tight vessel availability. By March, the Baltic BLNG1 assessment had declined to nearly \$20,000/day. As trade volumes expand, traders' exposure to volatile freight rates increases, Affinity noted.

YPF HIRES EXCELERATE LNG CARRIER

Argentina's YPF has signed a preliminary deal to hire an LNG carrier from US-based ExceleRate Energy to serve at the Tango floating LNG project, the state company said on July 25.

The two sides aimed to reach a finalised charter agreement within the coming days, with the 138,000-m³ LNG carrier due to start operating in the first week of September. It will be used to ship LNG from the Tango facility in Bahia Blanca to global gas markets until May 2020.

The 500,000-m³ Tango terminal was launched in May, marking YPF's first foray into LNG production. It exports gas produced in Argentina's prolific Vaca Muerta shale

basin. As its gas output continues to rise, Argentina is poised to become an emerging source of gas supply to Asia during peak demand periods, according to Edinburgh-based Wood Mackenzie.

GTT PROFITS DOWN BUT ORDERS STAY HIGH

French LNG engineering company GTT saw a 25% drop in income in the first half of 2019 despite its order intake remaining solid, the company said on July 25.

The specialist in developing gas containment systems posted a net profit of €56.6mn (\$63mn) in January through June, down from €75.7mn a year earlier. Revenues fell 3.6% yr/yr in the six-month period to €122.6mn, but were up 8.2% quarter on quarter in April through June.

"The first half of 2019 was characterised by intense business activity and LNG carrier orders at record levels," CEO Philippe Berterottiere said.

The company expects to see more of a benefit from this rise in activity during the rest of the year. "As a result, considering the backlog in our order book along with busy shipbuilding schedules, we are upgrading our projections for revenues and Ebitda for the full 2019 financial year," Berterottiere said.

Excluding LNG as fuel orders, GTT had orders at the end of June for equipment at 95 LNG carriers, seven floating storage and regasification units (FSRUs), two floating LNG facilities and three onshore storage tanks. It secured an additional two orders at LNG carriers in July from South Korea's Hyundai.

GASLOG UNIT SEES PROFITS FALL

GasLog Partners, a New York-listed subsidiary of Monaco-based LNG vessel operator GasLog, saw profits drop in the second quarter to \$19.1mn from \$29.6mn a year earlier, according to its financial report published July 25.

The company blamed a decreased gain from mark-to-market valuation of derivatives for the dip in income. →

Revenues, in contrast, soared to an all-time quarterly high of \$91.8mn, from \$74.9mn in the corresponding period of 2018. Pre-tax (Ebitda) earnings were up slightly at \$67.5mn, compared with \$66.9mn a year earlier.

GasLog Partners owns 15 LNG carriers, the bulk of which serve Anglo-Dutch Shell, Cheniere Energy and Trafigura under long-term charter contracts. It successfully re-chartered the GasLog Shanghai in the second quarter to Gunvor for three and a half more years, helping the company raise its contracted revenue days to 99% during the second half of 2019 and 81% next year.

The shipowner said it expected the chartering market to grow more bullish during the second half of this year and into 2020.

"In 2021 and beyond, we continue to see a balanced market for LNG shipping relative to supply and demand for the LNG commodity, but caution that additional ordering of new LNGCs beyond those in the orderbook could dampen shipping rates, particularly from 2022 onwards," it said.

VLADIMIR RUSANOV LNG CARRIER OPENS NSR

The Vladimir Rusanov LNG carrier has shipped a cargo from the Yamal LNG export terminal eastwards to the Chinese port of Tianjin, the Yamal project's operator Novatek said on July 25. It marks the first journey via the Northern Sea Route (NSR) in this year's summer navigation season.

According to Novatek, the Arc7 ice-class vessel traversed the ice-covered section of the journey in only six days, setting a record time for ships carrying cargo along NSR without ice-breaking support. The overall trip to Tianjin took 16 days to complete, or less than half the time it would have taken to transport LNG from Yamal to China via the Suez Canal and the Strait of Malacca.

"For the second year in a row, our Arc7 ice-class LNG tankers were once again the first ships to open the summer navigation period via the Northern Sea Route," Novatek's deputy chairman Lev Feodosyev said. "We will continue to optimise our logistical model to ensure competitive LNG supplies to key global consuming markets."

Vladimir Rusanov is jointly owned by China's Cosco Shipping and Japan's Mitsui OSK Lines (MOL), and began working at Yamal LNG under a long-term charter contract last year. MOL and Cosco held a naming ceremony on July 18 for a sister vessel called Nikolay Urvantsev.

KEPPEL FINISHES FIRST LNGC FOR STOLT-NIELSEN

The first of two small-scale LNG carriers ordered by Norwegian shipowner Stolt-Nielsen at the Keppel Nantong shipyard in China has been launched, the vessels' Italian designer Marine Engineering Services (MES) said on July 23.

Stolt-Nielsen commissioned Keppel to produce two 7,500-m³ LNG carriers under a \$80mn contract signed in May 2017. The vessels are capable of ship-to-ship bunkering and can run on both LNG and diesel fuel. According to MES, the first carrier's launch took place on July 20.

The pair will be used by Avenir LNG, Stolt-Nielsen's joint venture with Golar LNG and Hoegh LNG that is aiming to complete an LNG import terminal in Sardinia next year.

Avenir LNG had been due to receive two more small-scale LNG carriers from Keppel, but cancelled the order and selected China's Nantong CIMC Sinopacific Offshore & Engineering (SOE) to build the units instead. CIMC SOE is also building two 20,000-m³ carriers for the Oslo-based company.

MOL NAMES THIRD YAMAL LNG CARRIER

Mitsui O.S.K. Lines (MOL) announced July 19 that it had named a third ship that will serve the Yamal LNG project in the Russian arctic.

The Japanese company hosted a ceremony naming the ice-breaking LNG carrier the Nikolay Urvantsev on July 18. The vessel, jointly ordered by MOL and China's COSCO Shipping Corp., will go into service this month, MOL said in a statement.

The Nikolay Urvantsev is the sister vessel of the Vladimir Rusanov and Vladimir Vize, which began transporting LNG from Novatek's Yamal LNG project in 2018.

Capable of carrying 172,000 m³ of LNG, the ship is due to head out on an ice-breaking navigation without ice-breaker support through the Northern Sea Route (NSR) towards the Russian terminal.

MOL agreed its role in serving the Yamal LNG project in 2014, and construction of the ice-breaking fleet started in May 2016. In 2017, the company signed a long-term charter contract for a further four →

conventional LNG Carriers to serve the terminal. The construction of these vessels “has been progressed as planned,” MOL’s statement added.

The third train at the Yamal LNG plant started its operation in December 2018, and the plant’s annual LNG production has reached 16.5mn mt/yr capacity. A 0.9mn mt/yr fourth train is expected to be launched this year.

Yamal LNG was first Novatek’s LNG export project. The company is planning to expand production in the Arctic further with the launch of the 19.8mn mt/yr Arctic LNG-2 and 5.5mn/yr Obsk LNG plants within the next five years.

The Yamal terminal shipped its first cargo to Japan in late June. The same month, Novatek announced that it was teaming up with Russian shipper Sovcomflot, China’s Silk Road Fund and Cosco to establish a joint venture to carry LNG exports from its Arctic projects.

Russian press reported on July 17 that Novatek has ordered four ice-breaking LNG carriers to serve its Arctic-2 LNG project from the Zvezda shipyard.

NAKILAT PROFIT EXPANDS ALONGSIDE FLEET

Qatari LNG shipper Nakilat announced July 10 that first half net profit grew 7% year on year.

The company reported net profit of QR476mn (\$130.8mn) for the first six months of the year, compared with QR445mn in 1H 2018.

The world’s largest shipper of LNG said the improved result was largely driven by fleet expansion on the back of increased trade in LNG. It stressed that under its long-term strategy, the acquisition of new ships continues.

Nakilat bought two new LNG carriers and one floating storage regasification unit (FSRU) in 2018, which are “among the main attributes to the positive financial results,” the company noted in a statement.

An increased volume of projects at its Erhama Bin Jaber Al Jalahma Shipyard facility also contributed, as did the “rationalisation of operational expenses,” it added.

Four more LNG carriers have already been purchased in 2019. The vessels are being built in South Korea under a joint venture with Maran Ventures. The acquisitions will affirm the company’s global leadership in energy transportation, Nakilat claimed. In March, the Qatari company said the additions will swell its fleet to 74 vessels, or about 11.5% of global LNG carrying capacity.

The expansion of LNG carrier fleets is in contrast with the oil shipping sector. The global expansion of liquefaction

capacity, drawing new strength from recent project FIDs, is boosting confidence among LNG shippers.

“The huge demand for cleaner energy supports LNG trade growth, hence increases demand for LNG shipping industry,” CEO Abdullah Al Sulaiti said. “Nakilat strives to meet the growing energy transportation needs by capitalising on the potential investment opportunity in promising strategic projects.”

MOL NAMES NEW LNG CARRIER FOR JERA

Mitsui OSK Lines (MOL) July 2 said it has named a new LNG carrier ordered by Trans Pacific Shipping 8, a joint venture between MOL and Jera.

The vessel, named Sohshu Maru, is equipped with dual fuel diesel electric (DFDE) propulsion system. This system achieves heat efficiency, and is a more environment-friendly, economically superior design than normal steam turbine propulsion system, MOL said. The vessel has a tank capacity of 177,269m³. Sohshu Maru will transport LNG that Jera purchases from the Freeport LNG project and other suppliers.

GTT HIRED FOR LNGC TANK DESIGNS

French LNG storage specialist GTT said on July 22 it had secured two orders from South Korea’s Hyundai for tank designs at two LNG carriers.

The vessels will be capable of storing 180,000 m³ and 174,000 m³ of gas respectively, GTT said, and will be built in South Korea’s Hyundai Heavy Industries (HHI) and Hyundai Samho Heavy Industries (HSHI) shipyards. The names of the two shipowners due to receive them remain confidential at this stage, it said.

The vessels’ tanks will be equipped with GTT’s Mark III Flex membrane containment system. Their delivery is slated for some time between the fourth quarter of 2021 and the first quarter of 2022.

GTT won another order earlier in July for tank designs at four LNG carriers due to be constructed at South Korea’s Daewoo Shipbuilding & Marine Engineering (DSME) shipyard and supplied to Greece’s Maran Gas. ●



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