IGU
INTERNATIONAL GAS UNION
UNION INTERNATIONALE DU GAZ

2020 WORLD LNG REPORT

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RYSTAD ENERGY

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MESSAGE FROM THE PRESIDENT OF THE INTERNATIONAL GAS UNION

Dear colleagues,

I write this message with a heavy heart at a time when the world is struggling to manage the growing global impact of the COVID-19 virus. These are difficult times and I hope we emerge stronger and more united. Access to energy remains a critical enabler to keeping people safe, connected and informed in such times and our industry plays a critical role in making sure that the lights are on, homes are heated, hospitals and industry keep running and essential goods are transported without disruption.

I present to you the *2020 IGU World LNG Report,* a comprehensive overview of physical and market developments in the global LNG industry in 2019.

Gas continues to play a vital role towards an economically and environmentally sustainable energy future. LNG in 2019 continued to play a key role in improving air quality in markets such as China. It produces less than 10% of the particulates[1] and 50% less GHG than coal when used in power[2], 21% less than fuel oil in transport[3] and above 95% efficiency[4] when used to heat homes. The industry continues to improve measurement and reduction of emissions across the full LNG value chain.

Global LNG trade increased to 354.7 MT, an increase of 40.9 MT since 2018 and the sixth year of consecutive growth in LNG trade. This was on the back of increased exports from the USA, Russia and Australia as well as Algeria and Egypt. Asia Pacific and Asia again imported the most volumes in 2018, together accounting for almost 70% of global LNG imports. However, the largest change in imports was observed in Europe, where the UK, France, Spain, the Netherlands, Italy and Belgium together imported 32 MT more than in 2018.

Furthermore, 70.8 MTPA of liquefaction capacity was sanctioned, and 41.8 MTPA in capacity was brought on-stream in 2019, mostly from Russia, Australia and the US. A huge wave of liquefaction capacity is currently still in pre-Final Investment Decision stages, totalling 907.4 MTPA with most of this capacity in the US and Canada, and a significant proportion in Africa and the Middle East (93.3 MTPA each).

The LNG shipping industry kept pace with this growth, adding 42 new vessels to a total of 541 active vessels by the end of 2019. The active fleet includes 34 FSRUs and 4 FSUs, demonstrating the continued interest in flexible solutions to enable markets to start importing LNG or increase their LNG imports as energy demand grows.

Regasification capacity continued to absorb the increase in supply and meet demand growth, adding 23.4 MTPA in 2019, reaching 821 MTPA by February 2020. Six new terminals began importing cargoes in 2019, and three expansion projects were completed. Asia Pacific took the lion's share of regas capacity additions with a total of 14.2 MTPA, while India added 7.5 MTPA. A total of 37 markets are now equipped to import LNG. A further 120.4 MTPA of regas capacity is currently under construction (as of Feb 2020), of which 12 are FSRUs, and of which 47.1 MTPA is expected to be onstream by end 2020, potentially adding 3 new importing markets: Bahrain, Ghana and the Philippines. 2019 also showed significant growth specifically for floating regas terminals with FSRUs being added in Jamaica, Turkey and Bangladesh

Interest in LNG as a marine fuel increased with the IMO 2020 regulations coming into force at the start of 2020, which will help reduce emissions, improve efficiency and trigger cost benefits. While the industry has invested in infrastructure ahead of demand, continued investment in the coming years will aid the adoption of LNG as a marine fuel. Gas continued to deliver security of electricity supply critical to the growing share of renewable energies. This is not just supporting renewables on the days wind does not blow or the sun does not shine, but also supports hydro-electric generation during extended dry seasons in, for example, Brazil and Colombia. Argentina demonstrated how flexible the LNG supply chain can be to respond to changing gas monetisation strategies – from signing of the charter agreement for the FLNG unit to export of the first LNG cargo took a mere 12 months.

Almost a billion people today have no access to electricity[5] and nearly three billion have to cook with fuels that produce toxic fumes in their homes[6]. Indoor air quality still represents a large part of the premature deaths attributable to air pollution (3.8 million deaths in 2016[7]) – proof of the urgent need to tackle this issue. As the cleanest-burning fossil fuel, natural gas has a key role in providing reliable and cleaner energy to all. Even in the most developed markets, affordability and reliability of clean energy is a key issue and switching to natural gas offers an enormous opportunity. The IGU will continue to demonstrate the vital environmental and economic role of gas in the sustainable energy future and encourage collaboration between industry and communities towards achieving this future.

Yours faithfully,

Joe M. Kang
President of the International Gas Union

[1] US DoE National Energy Technology Laboratory, Cost and Performance Baseline for Fossil Energy Plants Volume 1a, Rev 3, 2015 (https://www.netl.doe.gov/projects/files/CostandPerformanceBaselineforFossilEnergyPlantsVolume1aBitCoalPCandNaturalGastoElectRev3_070615.pdf)
[2] IEA, The Role of Gas in Today's Energy Transitions (https://www.iea.org/reports/the-role-of-gas-in-todays-energy-transitions)
[3] Thinkstep, Life Cycle GHG Emission Study on the Use of LNG as Marine Fuel (https://www.thinkstep.com/content/life-cycle-ghg-emission-study-use-lng-marine-fuel-0)
[4] IEA, Tracking Buildings (https://www.iea.org/reports/tracking-buildings/heat-pumps)
[5] IEA, Population without access to electricity falls below 1 billion (https://www.iea.org/commentaries/population-without-access-to-electricity-falls-below-1-billion)
[6] WHO, Household air pollution and health (https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health)
[7] WHO, Household air pollution and health (https://www.who.int/news-room/fact-sheets/detail/household-air-pollution-and-health)

1.0 State of the LNG Industry

Samcheok LNG Terminal - Courtesy of KOGAS

LNG Trade[1]

40.93 MT

Increase in Global LNG Trade, Since 2018

Global LNG trade increased further in 2019, reaching 354.73 MT, an increase of 40.93 MT since the end of 2018. This constitutes an increase of 13%, a sixth year of consecutive growth.

Most of the additional exported volumes in 2019 were from existing exporting markets: the US (+13.1 MT), Australia (+8.7 MT) and Russia (+11 MT). Qatar managed to maintain its position as the largest exporter in the world (77.8 MT), closely followed by Australia (75.4 MT). The USA (33.8 MT) overtook Malaysia (26.2 MT) as the third largest exporter, and added record export volumes. Russia is now the fourth largest exporter of LNG (29.3 MT). Asia Pacific continued it's growth trajectory as the largest export region (131.7 MT).

Only three markets saw a drop in export levels versus 2018: Indonesia saw the largest drop in export (-2.7 MT), followed by Equatorial Guinea (-0.65 MT) and Norway (-0.45 MT). No new importers were added to the list in 2019. However, most recent new importers increased imports further in 2019, such as Bangladesh, Pakistan, Poland and Panama. The largest increases in imports were seen in Europe, with the UK, France, Spain, the Netherlands, Italy and Belgium accounting for most of the additional imports (+32 MT). Asian and Asian Pacific markets that contributed to global trade were China, India and Malaysia. The largest importing regions, consistent with 2018, were Asia Pacific (131.7 MT) and Asia (114.5 MT).

Liquefaction Plants

42.5 MTPA

Global Liquefaction Capacity Added, 2019

Global liquefaction capacity continued to grow significantly in 2019, totaling 42.5 MTPA in capacity additions. Ichthys LNG T1-2 (8.9 MTPA) and Yamal LNG T3 (5.5 MTPA) were commissioned in late 2018 and began commercial deliveries in 2019. Corpus Christi LNG T1-2 (9 MTPA), Cameron LNG T1 (4.0 MTPA), Freeport LNG T1 (5.1 MTPA), Sabine Pass T5 (4.5 MTPA) and Elba Island T1-3 (0.75 MTPA) commenced commercial operations in 2019, contributing to more than half of the capacity additions. Prelude FLNG (3.6 MTPA) and Tango FLNG (0.5 MTPA) achieved commercial exports in June 2019, becoming the third and fourth operational FLNG developments in the world after Cameroon FLNG (2.4 MTPA) and Petronas FLNG Satu (1.2 MTPA). As of December 2019, 123.3 MTPA of liquefaction capacity was under construction or sanctioned for development. 24.35 MTPA out of the 123.3 MTPA capacity is expected to come online in 2020. In addition, 2019 also saw a record in sanctioned liquefaction capacity, totaling 70.8 MTPA. The FIDs were largely driven by the expectation of growing LNG demand globally, creating the need for additional liquefaction capacity.

Proposed New Liquefaction Plants

907.4 MTPA

Proposed Liquefaction Capacity, 2020

Currently, 907.4 MTPA of liquefaction capacity is in pre-FID stage, with the majority of the proposed capacity coming from the United States and Canada. Africa has 93.3 MTPA of liquefaction capacity proposed and could emerge as a key LNG production region if those projects materialise. The Qatar LNG expansion plan is progressing towards FID and those capacity additions could re-position Qatar as the market with the largest liquefaction capacity globally.

The record volume of sanctioned liquefaction projects is underpinned by the expectation of growing LNG demand globally, creating the need for additional liquefaction capacity. This will also lead to competition to secure EPC capacity, as project developers aim to enter the market by the mid-2020s in order to capture growing demand.

Shipping

541 Vessels

LNG Fleet, End-2019

The global LNG fleet consisted of 541 active vessels at the end of 2019, including 34 Floating Storage Regasification Units (FSRUs) and four Floating Storage Units (FSUs). Overall, the global LNG fleet grew by 8.4% year-on-year (YoY) in 2019, with a total addition of 42 new vessels, out of which three were FSRUs. By comparison, annual growth of LNG trade in 2019 stands at 13%[2], showing a good balance between growth in the LNG shipping market and LNG trade. Charter costs in 2019 began strong at approximately $70,000 per day for steam turbine vessels and $100,000 per day for TFDE/DFDE. Rates decreased to level off at approximately $30,000 for steam turbine vessels and about $40,000 for TFDE/DFDE vessels, varying as expected with summer months impacting LNG shipment volumes. Sanctions on COSCO followed by a European storage buildup and sustained increases in US production caused an acute increase in charter prices, peaking in late October 2019 before declining towards the end of the year.

LNG Receiving Terminals

826 MTPA

Global Nominal Regasification Capacity, February 2020

Global regasification capacity grew during the past year, reaching a total of 821 MTPA as of February 2020. With a total regasification capacity expansion of 23.4 MTPA, 2019 marked the second consecutive year in which regasification capacity additions were outpaced by increases in liquefaction capacity. Six new terminals began importing LNG cargoes in 2019 and expansion projects at three existing terminals were successfully completed. A significant share of regasification capacity additions occurred in the Asia and Asia Pacific regions, contributing a total of 14.2 MTPA in receiving capabilities, reaffirming the regions' status as a source of demand growth. In particular, India added the most regasification capacity through terminal construction and expansion, amounting to 7.5 MTPA of commissioned capacity. As of February 2020, 37 markets are equipped with LNG receiving capabilities. Accompanying the rise of global LNG trade, regasification capacity expansion is anticipated to follow in established regions as well as a number of new markets, both of which are experiencing surges in gas demand. As of February 2020, 120.4 MTPA of new regasification capacity was under construction, including 14 new onshore terminals, 12 floating storage and regasification units (FSRUs), and seven expansion projects at existing receiving terminals. By year-end 2020, 47.1 MTPA of regasification capacity is set to come online and could include new importers such as Ghana.

Floating Regasification

101.2 MTPA

Regasification Capacity, February 2020

Regasification capacity at operational offshore terminals experienced an increase of 13.0 MTPA in 2019 through the construction of three new-built floating terminals at ports in Brazil (Sergipe), Jamaica (Old Harbour) and Bangladesh (Moheshkhali (Summit)) as well as the chartering of a replacement FSRU with larger receiving capabilities in an existing market – Turkey (Etki). Kuwait's Mina al-Ahmadi terminal has signed a new two-year charter contract beginning March 2020 with its existing FSRU – Golar Igloo, after its first charter contract concluded at the end of 2019. By early 2020, offshore regasification capacity at 24 operational terminals rose to reach 101.2 MTPA. As of February 2020, 12 offshore terminals, adding up to 36.6 MTPA of regasification capacity, were under construction. Eight terminals have announced plans to come online by end-2020, including new importers such as Ghana. Beyond 2020, other new importers, such as El Salvador, Croatia and Cyprus, are anticipated to add their first regasification terminals through offshore facilities. Mature markets are also expanding floating regasification capabilities, a prime example being India, which is anticipated to commission its first FSRU-based terminal in early 2020, equipping India with both onshore and floating regasification terminals. As of February 2020, there were about 10 FSRUs (including conversions) on the order book of shipbuilding yards. The FSRU market for offshore terminals experienced a surplus in 2019, with a number of vessels temporarily utilised as conventional LNG carriers while others were open for charter.

[1] LNG trade data for 2019 in this report has been supplied by GIIGNL, and is compared against GIIGNL data from 2018, from the GIIGNL Annual Report 2019 (https://giignl.org/publications/giignl-2019-annual-report). Other data in this report is supplied by Rystad Energy.

[2] GIIGNL

2 LNG Trade

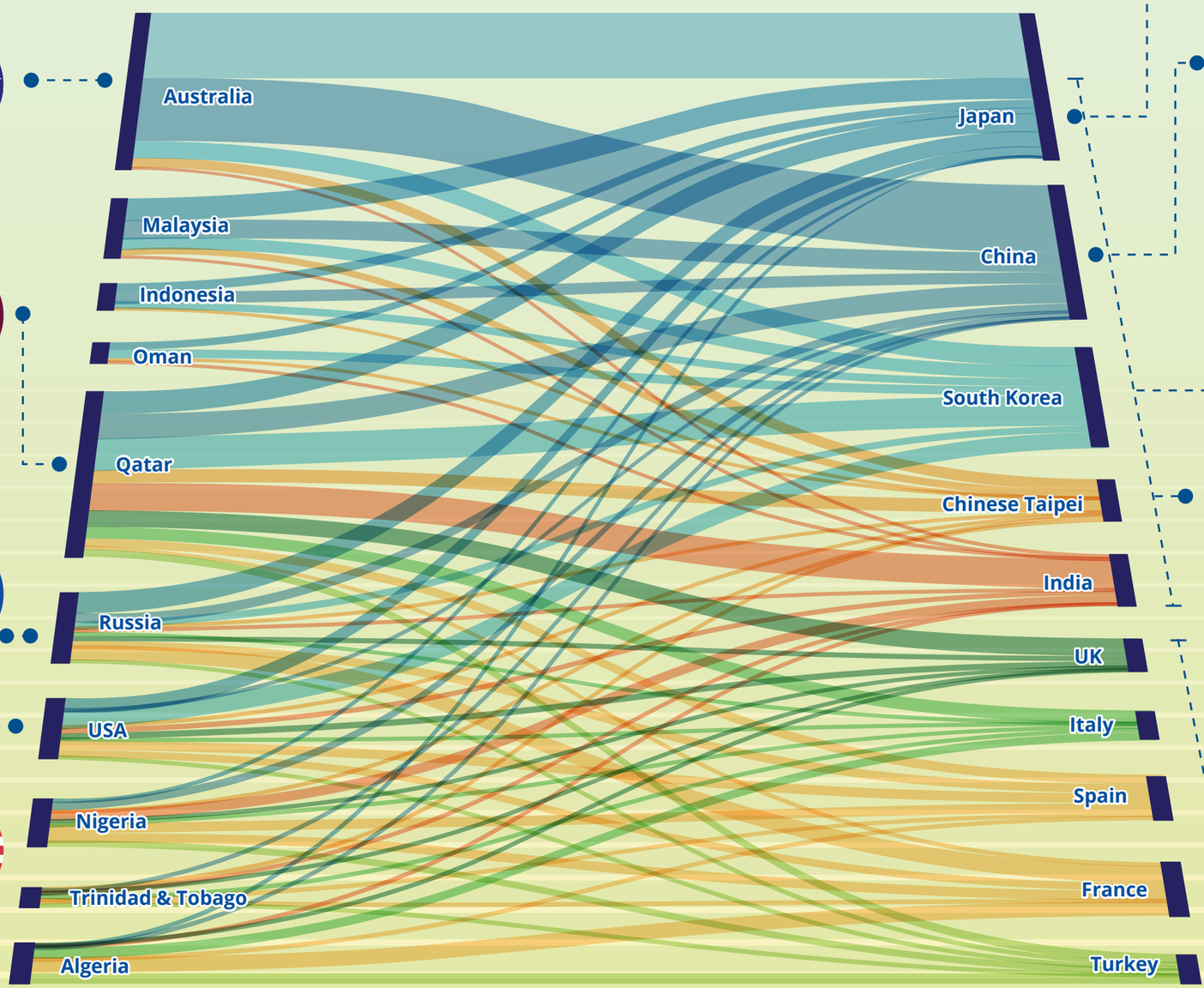
Global LNG trade increased to **354.7 MT** in 2019, an increase of **40.9 MT** or 13% vs. 2018. This is the sixth year of consecutive growth in global LNG trade.

Australia is the second largest exporter with a total of **75.4 MT**

Qatar managed to maintain its position as the largest exporter in the world, exporting **77.8 MT**

Russia is now the fourth largest exporter of LNG, with **29.3 MT** of export in 2019

The USA overtook Malaysia as the third largest exporter, and added a record of **+13.1 MT**



Japan imported **76.9 MT** (-5.6 MT vs. 2018)

China imported **61.7 MT** (+7.7 MT vs. 2018)

The largest global LNG trade flow route continues to be intra-Asia Pacific trade **77.3 MT**

The largest importing regions, consistent with 2018, were

- Asia Pacific **131.7 MT**
- Asia **114.5 MT**

European imports surged on the back of low prices, almost doubling to **85.9 MT**

*The diagram only represents trade flows between the top 10 exporters and top 10 importers.

2.0 LNG Trade

Global LNG trade increased further in 2019, reaching 354.7 MT, an increase of 40.9 MT since the end of 2018. This constitutes an increase of approximately 13%, a sixth year of consecutive growth.

Shell LNG Station - Courtesy of Shell

2.1 OVERVIEW

Global LNG trade increased further in 2019, reaching 354.7 MT, an increase of 40.9 MT since the end of 2018. This constitutes an increase of approximately 13%, a sixth year of consecutive growth.

Most of the additional exported volumes in 2019 were from existing exporting markets: the US (+13.1 MT), Australia (+8.7 MT) and Russia (+11 MT). Qatar managed to maintain its position as the largest exporter in the world (77.8 MT), closely followed by Australia (75.4 MT). The USA (33.8 MT) overtook Malaysia (26.2 MT) as the third largest exporter, and added record export volumes. Russia is now the fourth largest exporter of LNG (29.3 MT) and Malaysia the fifth largest exporter. Asia Pacific continued its growth trajectory as the largest export region (131.7 MT).

Only three markets saw a drop in export levels versus 2018: Indonesia saw the largest drop in export (-2.7 MT), followed by Equatorial Guinea (-0.7 MT) and Norway (-0.5 MT). Gibraltar was the only new importing market in 2019, but has been excluded from this report as the capacity is below 0.5 MTPA. Most recent new importers increased imports further in 2019, such as Bangladesh, Pakistan, Poland and Panama. The largest increases in imports were seen in Europe, with the UK, France, Spain, the Netherlands, Italy and Belgium accounting for most of the additional imports (+32 MT) in this order. The largest importing regions, consistent with 2018, were Asia Pacific (131.7 MT) and Asia (114.5 MT). Key Asian and Asian Pacific markets that contributed to these regions' high imports continue to be Japan (76.9 MT), China (61.7 MT), India (24 MT) and Chinese Taipei (16.7 MT).

Global LNG Trade	LNG Exporters & Importers	LNG Re-Exports
+40.9 MT Growth of global LNG trade	No new LNG importers in 2019[1]	-2.2 MT Re-exported volumes decreased by 59% YOY in 2019
Global LNG trade reached an all-time high of 354.7 MT in 2019, setting a new annual record. China provided 7.7 MT in new import demand, and Europe increased imports by 37 MT. Contractions were largest in Japan (-5.6 MT), South Korea (-3.8 MT) and Egypt (-1.9 MT).	Bangladesh, Brazil, China, India, and Jamaica increased imports through new-built terminals. While most liquefaction capacity was added in markets already exporting LNG, a floating liquefaction project came online in Argentina, raising the number of exporters to 20.	Re-export activity dropped in 2019 to 1.6 MT (3.8 MT in 2018). Re-exports received dropped in all markets. Asia received the largest volume of re-exports (0.9 MT), while Europe re-exported the highest volumes (0.9 MT).

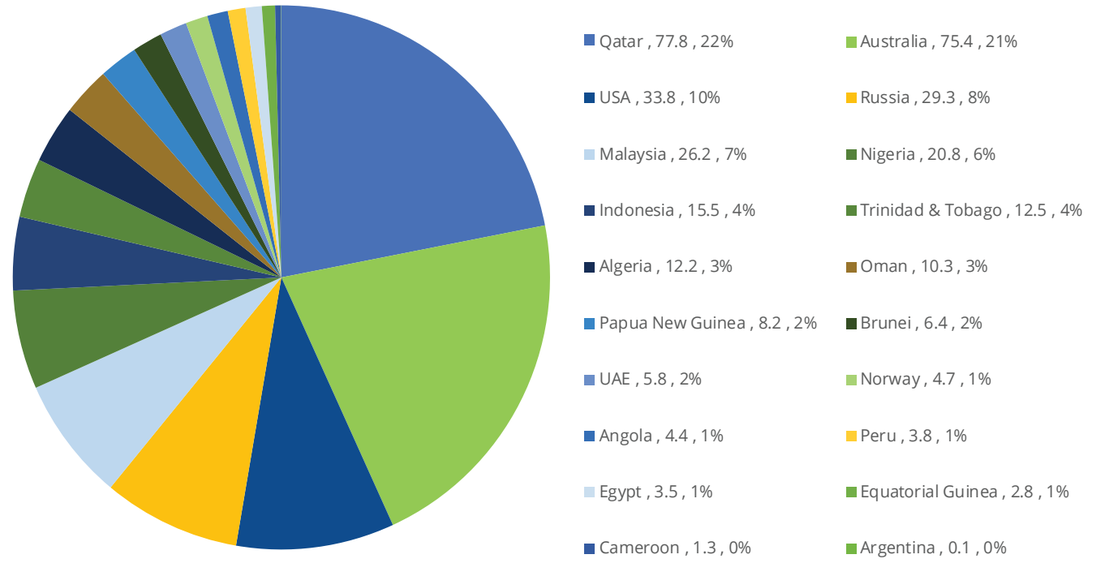
Kogas Jeju LNG Terminal – Courtesy of Kogas

[1] This report excludes those with only small-scale (<0.5 MTPA) regasification capacity but includes markets with large regasification capacity that only consume domestically-produced cargoes, such as Indonesia.

2.2 LNG EXPORTS BY MARKET

Most of the liquefaction capacity added in 2019 was from existing exporting markets: the US, Australia and Russia. Argentina's 0.5 MTPA Tango FLNG came on-stream and that made Argentina the 20th global exporter of LNG in the world.

Figure 2.1: 2019 LNG Exports and Market Share by Market (in MT)



Source : GIIGNL

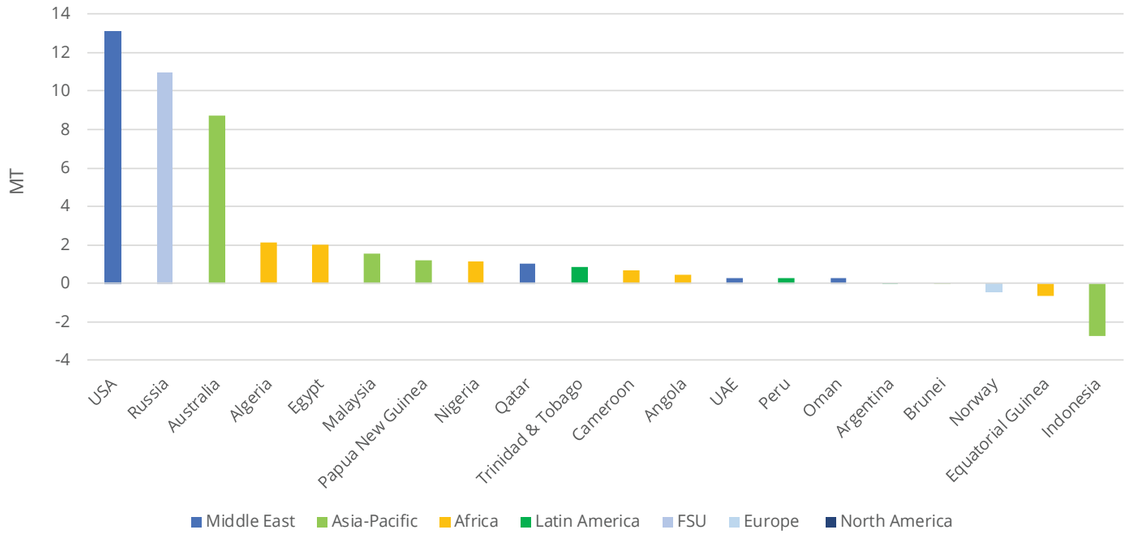
Qatar managed to maintain its position as the largest exporter in the world, exporting 77.8 MT in 2019, closely followed by Australia who exported a total of 75.4 MT, an increase of 13% year-on-year, driven by the start-ups of Ichthys LNG T1-2 (8.9 MTPA) and Prelude FLNG (3.6 MTPA). The USA overtook Malaysia as the third largest exporter, and added a record of 13.1 MT, an increase of 63% as Corpus Christi LNG T1-2 (9 MTPA), Cameron LNG T1 (4.0 MTPA), Freeport LNG T1 (5.1 MTPA), Sabine Pass T5 (4.5 MTPA) and Elba Island T1-3 (0.75 MTPA) started up. Russia is now the fourth largest exporter of LNG, with 29.3 MT of export in 2019 as Yamal LNG T3 (5.5 MTPA) and Vysotsk LNG (0.66 MTPA) were commissioned and started exporting cargoes, an increase of 60% compared to 2018.

Another large shift in export volumes was observed in Algeria (+2.1 MT), which managed to recover some of the drop in export observed in 2018 (-2.2 MT) due to the drop in gas and LNG prices, making LNG more competitive versus pipeline options into Europe. Egypt also increased LNG exports significantly, exporting an additional 2 MT compared to 2018, driven by Idku LNG reaching full export capacity at end 2019. Lastly, Argentina commissioned the Tango floating LNG project in June 2019, subsequently exporting a first cargo in November, thus adding Argentina to the list of global LNG exporters.

Only three markets saw a drop in export levels versus 2018. Indonesia saw the largest drop in export (-2.7 MT) in 2019, mainly driven by declining gas resources feeding into Bontang LNG and turndowns in the lower price environment. Equatorial Guinea has also started to see gas supply declining, triggering a drop in export of 0.7 MT. Lastly, Norway saw a decrease in export (-0.5 MT) due to accelerated maintenance in the lower price environment.

Asia Pacific continued it's growth trajectory as the largest export region, exporting a total of 131.7 MT in 2019, an increase of 7%, driven by the aforementioned increases in production from Australia as well as from Papua New Guinea (+1.2 MT). The largest regional increases came from North America (63%, driven by the USA) and the FSU (Russia, 60%). Africa also added significant exports (+5.7 MT) through increases from Algeria, Egypt and Cameroon as they ramped up production and exports in 2019. The Middle East only increased exports by 2% with small increases from Qatar, the UAE and Oman.

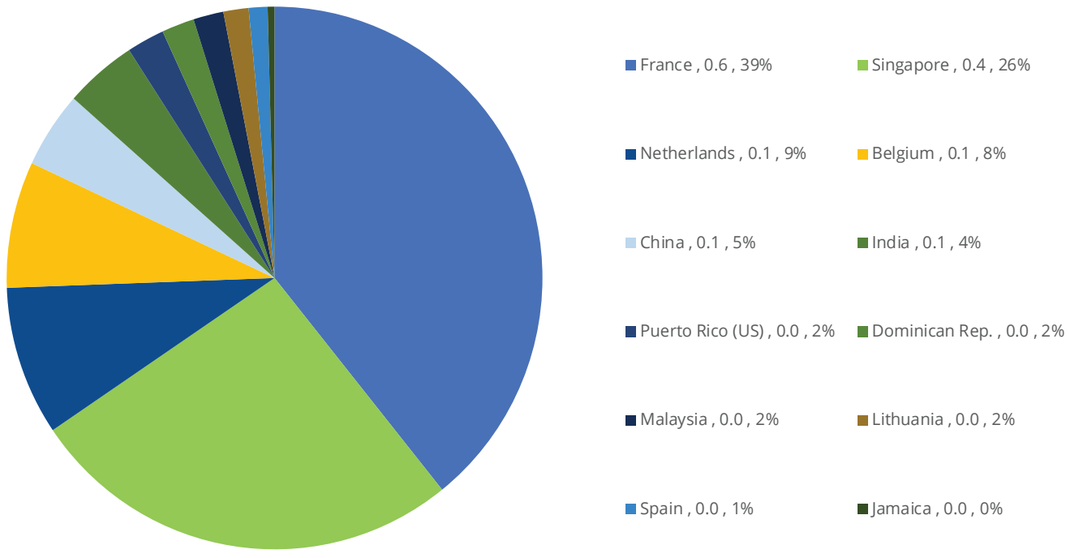
Figure 2.2: 2019 Incremental LNG Exports by Market Relative to 2018 (in MT)



Source : GIIGNL

Re-exported trade dropped in 2019 by 59% from 3.8 MT to 1.6 MT – equal to roughly 0.4% of global trade in 2019. 12 Markets re-exported volumes, with some marked shifts from 2018. For example, China, Malaysia, Lithuania and Jamaica loaded re-export volumes, whereas they did not do so in 2018. The Dominican Republic was the only market that re-exported volumes both in 2018 and 2019, and also increased their re-exports, although only marginally (+0.01 MT). Europe re-exported 58% of global re-exports in 2019, and France and Singapore had the highest re-export loadings in 2019, re-exporting 0.6 MT and 0.4 MT respectively.

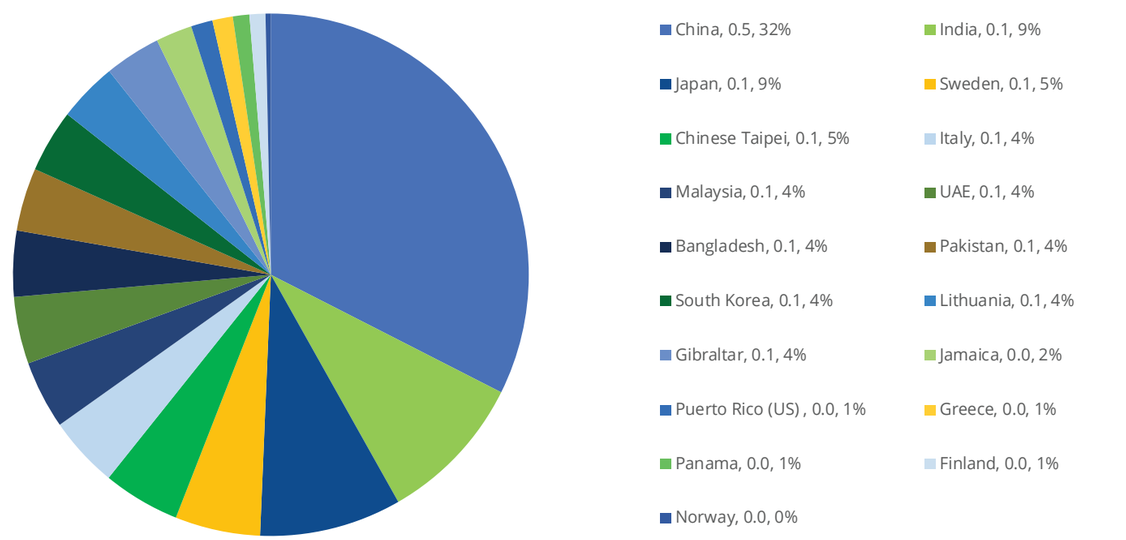
Figure 2.3: Re-Exports Loaded by Re-loading Market in 2019 (in MT)



Source : GIIGNL

At the same time, 19 markets received re-exported volumes, versus 22 markets in 2018. New receivers of re-exported volumes in 2019, who did not do so in 2018, were Bangladesh, Malaysia, Gibraltar, Greece, Italy, Lithuania, Norway, Jamaica and Panama. China received the highest volume of re-exports at 0.5 MT.

Figure 2.4: Re-Exports Received in 2019 by Receiving Market (in MT)



Source : GIIGNL

As already forecasted in the 2019 IGU World LNG Report, a lower price environment was likely to trigger a drop in re-exports, as the opportunities for inter-basin arbitrage plays decreased. This was clearly observed in 2019, as despite a continued ramp-up of Yamal volumes that were expected to be re-loaded at European terminals, re-exports from Europe dropped by around 70%. Even though a number of new markets were involved in the loading of re-exports and received re-exports, the volumes were too small to offset the significant drop in re-exports from Europe.

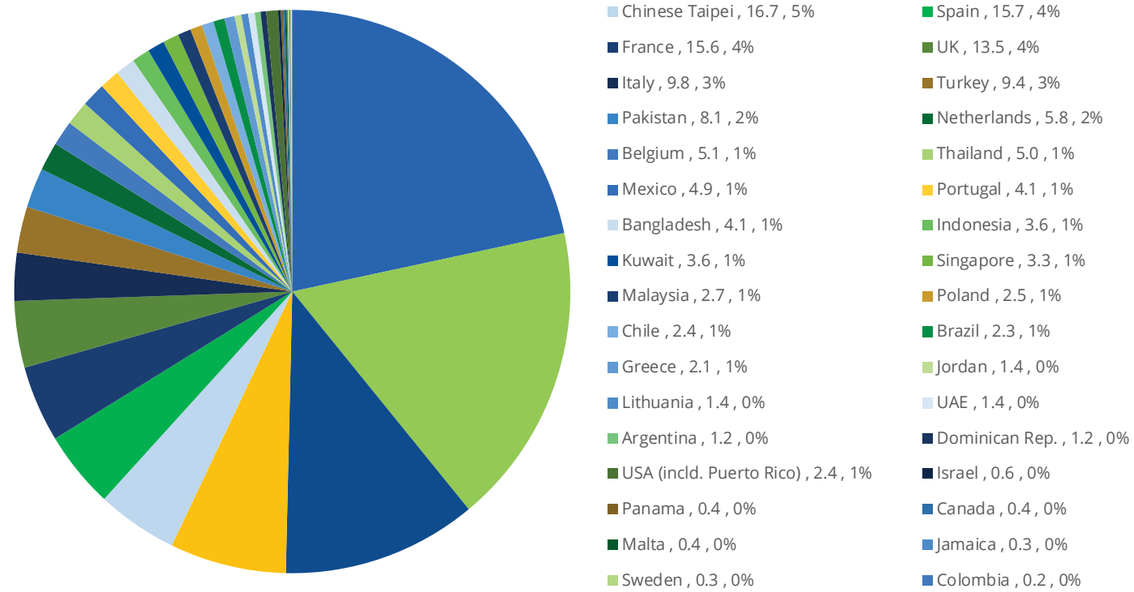
LNG Vessel at Shell's Terminal at Hazira – Courtesy of Shell

2.3 LNG IMPORTS BY MARKET

While new regasification facilities were commissioned in new markets in 2019, none imported cargoes by the end of December, and hence no new importers were added to the list in 2019. However, most recent new importers (that started importing between 2015 and 2018) increased imports further in 2019, such as Bangladesh (+3.4 MT), Pakistan (+1.2 MT), Poland (+0.5 MT) and Panama (+0.3 MT). The largest increases in imports were seen in Europe, with the UK, France, Spain, the Netherlands, Italy and Belgium alone adding 32 MT of imports in 2019.

The largest importing regions, consistent with 2018, were Asia Pacific and Asia (131.7 MT and 114.5 MT respectively), although Asia Pacific's market share of total LNG imports declined by 7% compared to 2018.

Figure 2.5: 2019 LNG Imports and Market Share by Market (in MT)



Source : GIIGNL

Demand from Asia Pacific was supported through growth in imports into Malaysia, Singapore, Indonesia and Thailand, but was challenged by declining imports in South Korea and Japan (approximately -9% or -3.8 MT and -7% or -5.6 MT respectively), driven by milder weather, the price environment and changes in domestic energy mixes and demand.

While Asia's market share remained stable with support from China, Pakistan and Bangladesh, India's demand growth was muted compared to the growth seen in 2018 and prior years (+1.5 MT) with infrastructure development slower than expected, and imports into Chinese Taipei dropped by 0.2 MT. China's growth in LNG imports slowed down on the back of slower coal-to-gas switching efforts, increased domestic production and an increase of renewables in the energy mix.

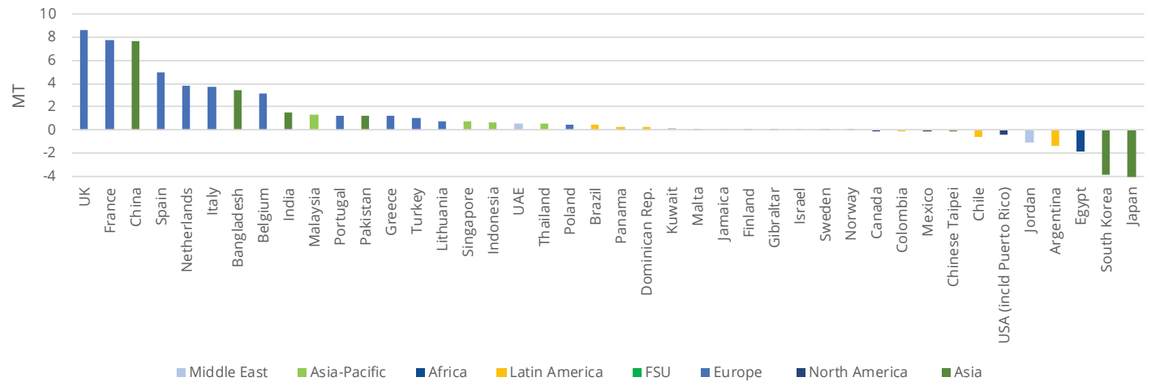
European imports surged on the back of low prices, almost doubling to 85.9 MT from 48.9 MT in 2018. This accounts for 90% of the global increase in LNG trade in 2019. Market share wise, this meant an increase from 16% to 24%. This was driven also by declines in domestic production, increased use of storage, additional gas-fired power generation and increases in LNG imports from for instance Algeria as LNG was competitive versus pipeline supplies.

Both Africa and Latin America reversed earlier growth trajectories in import, with Egypt and Argentina becoming exporters again after having previously imported LNG. Chile's LNG imports also dropped as Argentina supplied more pipeline gas.

In North America, Puerto Rico was the only market to grow LNG import further after 2018 showed recovery following Hurricane Maria. While pipeline capacity additions in Mexico continue to be delayed, LNG imports into Mexico remained relatively stable at 4.9 MT.

Lastly, in the Middle East, the UAE increased imports by 0.6 MT, but Jordan's imports decreased by 1 MT as Jordan reduced pipeline exports to Egypt further.

Figure 2.6: Incremental 2019 LNG Imports by Market & Incremental Change Relative to 2018 (in MT)



Source : GIIGNL

2.4 LNG INTERREGIONAL TRADE

The largest global LNG trade flow route continues to be intra-Asia Pacific trade (77.3 MT), driven mainly by continued ramp up in exports from Australia, and to a lesser extent additional exports from Papua New Guinea and Malaysia, into the largest market of the world – Japan, as well as a large flow into Singapore, Indonesia, Thailand and South Korea. Interestingly 3.6 MT was intra-Indonesian trade. Most of the remaining supply out of Asia Pacific ended up in Asia, being the second largest LNG trade flow in 2019 – 54 MT with 28 MT from Australia to China alone.

The third largest trade flow is from the Middle East to Asia at 36.3 MT – with most of those supplies being exported from Qatar. There were also significant flows from the Middle East to Asia Pacific, which was the second largest trade flow last year, but has now settled at 31.2 MT. A lot of the trade flow that used to go to Asia instead moved to Europe in 2019 as prices went down. Intra-Middle East trade was only 3 MT.

African exports flowed mainly to Europe and Asia (25.1 MT and 13.6 MT respectively), supported by additional exports from Algeria and Egypt, and overall demand growth in for example China and Bangladesh. 2.9 MT of African supply was imported into Asia Pacific, a drop from last year, while notably 1.5 MT was imported into North America, an increase from last year, almost all of this went to Mexico.

North American supplies were similarly globally distributed as they were in 2018 with volumes being imported into Europe, Asia Pacific, Latin America, Asia, North America and the Middle East. The largest flow was, predictably given 2019's price developments, into Europe (12.7 MT), but significant flows also went to Asia Pacific (9.5 MT).

FSU (Russia) exports topped at 29.3 MT, of which more than half was destined for Europe in 2019. A significant volume also went to Asia Pacific (8.8 MT), mainly Japan (6.3 MT), as the Northern Sea route trade flow grew steadily.

Latin American volumes showed a similar global distribution in 2018 and 2019 as North American volumes. Intra-Latin American trade decreased, and instead more volumes went to Europe (5.9 MT) and Asia (1.9 MT). Imports into North America remained similar to last year (3.1 MT).

Lastly, European volumes remained within Europe (4.2 MT), meaning Norway's lowered exports were mainly imported into other European markets, with almost half destined for France (1 MT) and Lithuania (1 MT).

Table 2.1: LNG Trade Between Regions, 2019 (in MT)

Exporting Region / *Importing Region*	Asia-Pacific	Middle East	Africa	North America	Former Soviet Union	Latin America	Europe	Reexports Received	Reexports Loaded	**Total**
Asia-Pacific	77.3	31.2	2.9	9.5	8.8	2.1	-	0.3	0.4	**131.7**
Asia	54.2	36.3	13.6	3.0	4.8	1.9	0.1	0.8	0.1	**114.5**
Europe	-	23.5	25.1	12.7	15.1	5.9	4.2	0.3	0.9	**85.9**
Latin America	-	-	0.8	4.2	-	2.6	0.4	0.1	-	**8.1**
North America	0.2	-	1.5	2.9	0.1	3.1	-	-	-	**7.7**
Middle East	0.1	3.0	1.0	1.4	0.6	0.8	-	0.1	-	**6.9**
Africa	-	-	0.1	-	-	-	-	-	-	**0.1**
Total	**131.7**	**93.9**	**45.0**	**33.8**	**29.3**	**16.3**	**4.7**	**1.6**	**1.6**	**354.7**

Source : GIIGNL

Table 2.2: LNG Trade Volumes Between Markets, 2019 (in MT)

Exporting Markets / Importing Markets	Algeria	Angola	Argentina	Australia	Brunei	Cameroon	Egypt	Equatorial Guinea	Indonesia	Malaysia	Nigeria	Norway	Oman	Papua New Guinea	Peru	Qatar	Russia	Trinidad & Tobago	UAE	USA	Re-exports Received	Re-exports Loaded	2019 IMPORTS	2018 IMPORTS
Bangladesh	0.3	-	-	-	-	-	0.1	-	0.1	0.1	0.4	-	0.1	-	-	2.8	0.3	-	-	-	0.1	-	4.1	0.7
China	0.1	0.1	-	28.2	0.6	0.5	0.2	0.4	4.5	7.5	2.0	0.1	1.1	2.8	0.7	8.5	2.8	0.8	0.1	0.3	0.5	0.1	61.7	54.0
Chinese Taipei	-	-	-	4.4	0.2	0.1	0.1	0.1	0.4	2.5	0.2	-	0.1	1.5	0.1	4.7	1.5	0.2	0.1	0.5	0.1	-	16.7	16.8
India	0.2	2.9	-	1.0	-	0.4	0.2	0.5	-	0.4	2.7	0.1	1.0	-	-	9.7	0.2	0.1	2.6	1.8	0.1	0.1	24.0	22.4
Pakistan	0.3	-	-	-	-	-	0.6	0.2	-	0.1	1.0	-	0.3	-	-	4.8	-	-	0.4	0.5	0.1	-	8.1	6.9
ASIA	0.8	3.0	-	33.6	0.8	1.0	1.2	1.3	5.0	10.6	6.2	0.1	2.6	4.2	0.8	30.4	4.8	1.1	3.2	3.0	0.8	0.1	114.5	100.8
Indonesia	-	-	-	0.1	-	-	-	-	3.6	-	-	-	-	-	-	0.0	-	-	-	-	-	-	3.6	3.0
Japan	0.1	-	-	29.8	4.3	-	0.1	0.1	4.0	9.4	0.8	-	2.9	3.7	0.7	8.7	6.3	-	2.2	3.6	0.1	-	76.9	82.5
Malaysia	-	-	-	1.5	0.7	-	-	0.1	-	0.3	0.1	-	-	-	-	-	-	-	-	0.1	0.1	-	2.7	1.4
Singapore	-	0.1	-	1.9	-	-	0.4	0.3	0.1	-	0.1	-	-	-	-	0.1	-	0.1	-	0.6	-	0.4	3.3	2.6
South Korea	-	-	-	7.6	0.6	-	0.1	0.1	2.3	4.7	0.6	-	3.9	0.3	1.1	11.1	2.4	0.1	0.2	5.0	0.1	-	40.1	43.9
Thailand	-	0.1	-	0.8	-	-	0.1	-	0.3	1.3	0.0	-	0.1	-	0.1	2.0	0.1	0.1	-	0.1	-	-	5.0	4.4
ASIA-PACIFIC	0.1	0.1	-	41.8	5.6	-	0.7	0.5	10.3	15.7	1.5	-	6.9	4.0	1.9	21.9	8.8	0.2	2.4	9.5	0.3	0.4	131.7	137.8
Belgium	-	0.1	-	-	-	-	0.1	-	-	-	-	-	-	-	-	3.3	1.4	-	-	0.3	-	0.1	5.1	1.9
Finland	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	0.1	0.1
France	2.7	0.3	-	-	-	-	0.3	-	-	-	3.0	1.1	-	-	0.3	1.3	5.0	0.2	-	2.0	-	0.6	15.6	7.8
Gibraltar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	0.1	-	0.1	-
Greece	0.4	0.1	-	-	-	-	0.2	-	-	-	0.3	0.4	-	-	-	0.4	0.1	-	-	0.2	-	-	2.1	0.9
Italy	2.2	-	-	-	-	-	0.3	0.1	-	-	0.1	0.1	-	-	-	4.7	0.1	1.1	-	1.2	0.1	-	9.8	6.1
Lithuania	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	0.3	-	-	0.1	0.1	-	1.4	0.6
Malta	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	0.3	-	-	-	-	0.4	0.3
Netherlands	0.1	0.2	-	-	-	-	-	-	-	-	0.2	0.3	-	-	0.3	0.1	3.1	0.1	-	1.4	-	0.1	5.8	2.0
Norway	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	0.1	0.1
Poland	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	1.7	-	-	-	0.7	-	-	2.5	2.0
Portugal	0.1	-	-	-	-	-	-	-	-	-	2.4	-	-	-	-	0.5	0.1	0.1	-	1.0	-	-	4.1	2.9
Spain	0.8	0.2	-	-	-	0.1	-	0.1	-	-	3.1	0.5	-	-	0.3	3.2	2.3	2.1	-	3.1	-	-	15.7	10.7
Sweden	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	0.1	-	-	-	0.1	-	0.3	0.2
Turkey	4.3	-	-	-	-	-	0.3	0.1	-	-	1.8	0.1	-	-	-	1.8	0.1	0.3	-	0.7	-	-	9.4	8.3
UK	0.7	0.1	-	-	-	0.1	-	0.2	-	-	0.3	0.3	-	-	0.2	6.6	2.4	0.7	-	2.1	-	-	13.5	5.0
EUROPE	11.3	0.9	-	-	-	0.1	1.3	0.4	-	-	11.2	4.2	-	-	1.2	23.5	15.1	4.7	-	12.7	0.3	0.9	85.9	48.9
Argentina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	0.7	-	-	1.2	2.6
Brazil	-	0.1	0.1	-	-	0.1	-	0.1	-	-	0.2	0.2	-	-	-	-	-	0.4	-	1.1	-	-	2.3	1.9
Chile	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	0.6	-	1.7	-	-	2.4	3.1
Colombia	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	0.1	-	-	0.2	0.3
Panama	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	0.1	-	0.2	-	-	0.4	0.2
Dominican Rep.	-	-	-	-	-	-	-	-	-	-	0.1	0.1	-	-	-	-	-	0.9	-	0.2	-	-	1.2	0.9
Jamaica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	0.2	-	-	0.3	0.2
LATIN AMERICA	-	0.1	0.1	-	-	0.1	-	0.3	-	-	0.3	0.4	-	-	-	-	-	2.5	-	4.2	0.1	-	8.1	9.0
Canada	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	0.4	0.4
Mexico	-	-	-	-	-	-	-	0.3	0.2	-	1.0	-	-	-	-	-	-	0.4	-	2.9	-	-	4.9	5.0
USA (incld. Puerto Rico)	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	0.1	2.3	-	-	-	-	2.4	2.8
NORTH AMERICA	-	0.1	-	-	-	-	-	0.3	0.2	-	1.1	-	-	-	-	-	0.1	3.1	-	2.9	-	-	7.7	8.2
Egypt	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	1.9
AFRICA	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	1.9
Israel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.4	-	-	-	-	0.6	0.5
Jordan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.4	0.2	-	0.8	-	-	1.4	2.5
Kuwait	0.1	0.1	-	-	-	-	0.1	-	-	-	0.4	-	0.7	-	-	1.8	-	0.1	-	0.2	-	-	3.6	3.4
UAE	-	0.1	-	0.1	-	-	0.1	-	-	-	0.1	-	0.1	-	-	-	0.1	0.1	0.3	0.4	0.1	-	1.4	0.8
MIDDLE EAST	0.1	0.3	-	0.1	-	-	0.1	-	-	-	0.5	-	0.8	-	-	1.9	0.6	0.8	0.3	1.4	0.1	-	6.9	7.2
2019 EXPORTS	12.2	4.4	0.1	75.4	6.4	1.3	3.5	2.8	15.5	26.2	20.8	4.7	10.3	8.2	3.8	77.8	29.3	12.5	5.8	33.8	1.6	1.6	354.7	-
2018 EXPORTS	10.1	4.0	-	66.7	6.4	0.6	1.4	3.4	18.2	24.7	19.7	5.2	10.0	7.0	3.5	76.8	18.3	11.6	5.5	20.6	3.8	3.8	-	313.8

Source : GIIGNL

3 LNG and Gas Pricing

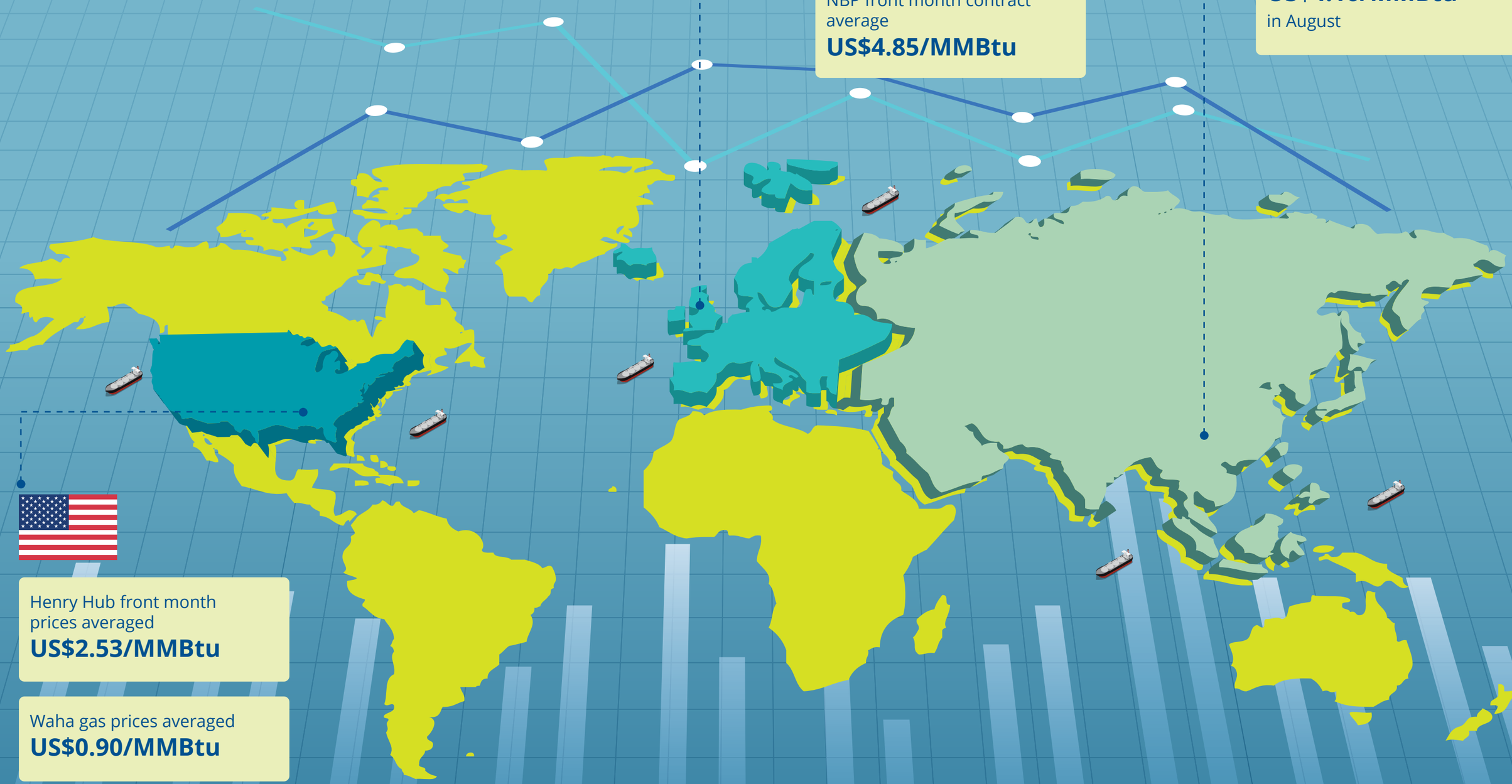
International gas prices hit a record low in 2019.

NBP front month contract trading reached lowest level in 10 years - **US$3.15/MMBtu** in July

NBP front month contract average **US$4.85/MMBtu**

Asian spot average **US$5.49/MMBtu**, lowest in 10 years

Asian spot reached a low of **US$4.10/MMBtu** in August



Henry Hub front month prices averaged **US$2.53/MMBtu**

Waha gas prices averaged **US$0.90/MMBtu**

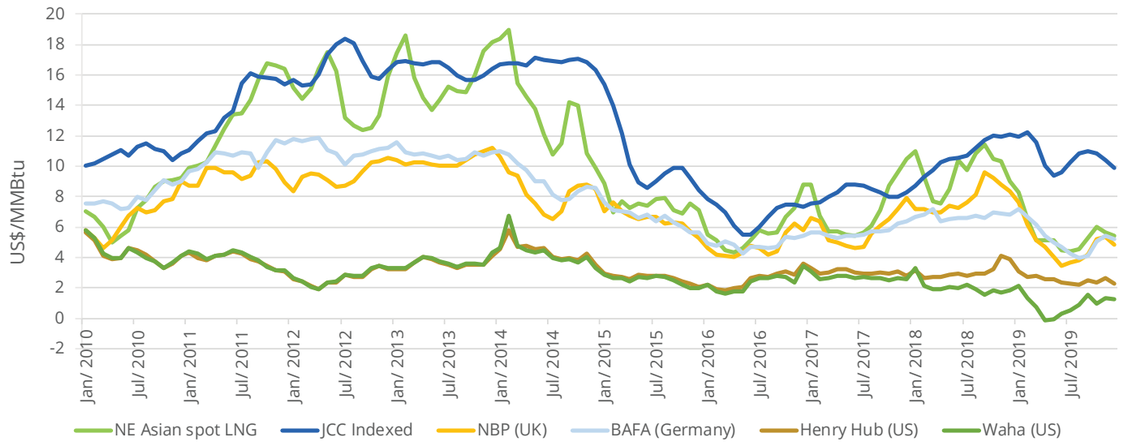
3.0 LNG and Gas Pricing

International gas prices reached record low levels in 2019 driven by increasing natural gas production, the commissioning of new export infrastructure and limited demand response from Asian markets.

Turquoise P FSRU - Courtesy of Pardus Energy

3.1 OVERVIEW

Figure 3.1: Monthly Average Regional Gas Prices 2010-2020



Source: Rystad Energy, Bloomberg, Refinitiv

US$2.53/MMBtu
Average Henry Hub
Front Month Prices, 2019

International gas prices reached record low levels in 2019 driven by increasing natural gas production, the commissioning of new export infrastructure and limited demand response from Asian markets.

In the US, Henry Hub front month prices averaged US$2.53 per MMBtu in 2019 compared to US$3.07 per MMBtu in 2018, dented by robust production growth from shale plays. Despite seeing a significant amount of coal-to-gas switching and an increase in LNG exports during 2019, these developments have not been significant enough to absorb the gas supply growth, leading to an overall decline in prices.

Total US natural gas supply increased from 850 Bcm in 2018 to 935 Bcm in 2019, an increase of 10% year-on-year. The Marcellus and Utica shales (in the Appalachia Basin) accounted for 45 Bcm of the growth in supply as new pipeline capacity supported sending the low cost gas out of the region. Another 27 Bcm was added from the Haynesville/Bossier Basin, which was made possible by improved well parameters for US shale wells. Longer laterals and higher proppant intensity contributed to lowered costs and improved well performance.

Associated gas supplies from oil fields have also flooded the US market. The Permian Delaware and Permian Midland tight oil plays increased natural gas supply from 2018 to 2019 by about 23 Bcm combined. These volumes are considered as zero cost gas as they are driven by oil activity and oil prices. This has put Western Texas gas prices under pressure during 2019.

As a result of the increase in production and local oversupply in Permian, Waha gas prices averaged US$0.9 per MMBtu in 2019, down from US$2.01 per MMBtu in 2018. The Waha spot price turned negative for a two-week period in April 2019. This deflated price was triggered by a depression in local gas prices over the last few quarters as well as a bottleneck created by a mismatch in production growth and infrastructure to send volumes to market. A seasonal gas demand decline was aggravated further by the failure of two compressor stations within the El Paso Natural Gas Pipeline System. Even though the capacity reduction was relatively small, the impact on prices was dramatic, with the elasticity of local spot prices taking an especially hard hit.

After the summer of 2019, Waha prices recovered as new infrastructure helped debottleneck the Permian Basin. The Gulf Coast Express pipeline commenced operations in September 2019 and is capable of transporting about 20 Bcm of natural gas eastward to the Agua Dulce receipt point near the Texas Gulf Coast. Since the commissioning of the pipeline, Waha prices averaged US$1.21 per MMBtu up to the end of 2019. However, there has been no material increase in West Texas exports to Mexico due to ongoing infrastructure build-out delays in Mexico.

Demand response across the US helped absorb some of the additional supplies coming into the market but this was not enough to prevent prices from falling. US natural gas demand increased from 851 Bcm in 2018 to 875 Bcm in 2019, mostly driven by the power sector as it became cheaper to generate power with gas than coal in most states. US LNG exports also increased from 30 Bcm in 2018 to about 50 Bcm in 2019 while net pipeline imports declined slightly by about 5 Bcm per annum. Despite the higher demand, gas flaring increased in 2019 as infrastructure bottlenecks prevented delivery of all volumes into the market.

In Asia, spot LNG prices averaged US$5.49 per MMBtu in 2019[1], the lowest level in the last ten years. After reaching a peak of US$11.6 per MMBtu at the end of September 2018 driven by Asian buyers re-stocking ahead of the winter, prices had a prolonged slide throughout 2019, reaching a low of US$4.1 per MMBtu in August. The decline in prices was caused by a mild winter in both Asia and Europe and a continuous increase in LNG supplies mainly from the US but also from Russia, Australia and others.

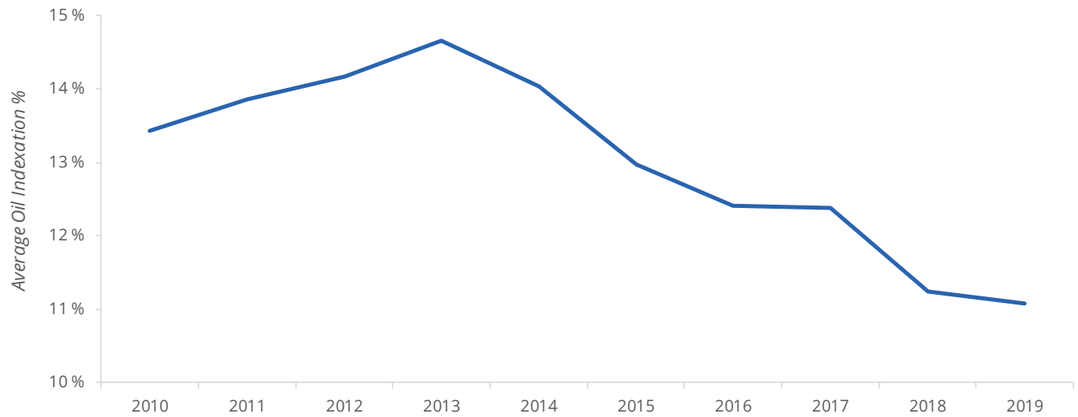
[1] Source: Refinitiv

Given that LNG demand in Asia was flat year-on-year throughout the summer of 2019, more and more volumes headed to Europe due to the region's liquid markets and the slightly higher netback. This resulted in a very loose European balance as pipeline exports from Russia and Norway remained steady. As a result, European prices also reached a historical low with the NBP front month contract trading as low as US$3.15 per MMBtu in July 2019[1], the lowest level in ten years. The NBP front month contract averaged US$4.85 per MMBtu in 2019[1].

At the start of the winter, Northwest European prices jumped to a level above US$5 per MMBtu, an increase of more than 25% driven by normal winter seasonality and some uncertainty regarding Russian exports through Ukraine. Despite the slight bump, winter prices remained at the lowest level in ten years. Asian prices also increased in line with winter demand, but prices remained at a historical low level for the winter period, ending 2019 at only US$5.10 per MMBtu. Netbacks remained in favour of Europe, signalling the continued looseness in the international market. The German Border Price (BAFA) averaged US$5.26 per MMBtu in 2019. This reflects an average premium of US$0.4 compared to NBP during 2019, in contrast to 2018 when BAFA traded US$1.14 below NBP on average. As opposed to the NBP, the price formation at BAFA is still heavily influenced by the oil price as a consequence of the large amount of Russian imported volumes that are traded via long-term contracts indexed to Brent. Hence, the average landed price of natural gas imported to Germany traded at a premium compared to NBP in 2019, as the oil price traded at a stable level compared to the NBP, which plummeted during the same period. The drop in European and Asian spot prices has resulted in wider spreads between oil-indexed contracts and spot prices. Asian spot prices tend to reach oil-indexed levels during winters to attract flexible cargoes during periods of market tightness. In September 2018, the spread between the JCC oil-indexed price and the Asia Spot price was only US$0.30 per MMBtu, but widened to reach a maximum spread of US$6.71 per MMBtu in August 2019 and ended the year at a level of US$4.80 per MMBtu.

With spot gas prices reaching record low levels, recent market fundaments have also changed and have been reflected in LNG contractual terms. Historically, most LNG contracts have been indexed to oil. The Fukushima disaster in 2011 drove up global gas prices and pushed the average oil indexation level to above 14%, but that indexation has gradually declined again over the past years. First, the collapse in oil prices in 2015 brought the average slope down to 12% in 2016. Subsequently, lower gas spot prices drove down the oil indexation to an average level of 11% starting from late 2018.

Figure 3.2: LNG Sales and Purchase Agreements (SPAs) Average Oil Indexation by Signature Year, Percent



Source: Rystad Energy

The abundance of shale volumes being produced and exported from the US has made Henry Hub a global gas price reference. US LNG exporters have created new business models and tend to sell their gas indexed to Henry Hub. While oil indexation is still common in Sales and Purchase Agreements (SPAs), there is an increasing trend to tie LNG contracts to European gas prices (NBP and TTF), the Japan/Korea Marker (JKM) and other hybrid pricing models involving multiple commodities. In April 2019, Shell and Tokyo Gas grabbed the entire world's attention by signing the world's first LNG contract indexed to coal. In 2019, around 68% of volumes sold through long-term contracts were indexed to oil while 24% were indexed to Henry Hub.

Long-term contracts continue to play an important role in securing financing for the development of the liquefaction projects and supplies to importing markets. Out of the 362 MTPA sold through SPAs during the past 10 years, 271 MTPA was sold with a contract duration of more than 10 years. As an example, the 12.88 MTPA Mozambique LNG Area 1 recently managed to lock 11.18 MTPA, or 87% of its nameplate capacity, into long-term contracts before reaching FID in June 2019. The typical new LNG SPA contract duration is now 11-20 years, rather than 20+ years which was a common practice in the past.

The global LNG market is becoming more financially liquid, transparent and competitive, and requires improved risk management. The need for flexible supply and demand is challenging traditional business models in the LNG industry. A total of 36.8 MTPA of SPAs was signed in 2019, out of which 43% (15.8 MTPA) did not specify final destinations. The trend of portfolio allocation has been well observed on the demand side as well. LNG buyers are diversifying LNG sources, allocating volumes to whichever destination that offers the best economics.

The first quarter of 2020 has proven to be very challenging for natural gas and LNG producers, as historically low gas prices have prevailed throughout the winter season. First, the increase in LNG exports combined with a mild winter across the Northern Hemisphere lead to a counter-cyclical drop in international gas prices. The bearish tone continued throughout February and March as markets around the world started to announce lockdowns in order to control the spread of the COVID-19 virus. The first to announce a lockdown was China, resulting in a drastic drop in LNG imports as a result of the lower industrial and commercial activity. As the epicenter moved from China to Europe, markets across the continent have started to take measures to control the spread of the virus. As of March 2020, it seems likely that more markets will decide on lockdowns. This will lead to depressed commercial and industrial activity around the world, which will have a negative impact on gas demand throughout this crisis. The current market environment lowers the expectations of seeing a recovery in prices any time before the coming winter.

4 Liquefaction Plants

Global liquefaction capacity reached **430.5 MTPA** in 2019.

Capacity Additions for 2019

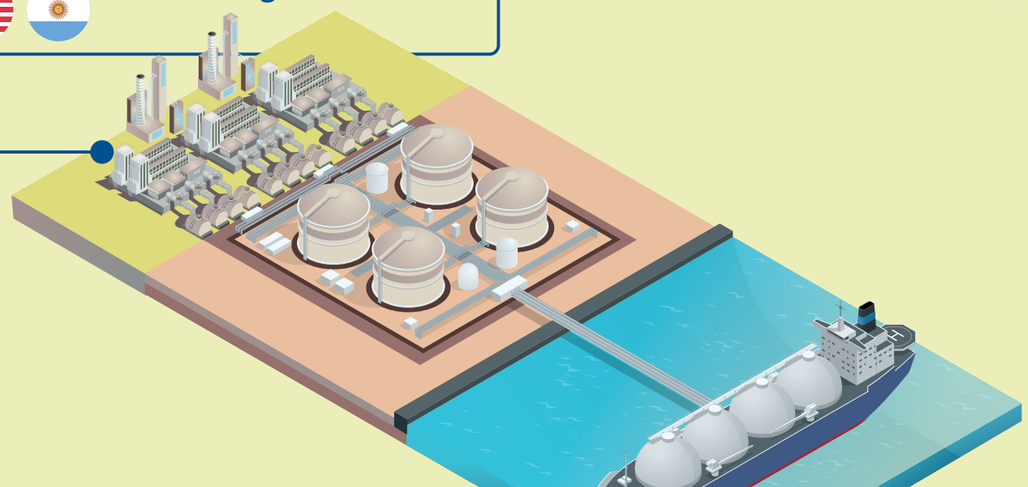
42.5MTPA
of liquefaction capacity brought online

11%
year-on-year growth vs 2018

Australia
87.6MTPA overtook
as the market with the highest liquefaction capacity

Qatar
77.1MTPA

Capacity added in **Australia**, **Russia**, **USA** and **Argentina**



FIDs and Under Construction

Record FIDs of liquefaction projects, totalling
70.8MTPA

FIDs were taken in **USA**, **Mozambique**, **Russia** and **Nigeria**

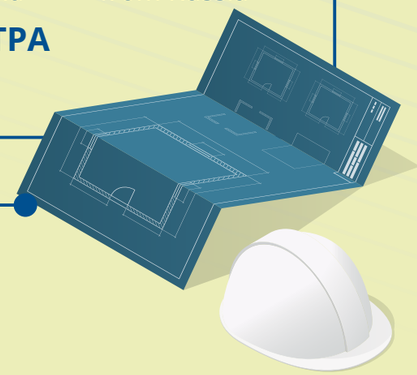
Global liquefaction capacity forecasted to reach
454.8MTPA
by end 2020

Liquefaction capacity forecasted to be added in 2020 in **USA**, **Indonesia**, **Malaysia** and **Russia**

Pre-FID

907.4 MTPA
of liquefaction capacity currently in pre-FID stage

350.5MTPA from USA
221.8MTPA from Canada
50.0MTPA from Australia
49.0MTPA from Qatar
42.2MTPA from Russia



4.0 Liquefaction Plants

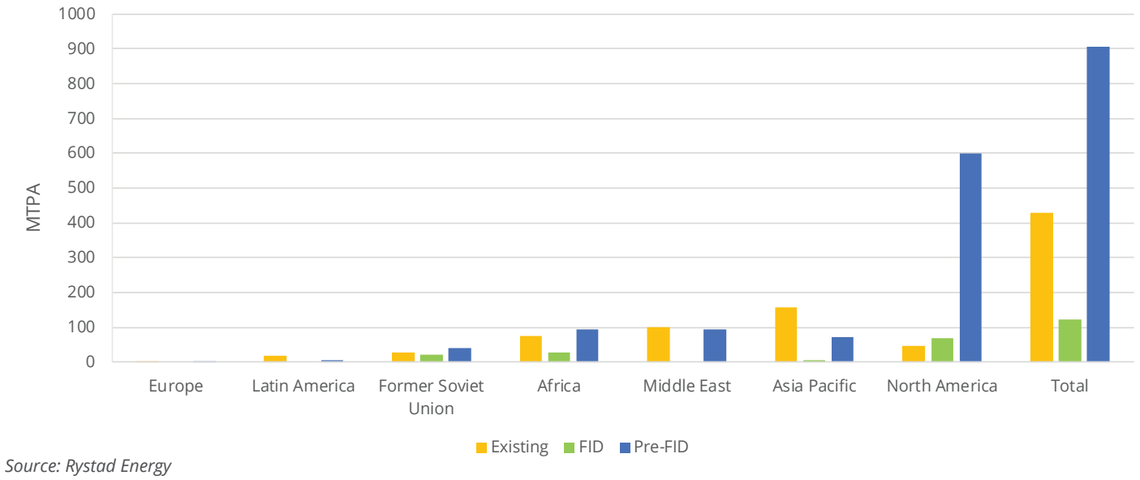
In 2019, around 42.5 MTPA of liquefaction capacity was brought online, increasing global liquefaction capacity to 430.5 MTPA[1]. This represents 11% year-on-year growth from 2018, well above the growth rate from 2017 to 2018. Ichthys LNG T1-2 (8.9 MTPA) and Yamal LNG T3 (5.5 MTPA) started up in late 2018, and began delivery of commercial cargoes in 2019. Corpus Christi LNG T1-2 (9 MTPA), Cameron LNG T1 (4.0 MTPA), Freeport LNG T1 (5.1 MTPA), Sabine Pass T5 (4.5 MTPA) and Elba Island T1-3 (0.75 MTPA) commenced commissioning activities in 2019 and began commercial operations later in the year, contributing to more than half of the capacity additions from North America alone. Prelude FLNG (3.6 MTPA) and Tango FLNG (0.5 MTPA) achieved commercial exports in June 2019, becoming the third and fourth operational FLNG developments in the world, after Petronas FLNG Satu (1.2 MTPA) and Cameroon FLNG (2.4 MTPA). Besides, Vysotsk LNG (0.66 MTPA) in Russia also commenced commercial operation in the year. Freeport T2 (5.1 MTPA) started commercial operation at the beginning of 2020, increasing global liquefaction capacity to 435.6 MTPA as of January 2020.

Tango FLNG - Courtesy of Exmar

[1] The number includes liquefaction capacity of Marsa El Brega LNG, Bontang LNG Train C-D, Yemen LNG and Damietta LNG, which have currently suspended operations. The number excludes liquefaction capacity of Kenai LNG, as parts of the LNG plant may be converted to an import terminal.

4.1 OVERVIEW

Figure 4.1: Global Liquefaction Capacity by Region and Status, as of December 2019



Source: Rystad Energy

Liquefaction capacity expansion is set to continue in 2020 and is expected to reach 24.35 MTPA in capacity additions. Freeport T2 (5.1 MTPA) started commercial deliveries in January 2020. Cameron LNG T2 (4.0 MTPA) produced its first LNG cargoes in late 2019, and the facilities are scheduled to start commercial deliveries in 2020. The ongoing site construction activities at Freeport LNG T3 (5.1 MTPA), Cameron LNG T3 (4 MTPA), Elba Island T4-T10 (1.75 MTPA) and Sengkang LNG T1 (0.5 MTPA)[2] are about to be completed and commercial operations can be expected by the end of 2020. In addition, Petronas FLNG Dua (1.5 MTPA) sailed away to the Rotan field in Malaysia in February 2020 and will start commercial deliveries 9 months later. In Russia, two mid-scale LNG plants, including Portovaya LNG T1 (1.5 MTPA) and Yamal LNG T4 (0.9 MTPA), are also aiming for commercial operation by the end of 2020. With those projects coming online, global liquefaction capacity is forecasted to further expand to 454.85 MTPA by the end of 2020.

2019 saw a record volume of sanctioned liquefaction projects, totaling 70.8 MTPA, compared to 21.5 MTPA in the previous year. Golden Pass LNG (15.6 MTPA) was sanctioned in February 2019, followed by the 12.9 MTPA Mozambique LNG (Area 1) FID in June 2019. Calcasieu Pass LNG (10 MTPA) and Arctic LNG 2 (19.8 MTPA) FIDs were announced in August and September 2019, respectively. Also, a few brownfield expansion plans received the greenlight for investment in 2019. Sabine Pass LNG, the first LNG export plant in service in the continental United States, took FID on its sixth train with a 4.5 MTPA capacity and NLNG reached FID on its 8 MTPA expansion plan in December 2019. The project includes a new 4.2 MTPA train and debottlenecking of existing facilities.

The record volume of sanctioned liquefaction projects is underpinned by the expectation of growing LNG demand globally, creating the need for additional liquefaction capacity. This will also lead to competition to secure EPC capacity, as project developers aim to enter the market by the mid-2020s in order to capture growing demand.

The United States continued to contribute significantly to LNG project sanctions in 2019, totaling 30.1 MTPA, thanks to the availability of abundant shale gas in the region. The African continent had 20.9 MTPA of liquefaction capacity sanctioned in 2019, driven by growing interest in commercialising the continent's rich gas resources. In East Africa, the sanctioning of Mozambique LNG (Area 1) is starting to change the role of Mozambique in global LNG supply. Currently, the market has no operational LNG facilities, but the sanctioning of Mozambique LNG (Area 1) in 2019 and Coral South FLNG in 2017, followed by a potential FID on Rovuma LNG (Area 4) in 2020 would allow Mozambique to emerge as the largest African LNG exporter. In West Africa, the 8 MTPA expansion project at NLNG reached FID at the end of 2019, after securing a 20-year gas supply deal, increasing NLNG's liquefaction capacity to 30 MTPA and reaffirming Nigeria's position as an important LNG hub. The sanctioning of Arctic LNG 2 shows growing interest in developing liquefaction facilities in the Arctic region, where projects are able to leverage abundant gas resources, geographic flexibility in exporting to both Europe and Asia, as well as take advantage of the climate for improved cooling efficiencies in the Arctic environment.

Long-term Sales and Purchase Agreements (SPAs) continued to play a key role in securing financing for certain LNG projects, as demonstrated by some of the new projects sanctioned in 2019. Mozambique LNG (Area 1) had close to 90% of its nameplate capacity under long-term SPAs at the time of FID. Calcasieu Pass LNG had signed 20-year SPAs with Shell, BP, Repsol, Edison, and a few other companies ahead of FID. The FID of Sabine Pass Train 6 was also underpinned by long-term offtake agreements with Petronas and Vitol, covering more than 40% of the new train's liquefaction capacity at the time of sanctioning.

However, as the global LNG market gets increasingly competitive and shorter-term contracts or spot deliveries become more common over time, LNG projects are taking more investment risks, taking FIDs without securing a significant number of long-term SPAs. Golden Pass LNG moved forward with FID in 2019, without announcing any long-term offtake contracts. Ocean LNG, a joint venture established by Qatar Petroleum and ExxonMobil, the two project owners, is responsible for marketing the produced LNG. The sanctioning of LNG Canada in 2018 was on a similar basis and the project was fully equity financed, rather than debt financing backed by long-term offtake agreements. Arctic LNG 2 reached FID with an expectation of equity partners offtaking LNG production proportionate to their ownership stakes, and the project may market a significant portion of production via spot deliveries.

Competition to secure long-term offtake contracts is also driving the development of small- to mid-scale LNG projects. Elba Island LNG bases its design on Moveable Modular Liquefaction System (MMLS) with a capacity of 0.25 MTPA per train. The required volume of long-term offtake to secure project financing is therefore significantly lower as compared to traditional large-scale LNG plants. Some projects also employ the concept of small- to mid-scale LNG trains and develop them in phases, depending on offtake sales. This method significantly reduces project investment risk. It also enables later phases to be financed by cash flow from earlier phases.

Portfolio contracts[3] offer flexibility for both suppliers and consumers. Under portfolio contracts, suppliers can send LNG cargoes to customers that bring the highest revenue while the buyers can diversify LNG sources, allocating volumes to destinations that offer the best economics. On the sell side, the percentage of portfolio volumes out of total contracted volumes globally has been on the rise. Portfolio volumes totaled 26% out of the volumes contracted between 2016 and 2019, compared to 20% between 2011 and 2015, and 10% between 2006 and 2010. On the buyer side, Shell, BP, Total, and Engie[4] have purchased the largest portfolio volumes without specifying the destinations of purchases. Japanese buyers have also shown interest in becoming portfolio players, as evidenced by redirecting excess volumes to other markets during periods of low domestic demand.

Currently, 907.4 MTPA of liquefaction capacity is in the pre-FID stage. Global liquefaction capacity could almost triple if all proposed projects materialise. The majority of the proposed capacity additions come from North America (599.6 MTPA), with 350.5 MTPA located in the United States, 221.8 MTPA in Canada and 27.4 MTPA in Mexico. Africa (93.3 MTPA), Asia Pacific (72.4 MTPA) and the Middle East (93.3 MTPA) follow North America, with significant proposed liquefaction capacity in the pipeline as well. 48.8 MTPA of liquefaction capacity is proposed in the rest of the world. However, not all of this planned capacity is needed and only the most competitive projects will move ahead.

Due to the low LNG prices in 2019, and into 2020 amid a global LNG supply surplus and uncertainties in the trade environment, some of the proposed projects are seeing slower progress towards FID. With the additional effect of COVID-19 on stock markets, many companies, including those in the energy industry, are struggling financially, further delaying progress of projects. However, the current LNG supply surplus situation could change if global LNG demand growth outpaces supply growth, which in turn would trigger new FIDs.

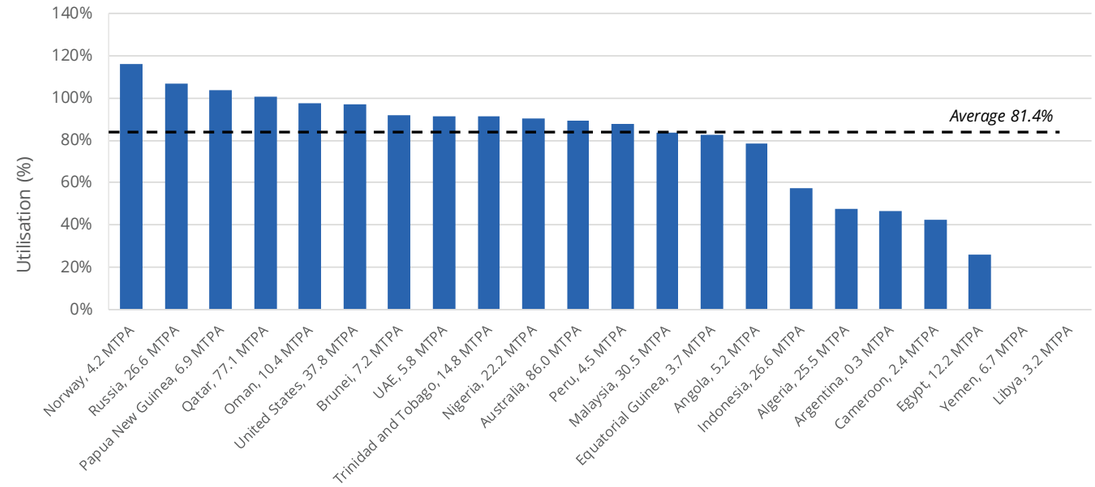
4.2. GLOBAL LIQUEFACTION CAPACITY AND UTILISATION

430.5 MTPA
Global Liquefaction Capacity, End of 2019

Global liquefaction capacity reached 430.5 MTPA at the end of 2019 and the utilisation rate was on average 81.4%[5].

10 out of 22 LNG exporting countries achieved utilisation rates of more than 90% in 2019, including Norway, Russia, Papua New Guinea, Qatar, Oman, the United States, Brunei, UAE, Trinidad and Tobago, and Nigeria.

Figure 4.2: Global Liquefaction Capacity Utilisation in 2019 (Capacity is Prorated)



Source: Rystad Energy, Refinitiv

The incremental supply of liquefaction capacity in 2019 was largely contributed by projects in the United States. Corpus Christi LNG T1-2 (9 MTPA), Cameron LNG T1 (4.0 MTPA), Freeport LNG T1 (5.1 MTPA), Sabine Pass T5 (4.5 MTPA) and Elba Island T1-3 (0.75 MTPA) collectively contributed 55% of the global capacity additions.

[2] Site construction at Sengkang LNG is close to completion. However, the project may face delays, subject to local authorities' approval on land use.

[3] Portfolio contracts are contracts that don't specify origins of supply or destinations of delivery. Thus, the seller can decide on where to supply each cargo from, and the buyer can decide where each cargo will be delivered.

[4] Engie's LNG portfolio was subsequently acquired by Total in 2018 (the deal was announced in 2017).

[5] The average utilisation excludes Yemen and Libya, which did not produce any LNG in 2019. Utilisation is calculated on a prorated basis, depending on when the plants are commissioned. Only operational capacity (including liquefaction capacity of Marsa El Brega LNG, Bontang LNG Train C-D, Yemen LNG and Damietta LNG) is included.