

# 2020 Gas Market Outlook

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**The Institute of Energy Economics, Japan**

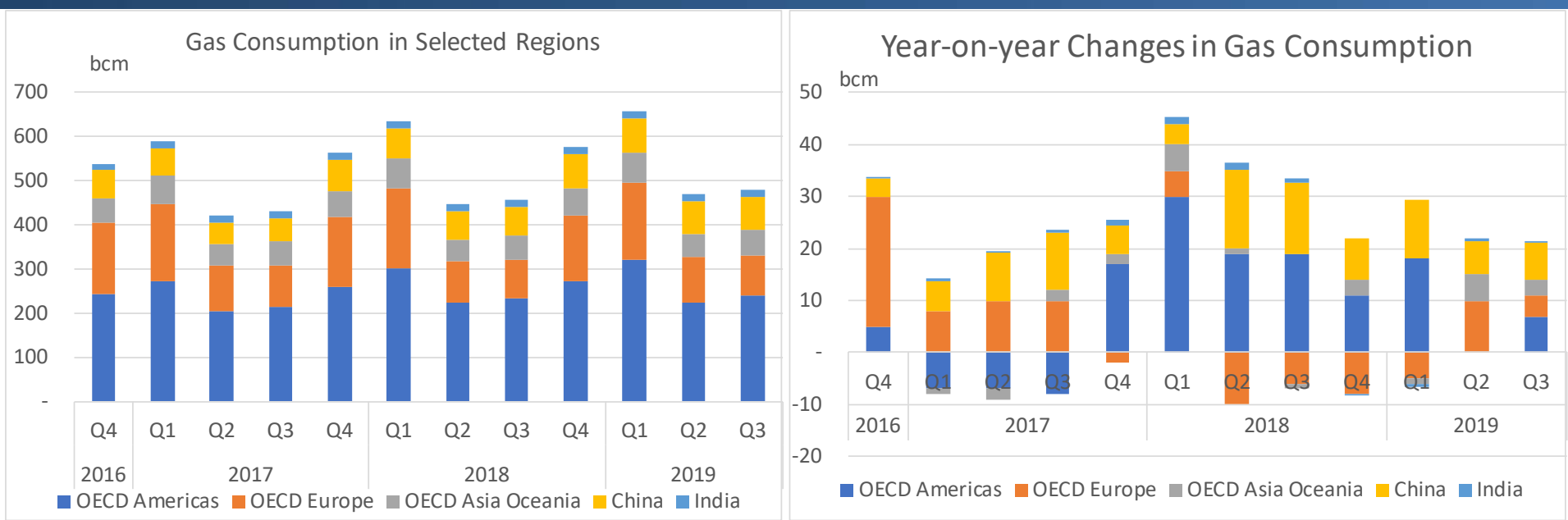
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# Executive Summary

- ✓ Japan's average LNG import price is expected to go down to USD 8.8 - 9.0 per million Btu in 2020, from USD 10 estimated for 2019.
- ✓ The global LNG market is expected to expand to 370 million tonnes in 2020, thanks to significant increases in supply capacity.
- ✓ The global LNG market is estimated to grow more than 10% in 2019, while the share of four major importing markets in Northeast Asia in the global total has shrunk to 55% from 62% in 2018, as the region has been importing almost the same volumes of LNG in 2019 as it did one year earlier.
- ✓ A major portion of the expanded supply of LNG has been directed into Europe where ample underground storage capacity is located. As spot LNG prices stay in the lowest level in the history, the gap between them and long-term contract prices has been the widest ever in Northeast Asia. With stronger influences of gas hub prices in Europe and the United States over LNG prices, underpinned by the increasing LNG imports in Europe and increasing LNG exports from the United States, global interaction of LNG prices in different regions has been more apparent.
- ✓ In 2019, final investment decisions (FIDs) representing 71 million tonnes of annual production capacity were announced, with many additional projects approaching the milestone.
- ✓ Competition has been intensified in big city areas in Japan's city-gas market, especially in the Kanto region, two years after the retail market was opened up.
- ✓ In order to effectively utilise expected flexible LNG supply sources, Japanese companies and government are expected to contribute jointly to emerging market development, infrastructure investment, and optimization of transportation.

# Natural Gas Consumption in Major Regions

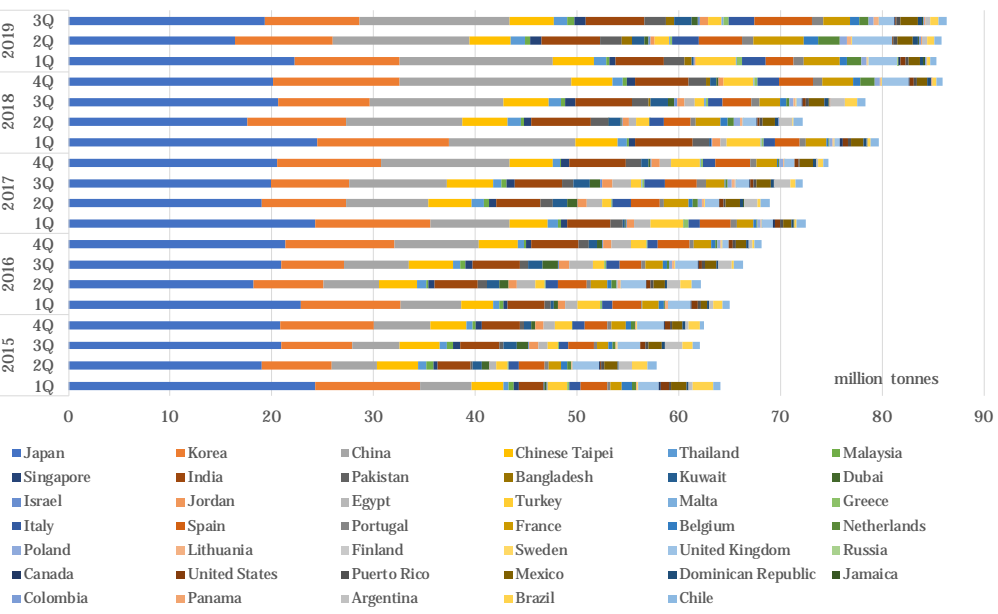


(Source) Compiled by the author based on data of IEA "Monthly Gas Statistics", China's NDRC and India's PPAC

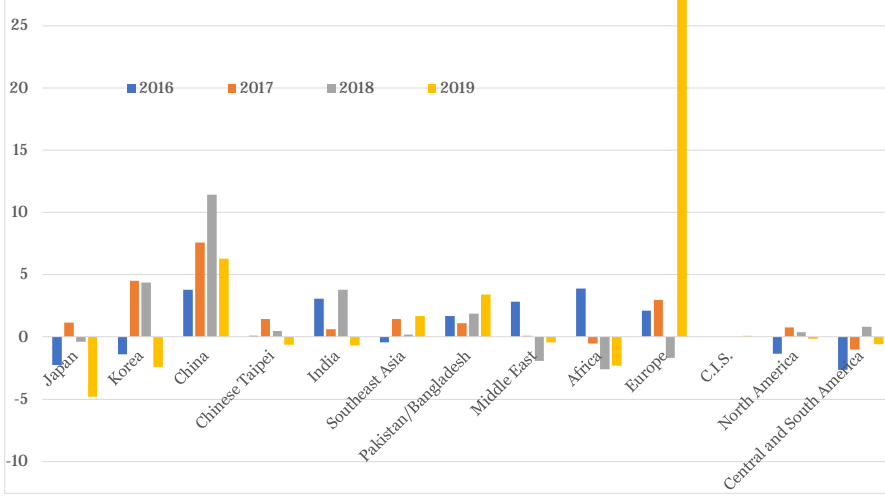
- The combined natural gas consumption in the OECD countries, China and India - representing more than half of global total - grew by 112 bcm or 6% - higher than global average - year-on-year to 2.1 tcm in 2018, and by 66 bcm or 4% from the same period in 2018 during the first three quarters of 2019.
- OECD Americas (+25 bcm or +3%) and China (+25 bcm or +10%) continue driving further demand growth in 2019, while OECD Europe returned to growth in the second quarter.
- However, the growth rates have been slowed in OECD Americas and China.
- Southeast and South Asian countries also increase gas consumption modestly.

# LNG Imports Surge in Europe Thanks to Expansion of Global Production

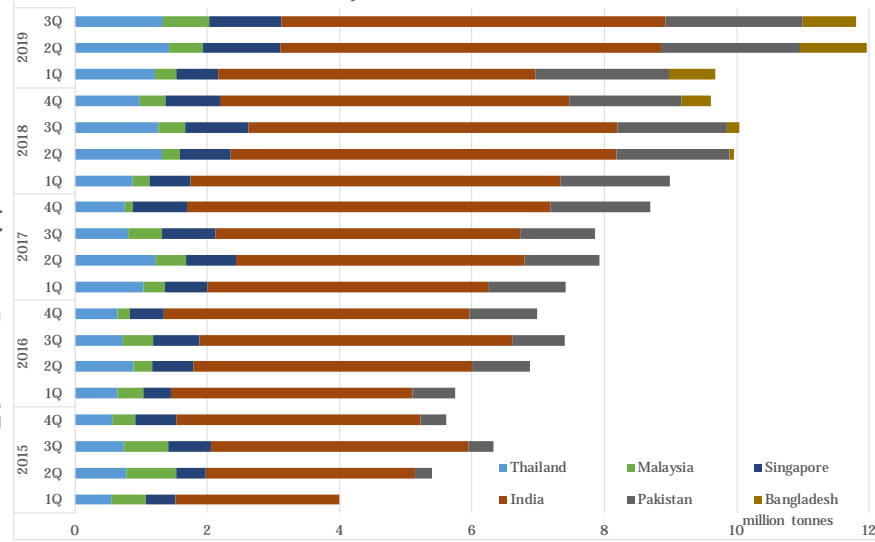
Global LNG Imports Driven by Production Expansion



Changes of LNG Imports in the First Nine Months of the Year



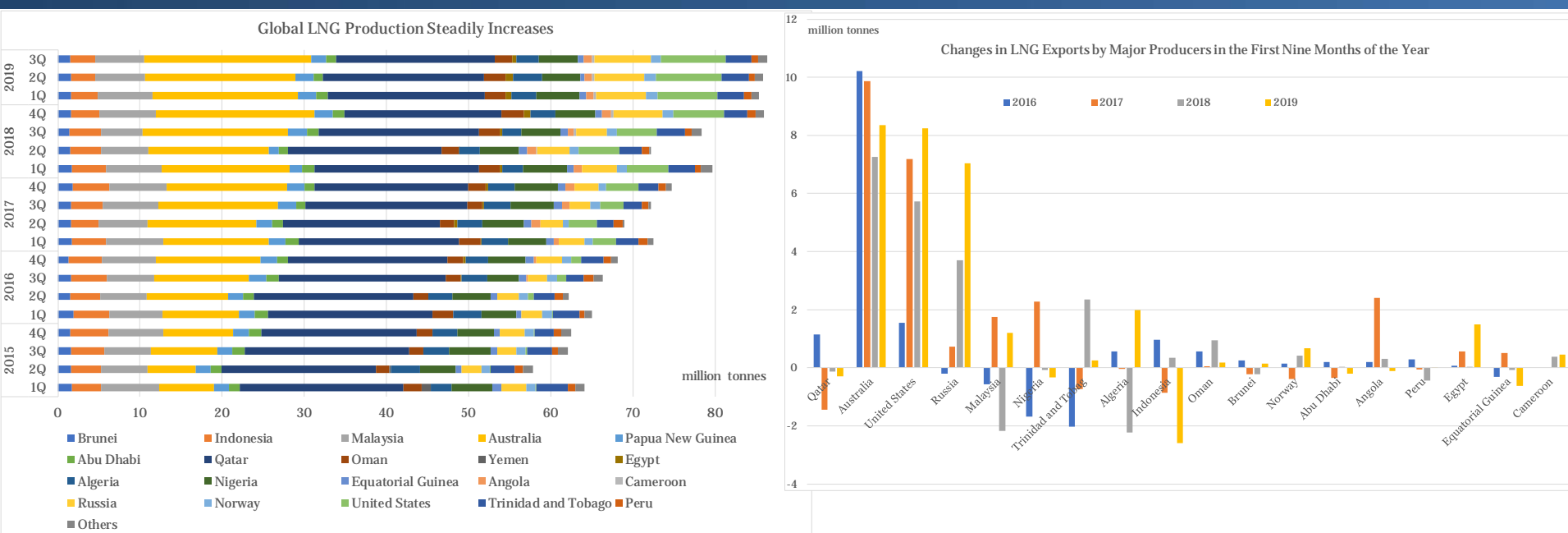
LNG Imports in Southeast and South Asia



(Source) Compiled by the author based on Cedigaz LNG Service data

- Global LNG imports grew by 12% to 260 million tonnes during the first nine months of 2019
- China's LNG imports grew by 15% during the first ten months of 2019
- Europe's LNG imports grew by 83% to surpass 60 million tonnes during the first nine months of 2019
- Southeast and South Asia's emerging LNG importers have increased volumes significantly in recent years, increasing by 25% or 1.7 million tonnes and by 65% or 3.4 million tonnes during the first three quarters of 2019

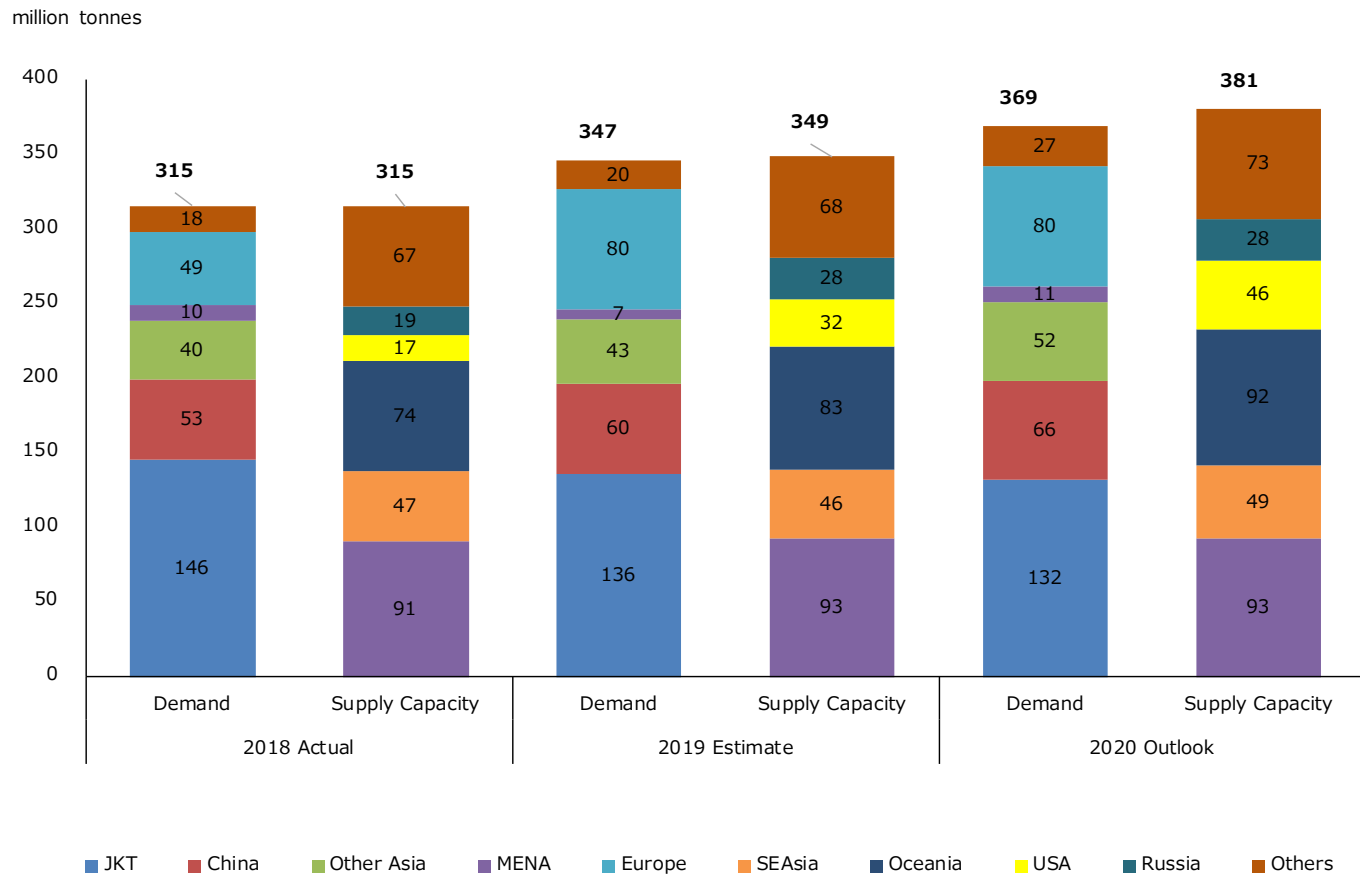
# LNG Production Increases in Australia, the United States and Russia



(Source) Compiled by the author based on Cedigaz LNG Service data

- Both Australia and the United States increased LNG exports by more than 8 million tonnes each, while Russia increased its by 7 million tonnes, during the first nine months of 2019.
- While Australia came very close to the world top LNG exporter position held by Qatar (equivalent to 77 million tonnes on an annualized basis), both the United States and Russia exported 50% more LNG than they did in the same period of 2018.
- Egypt and Algeria, as well, increased their LNG exports, by 230% (or 1.5 million tonnes) and 27% (2 million tonnes), respectively.

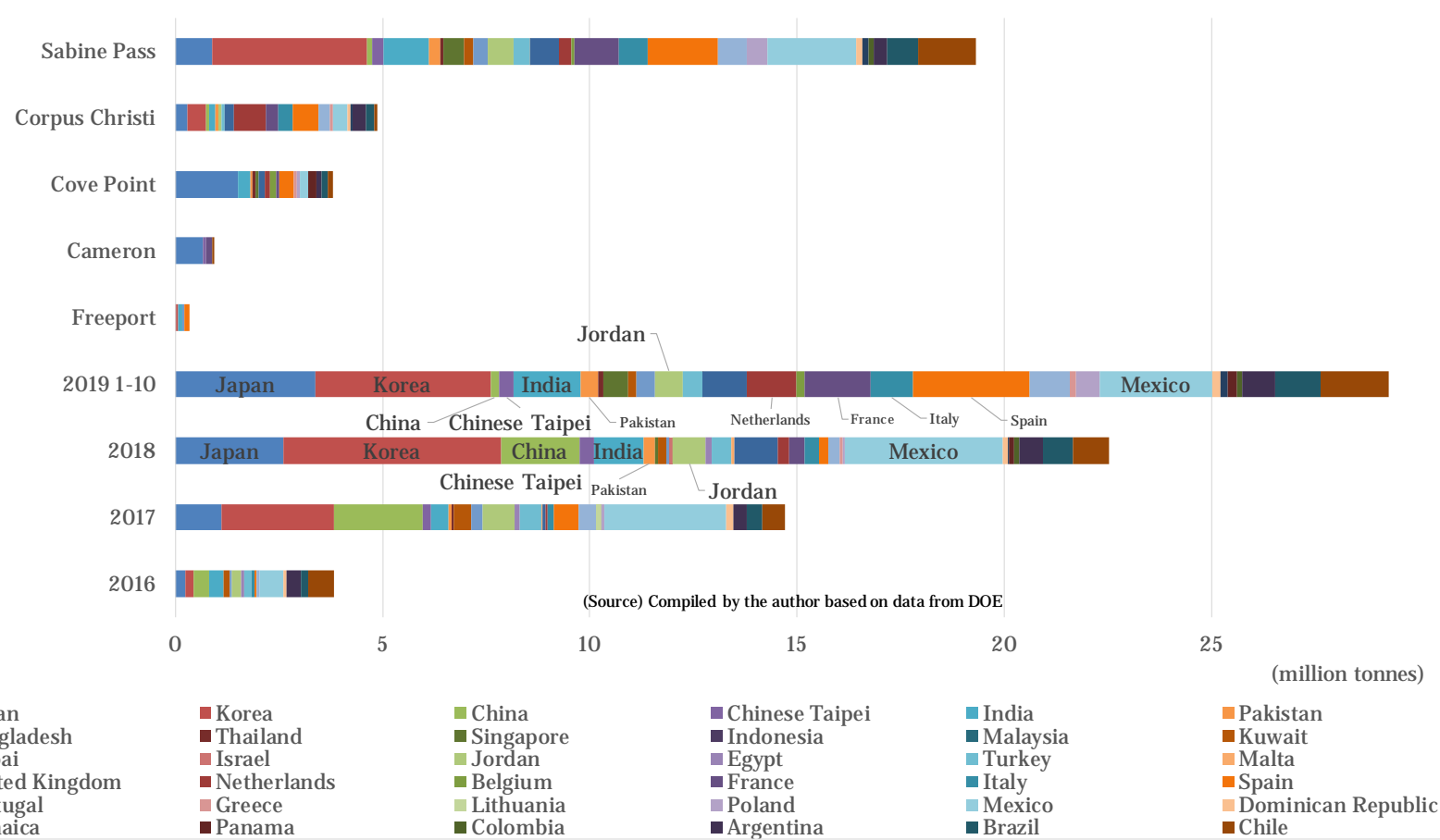
# LNG Demand and Supply Outlook



- The global LNG demand is expected to grow by 6% - 7% to 370 million tonnes in 2020, from estimated 350 million tonnes in 2019.
- The global LNG supply capacity in the new year is expected to be more than 380 million tonnes even after assuming lower utilization rates.
- Growth is expected to be led by China and Emerging Asia on the demand side and by the United States on the supply side, respectively. Europe is expected to maintain its healthy appetite.

# In Parallel with Outlet Diversification, Over Half of LNG Exports from the United States Come to Asia

LNG Export in Bulk from the United States by Project (Ten Months in 2019) (upper) and Yearly (down)



(Source) Compiled by the author based on data from DOE

- LNG exports amounted 29.28 million tonnes during the first ten months of 2019, representing a 65% increase from one year earlier.
- Cargoes have already reached 36 countries and regions in just first four years of LNG exports.
- New LNG export facilities have started up in addition to the three projects in operation shipping out bulk exports to Japan.

# All Active - LNG Exports, Project Commissioning, Investment Decisions, and Permitting - in the United States

Starting Up	Cameron, Freeport, Elba Island
FIDs	Golden Pass, Sabine Pass (T6), Calcasieu Pass
FERC Approval (February - September 2019)	Calcasieu Pass, Driftwood, Port Arthur, Freeport (T4), Gulf LNG Pascagoula, Eagle LNG Jacksonville, Plaquemines
(November 2019)	Corpus Christi Stage 3, Texas LNG Brownsville, Annova LNG, Rio Grande
Approved yet no FID	Lake Charles, Magnolia, Delfin LNG Deepwater Port
FERC Administrative issues	By filling a vacant seas and a planned Houston office, speeding up approvals

- The annual LNG export capacity in operation in the United States is expected to be 48 million tonnes by the end of 2019 and 66 million tonnes by the end of 2020.
- The total capacity is expected to grow further, surpassing 100 million tonnes per year when the facilities in which final investment decisions (FIDs) have been announced are completed.
- Those facilities which have been approved by FERC but FIDs have not been made on could add further 160 million tonnes per year of capacity.



# Diversifying Business Models of LNG Export in the United States

- SPA Model - Project company directly sells LNG volumes

- While FOB deals give substantial flexibility to buyers, there have been some DES deals lately.
- A unified feedgas arrangement provides the operator an advantage of simplified operation.
- IPM (Integrated Production Marketing offered to gas producers)

The LNG project operator buys feedgas from a producer and pays a price netted back from the international market.

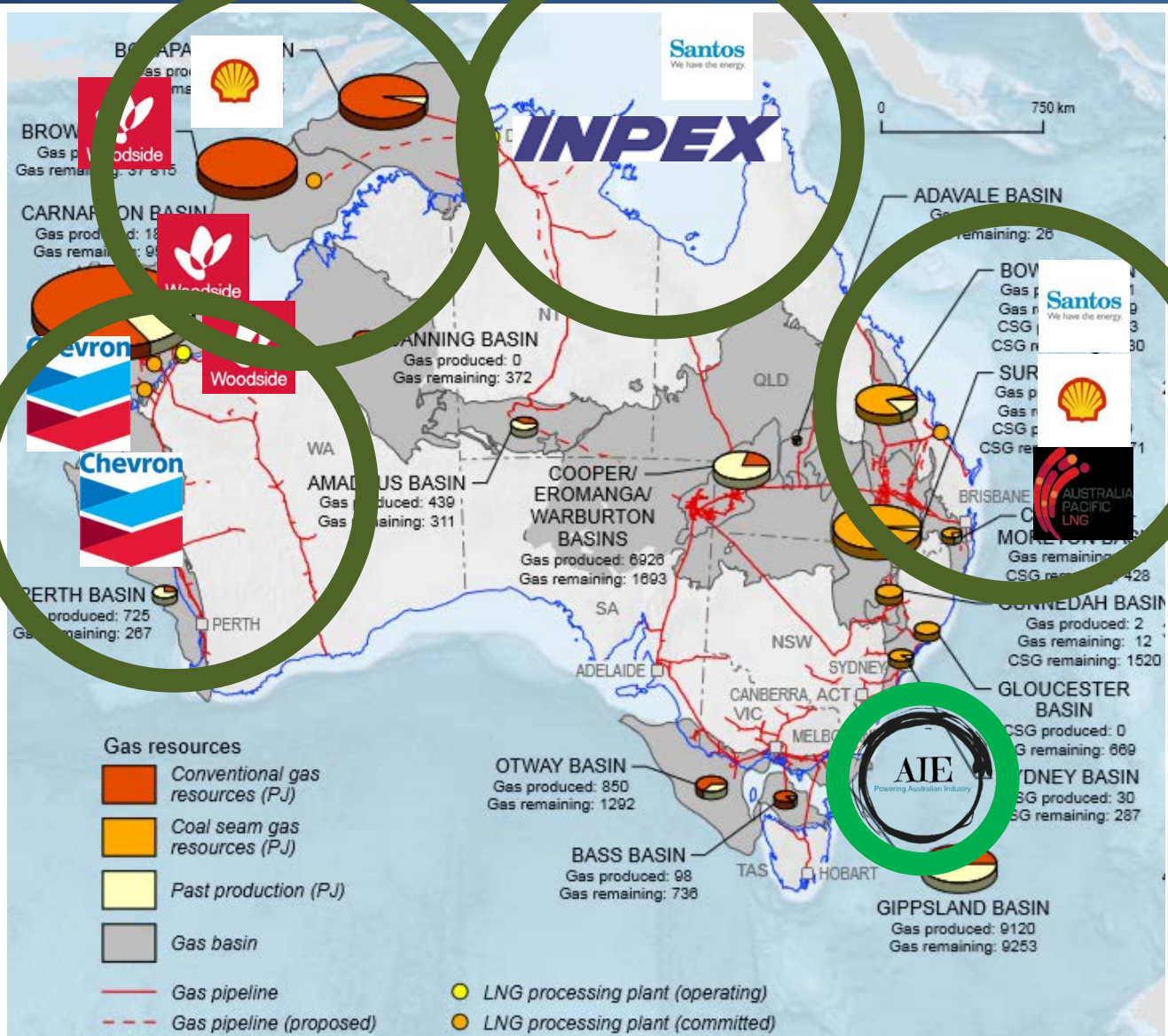
- Tolling - Liquefaction service arrangement, in which a capacity holder is responsible to sell LNG volumes and procure feedgas supply

- Some Japanese trading houses and utility companies have already participated in such arrangements.
- While the model provides a capacity holder with significant operational flexibility, it also requires a certain level of expertise to operate in the dynamic gas and LNG markets.

- Equity Model - Project leading company directly invests in the project entirely on the company's balance sheet, or accepts equity injections from other companies including other developers or LNG buyers, with LNG lifting and sales commitments distributed based on equity holdings

- The largest LNG players finance a new project entirely on their balance sheets.
- New entrants in LNG liquefaction projects try to entice international majors and established LNG buyers into participating in the new projects.
- Established LNG players incorporate volumes from new projects into their global LNG portfolios.
- LNG buyers may have additional preferential purchasing allocations from the project leading company in addition to volumes based on the buyers' own equity participation.

# Australia Continues Increasing LNG Export

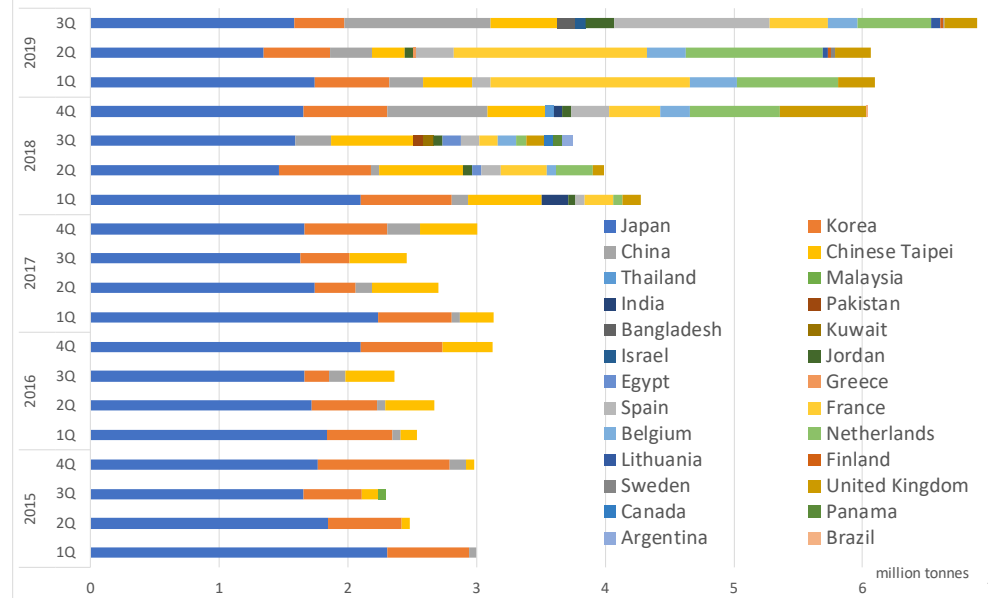


- Australia exported 64 million tonnes of LNG during the first ten months of 2019, increasing by 14% year-on-year.
- The Ichthys project since late 2018 and the Prelude FLNG since June 2019 ramp up production.
- Notable developments have been reported toward new generation LNG projects, including renewed project sponsor formations and additional feedgas arrangements to existing LNG production facilities.
- In the meantime, the country has several LNG importing projects in the Eastern regions.

(Sources) Australian Energy Resource Assessment 2018, Department of Industry, Australian Government

# Russia Increases LNG Exports and Advances Export Pipeline Projects

Russia's LNG Exports by Destination



Power of Siberia Pipeline Starting Operation



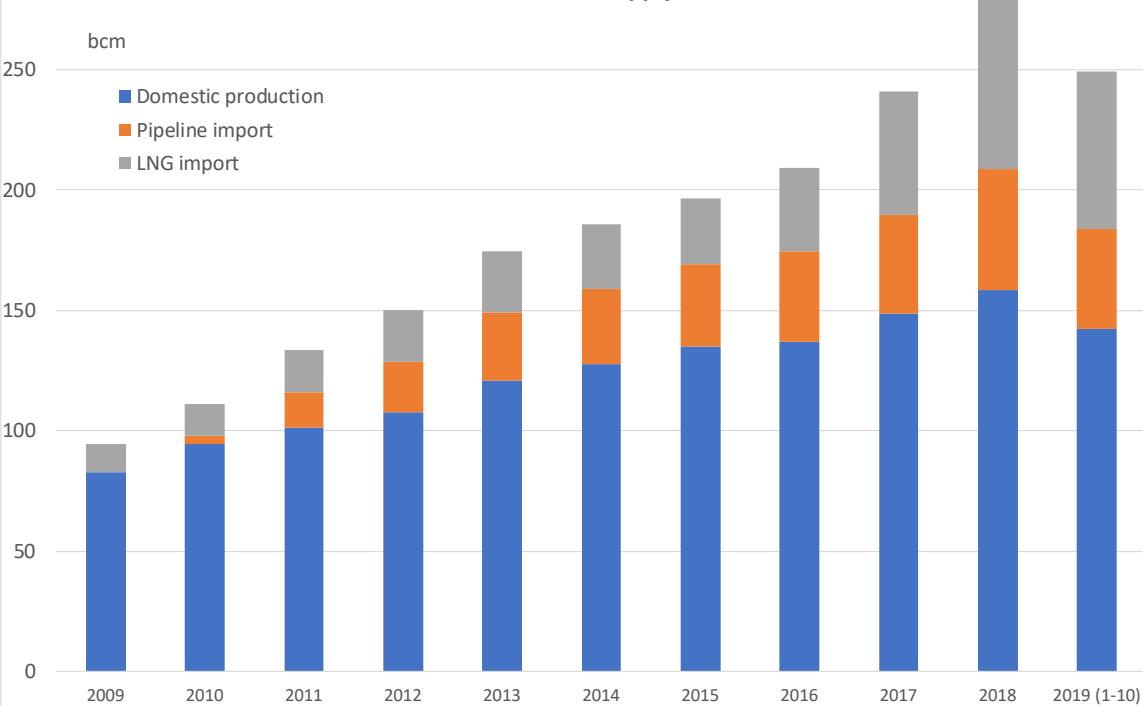
(Source) Compiled by the author based on Cedigaz LNG Service data

(Source) Gazprom website

- New pipeline projects to supply China and Turkey are starting operations, while the Nord Stream 2 to supply Germany has been slipped into 2020.
- The Arctic LNG 2 led by Novatek has advanced with participation of Japanese players to commence operation in 2023.
- The Yamal LNG project also led by Novatek is in competition in Europe against pipeline gas from Gazprom, who used to monopolize Russia's gas export.

# China Continues Expanding Natural Gas Market at Slower Rates than Previous Years

China's Gas Supply



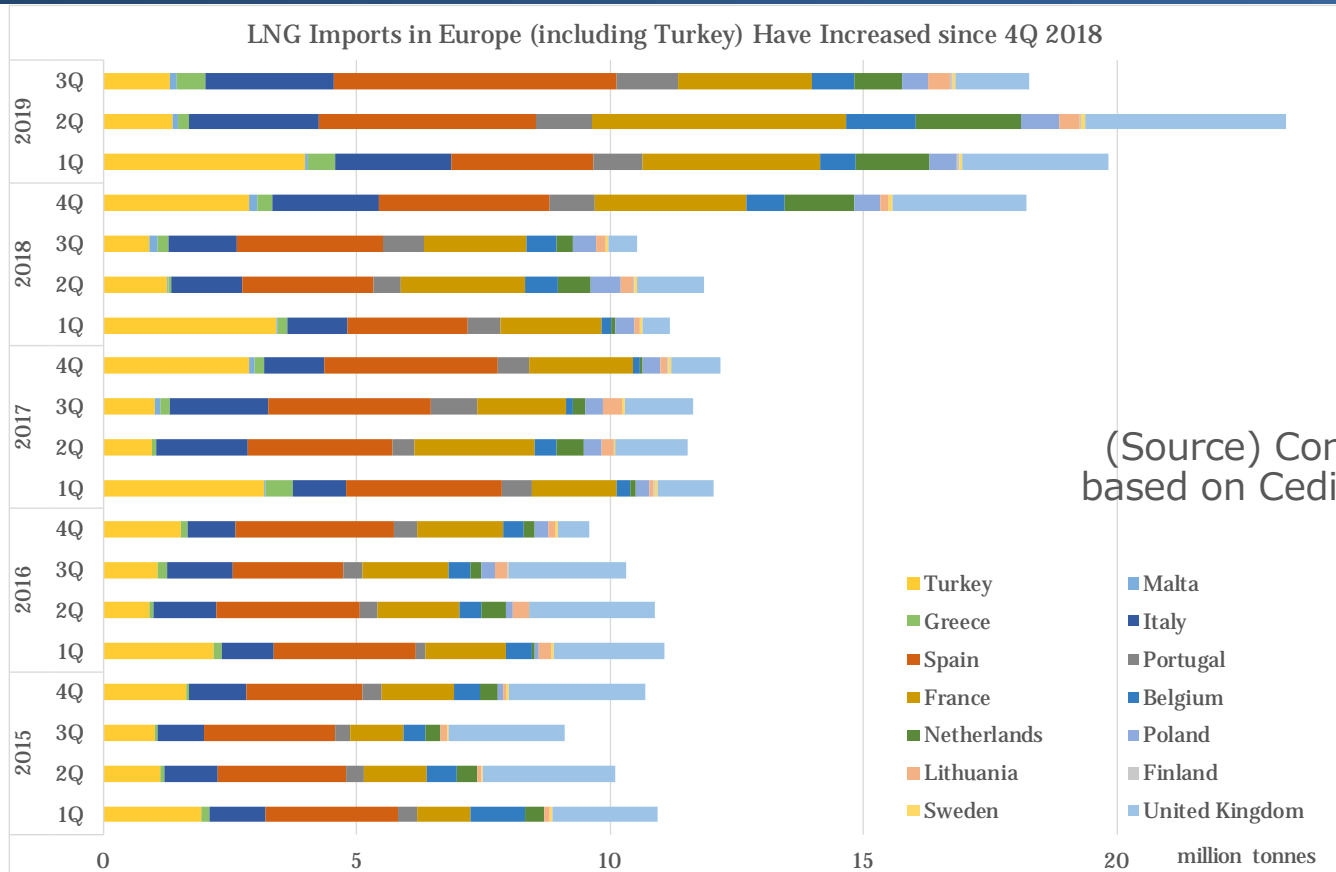
(Source) compiled by the author based on data from NDRC and customs statistics

Terminal	Owner	Operation	Reception 2018
Shenzhen Dapeng	CNOOC	2006	6.22
Putian	CNOOC	2009	3.35
Shanghai Yangshan	CNOOC	2009	4.15
Rudong	CNPC	2011	6.58
Dalian	CNPC	2012	3.18
Ningbo	CNOOC	2012	5.55
Zhuhai	CNOOC	2013	2.33
Tangshan	CNPC	2013	5.49
Tianjin FSRU	CNOOC	2013	3.64
Yangpu	CNOOC	2014	0.55
Qingdao	SINOPEC	2014	4.95
Beihai	SINOPEC	2016	1.74
Shenzhen Dachan	CNPC	2014	0.13
Dongguan	JIUFENG	2016	0.76
Lvsi	Guanghai	2017	0.79
Yuedong	CNOOC	2017	0.80
Tianjin	SINOPEC	2018	2.92
Shenzhen Diefu	CNOOC	2018	0.39
Zhoushan	ENN	2018	0.26
Fangchenggang	CNOOC	2019	

LNG Import Terminals and Owners. Volumes in million tonnes

- China's natural gas production and consumption both increased by 10% year-on-year during the first ten months of 2019 to 142.3 bcm and 246.3 bcm, respectively, although the growth rates were not as high as those in the last two years.
- During the same period, the country imported 47.70 million tonnes of LNG, 6.09 million tonnes or 15% more than it did one year earlier.
- China has 21 terminals in operation with total capacity 68 million tonnes per year: 34 million tonnes by CNOOC, 19 million tonnes by CNPC, and 9 million tonnes by SINOPEC. Additional 70 million tonnes are planned and proposed.

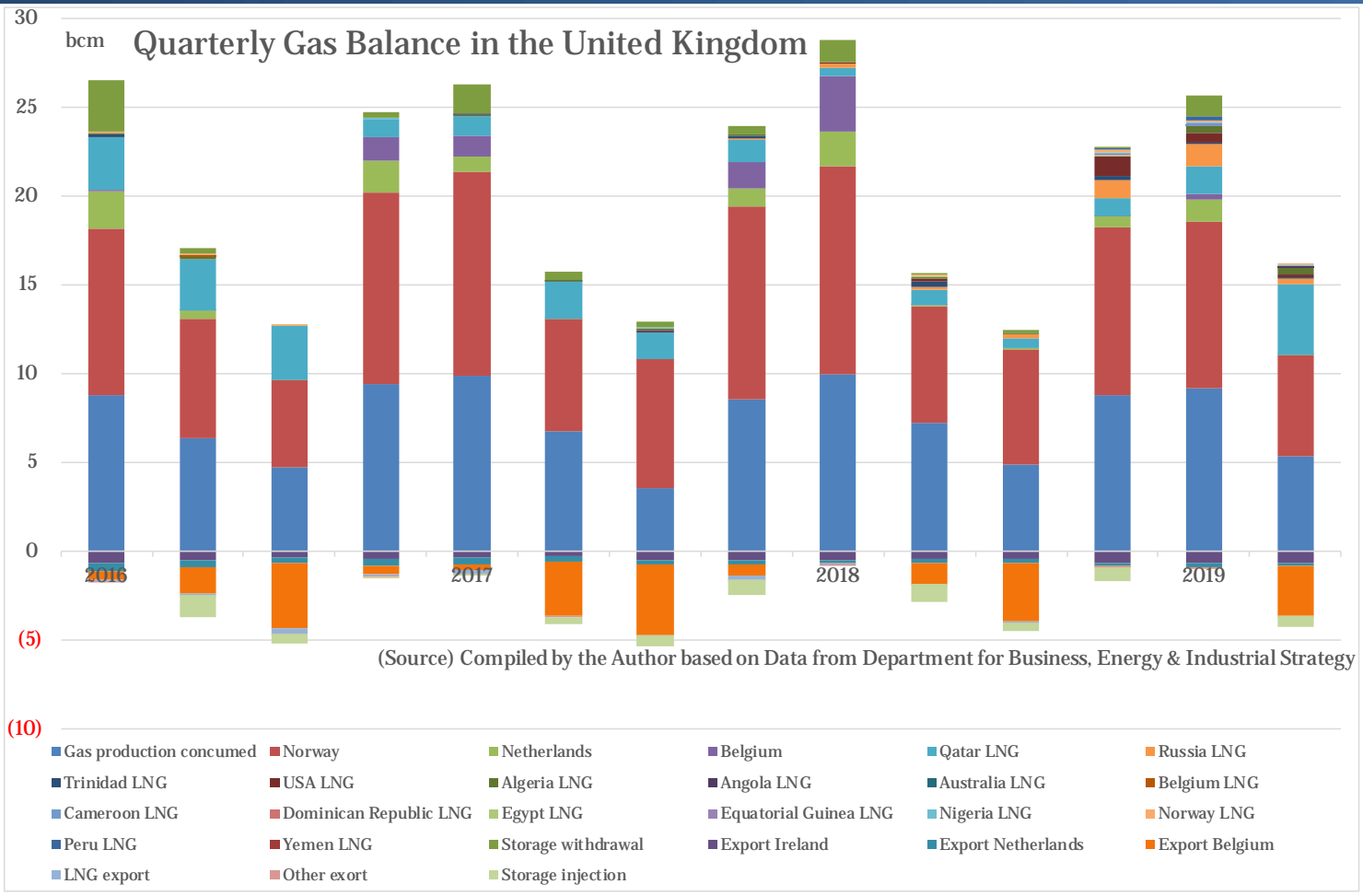
# Europe Increases Natural Gas Demand and Imports Significantly More LNG



(Source) Compiled by the author based on Cedigaz LNG Service data

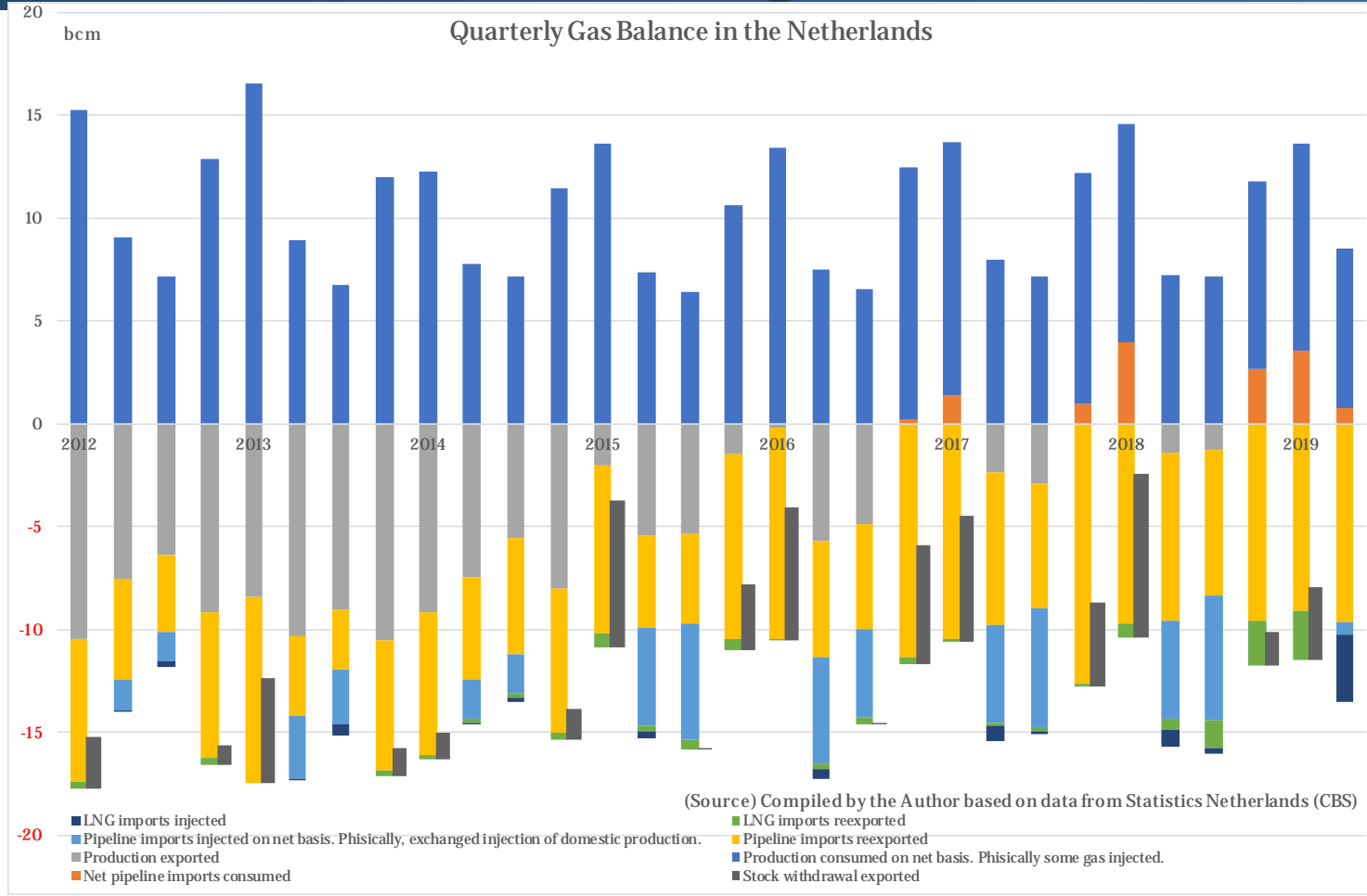
- Natural gas consumption increased by 2% during the first three quarters of 2019 year-on-year due to a shift from coal caused by commodity and carbon price advantages. As domestic gas production decreases, LNG imports have surged.
- The inventory in European underground gas storage facilities at the end of October was equivalent to 71 million tonnes of LNG, 8.7 million tonnes or 14% larger than one year earlier. It represented 98% of the total working underground gas storage capacity, significantly higher than 87% one year earlier and the highest in the history of the storage statistics.

# Dependence on Gas Imports Went Up to Over Half of Domestic Demand During the Last Ten Years in the United Kingdom



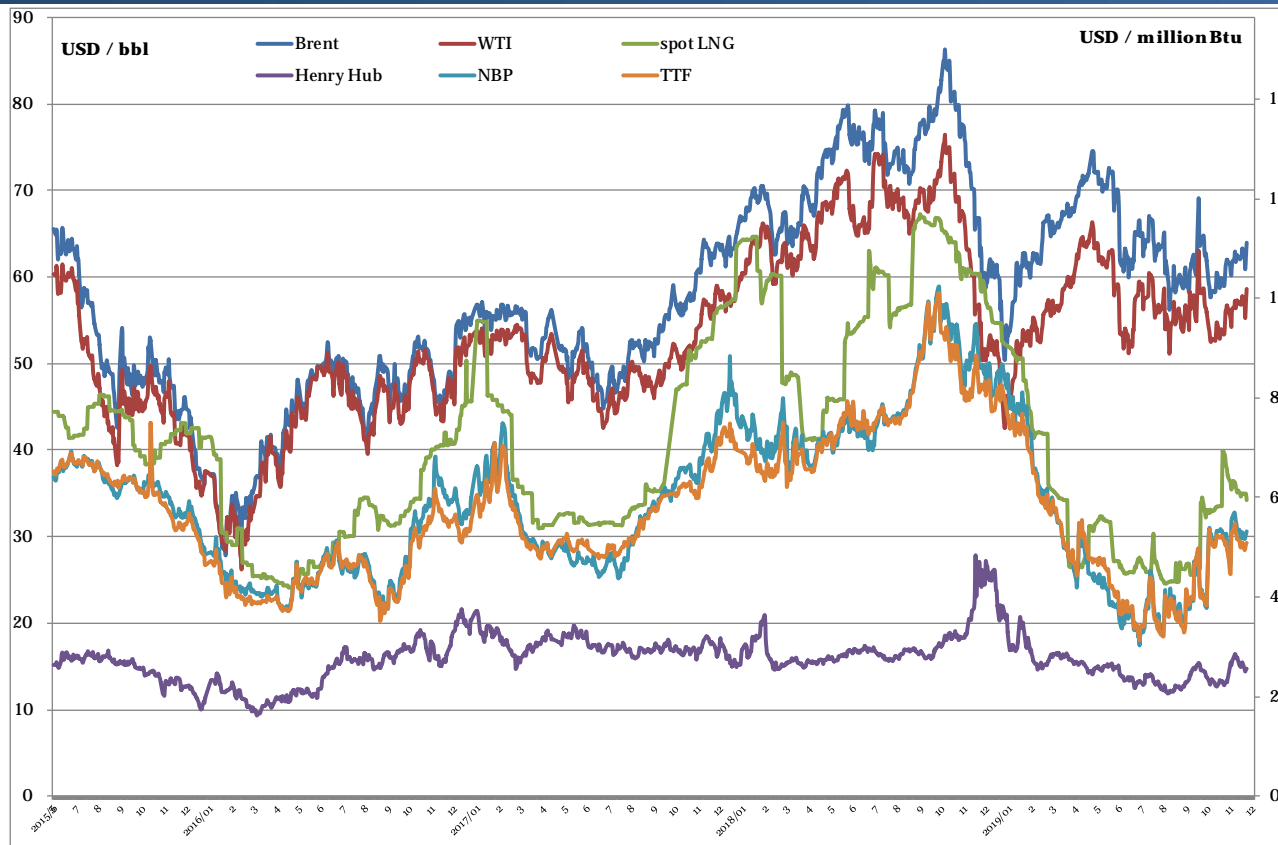
- Dependence on gas imports went up from one-third to more than half of domestic demand during the last ten years in the United Kingdom, one of the largest gas markets in Europe. However, more than half of the imports comes Norway via pipeline.
- During the last year of LNG expansion, imports of LNG from Qatar and Russia increased significantly. In summer, however, the United States continues exporting gas to the Continent via pipeline.

# The Netherlands Decreases Gas Production, While It Continues Moving Gas Volumes Around



- The largest gas producing country in Europe is expected to decrease gas production. The country has imported gas via pipeline for many years, enhancing liquidity beyond the country's own gas consumption, by increasing gas exports and storage utilisation.
- While the country has seen net gas importing quarters since 2017, it maintains its position as the main gas transportation hub through pipeline gas imports, exports and storage. The increasing LNG imports make TTF more influential in the global LNG market.

# A Significant Gap Between Spot LNG and Crude Oil Prices, as well as Crude Linked LNG prices

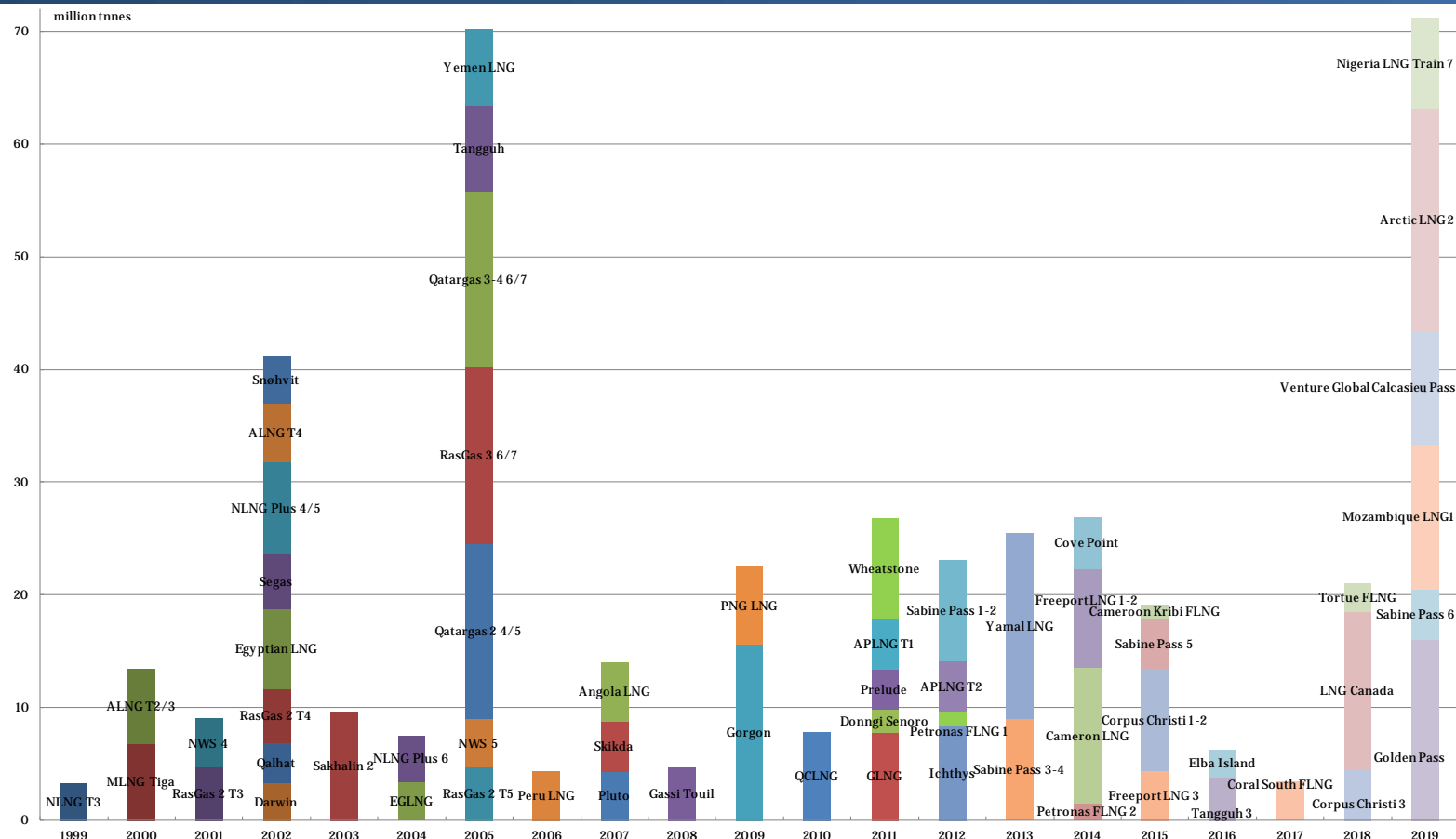


(Source) Compiled by the author based on data from exchange places

- Spot LNG prices in Asia (Assessed prices and those published by METI) have moved in a range between European gas hub and crude oil equivalent prices.
- Spot LNG prices in Asia came close to the bottom of this range in 2019 and were about half of average import LNG prices in the second half of 2019.
- Better terms and conditions of LNG sales and purchase contracts are desired to take advantage of the short-term LNG market.



# Investment Decisions Have Been Made on Significant LNG Export Capacity in 2019



(Source) Compiled by the author based on company announcements

- In 2019, final investment decisions (FIDs) representing 71 million tonnes of annual production capacity - three in the United States, and one each in Mozambique, Russia, and Nigeria - were announced
- Many additional projects are apparently approaching an investment decision, including four ones in the United States that were approved for construction in November. Most of them are expected to make investment decisions only in 2020 or later.

# Competition Intensifies in Japan's City-Gas Retail Market

**Customer Switching (October 2019)**

- Switching City-Gas
- Switching Electric Power

Chugoku Electric Power has lost about 0.53 million customers. But Neither city-gas nor electric power companies has not entered the other's markets yet, but try to enhance their customer services.

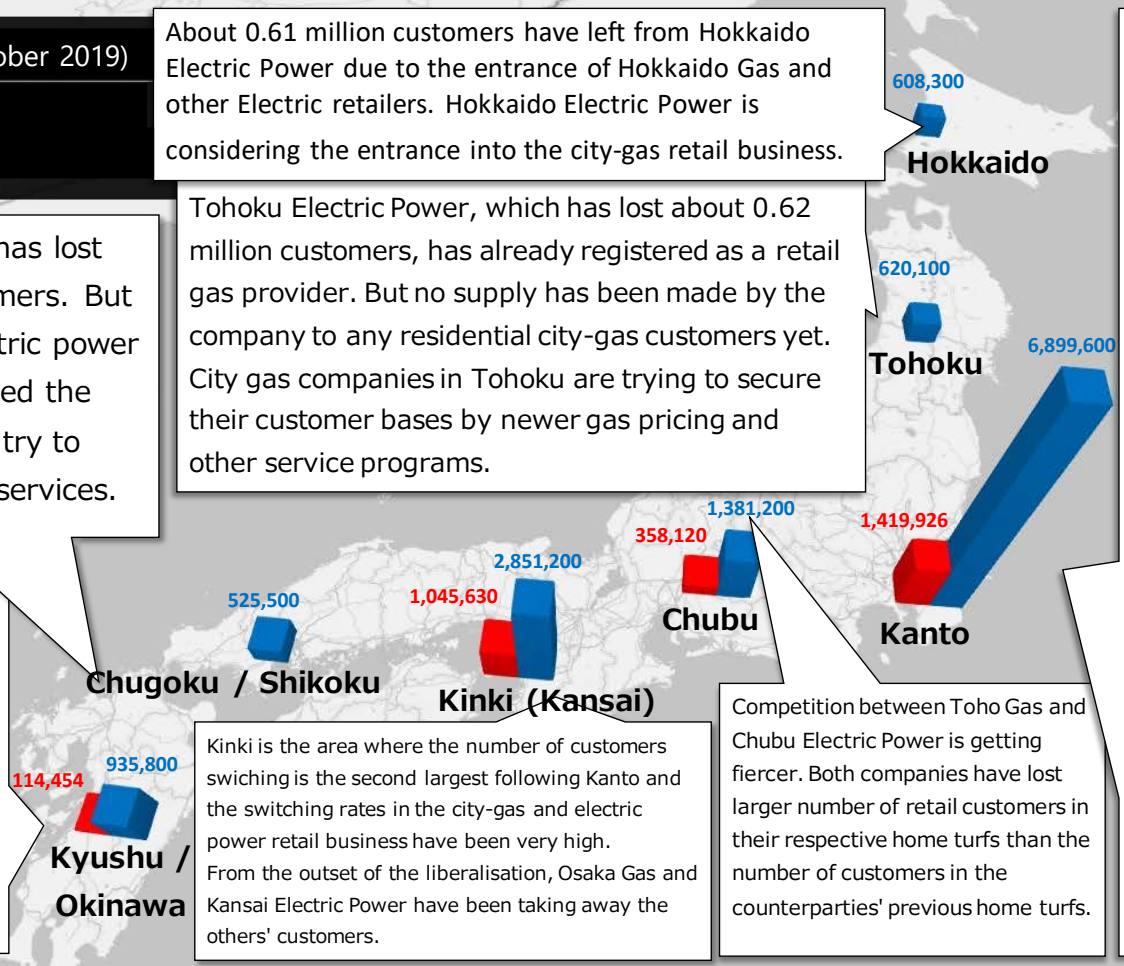
Both of Saibu Gas and Kyushu Electric Power have lost about 10% of their own customers. Saibu Gas plans to diversify the business and build several core profitable sectors.

About 0.61 million customers have left from Hokkaido Electric Power due to the entrance of Hokkaido Gas and other Electric retailers. Hokkaido Electric Power is considering the entrance into the city-gas retail business.

Tohoku Electric Power, which has lost about 0.62 million customers, has already registered as a retail gas provider. But no supply has been made by the company to any residential city-gas customers yet. City gas companies in Tohoku are trying to secure their customer bases by newer gas pricing and other service programs.

Kinki is the area where the number of customers switching is the second largest following Kanto and the switching rates in the city-gas and electric power retail business have been very high. From the outset of the liberalisation, Osaka Gas and Kansai Electric Power have been taking away the others' customers.

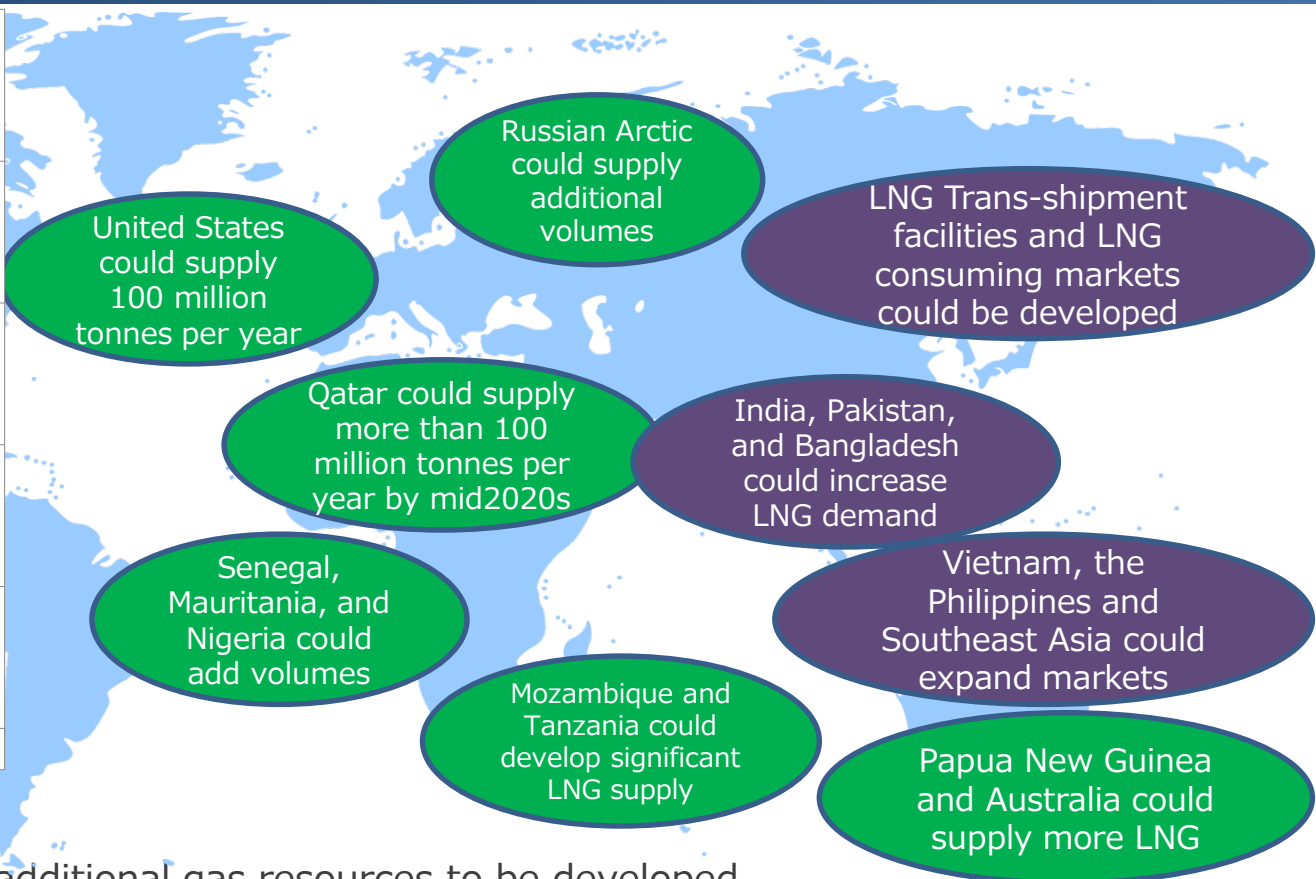
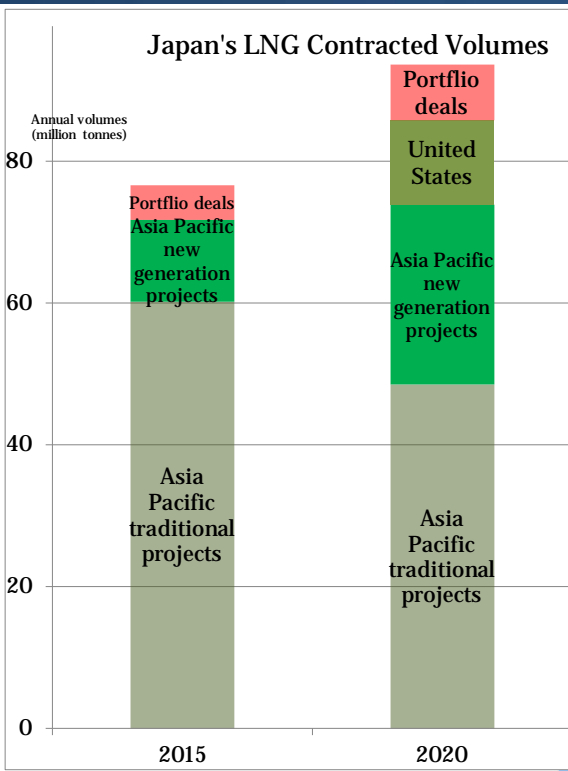
Kanto is the area where the largest number of customers have switched their city-gas and electric retail providers. Especially, the number of customers switching city-gas has sharply increased in a year and surpassed the number in Kinki. TEPCO EP, NIPPON GAS and Tokyo Energy Alliance in January 2019 announced that the number of their city-gas customers had reached 1 million and they are trying to reach 2 million by end of March 2020. On the other hand, Tokyo Gas also announced in August 2019 that the number of its electric power retail customers had reached 2 million.



Competition between Toho Gas and Chubu Electric Power is getting fiercer. Both companies have lost larger number of retail customers in their respective home turfs than the number of customers in the counterparties' previous home turfs.

- The number of customers switching retail suppliers in Japan's city-gas market has doubled during the last year to reach 12% of the total in the country. In the Kanto region, in particular, the number has surpassed 1.5 million or 12% of the total retail customers there.
- In the electric power retail market, the switching rates have reached 22% in the country and 30% in Kanto.

# As Greater Supply Flexibility is Expected, More Investment is Required in Downstream Facilities



- The world has significant additional gas resources to be developed.
- To effectively utilise expected flexible LNG supply sources, more infrastructure investment is required in such facilities as LNG trans-shipment terminals, LNG FSRU receiving terminals, and LNG bunkering stations, to which Japanese companies and government are expected to contribute jointly.
- So far in 2019, definitive and basic LNG sales agreements have been concluded for 30 million tonnes per year in total in the world, with no destination restrictions attached.