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Gas Market Outlook

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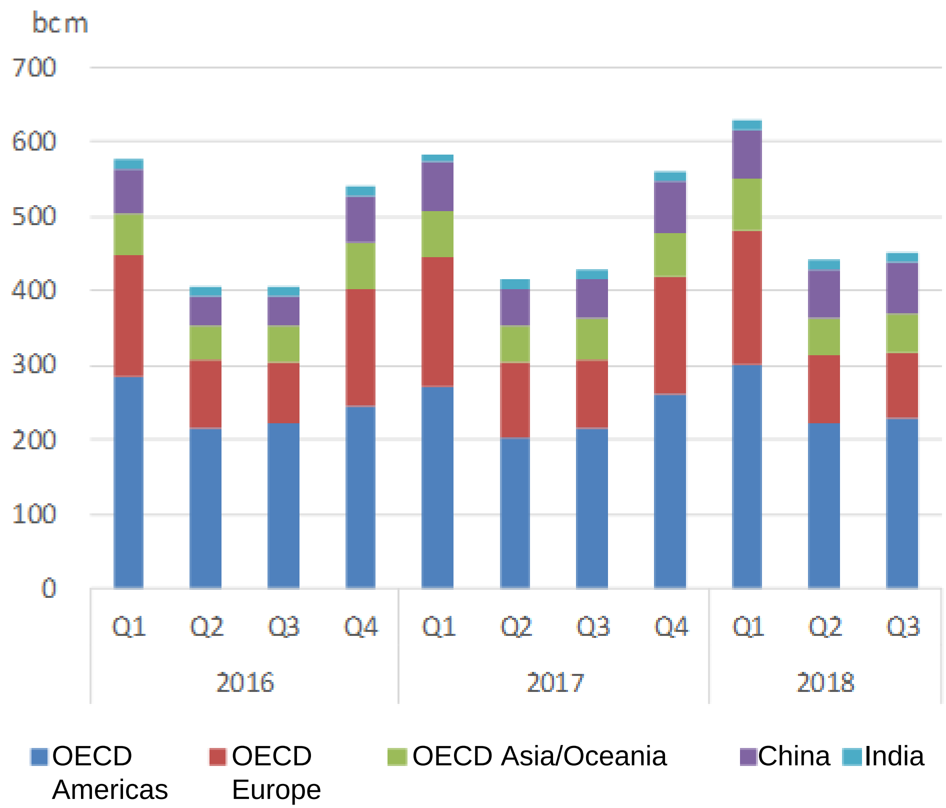
Points of the report

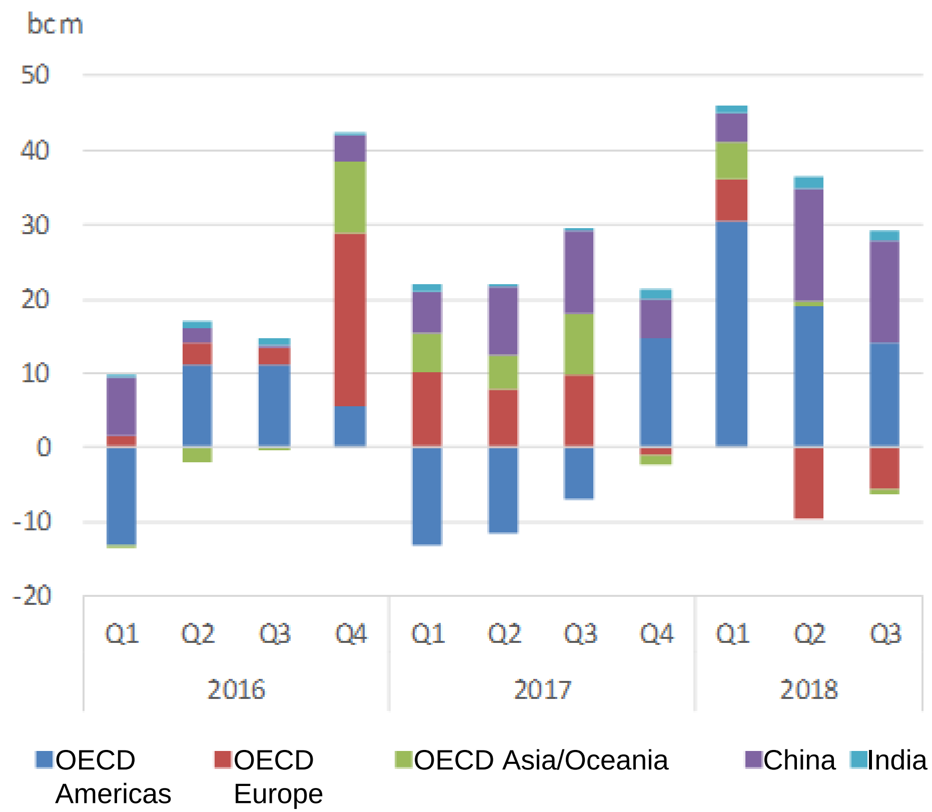
- ✓ Global LNG demand in 2019 will total 338 million tonnes (accounting for 12% of natural gas demand) against supply capacity at 344 million tonnes. As supply capacity increases faster than demand, the supply-demand balance will ease in the year.
- ✓ The average price for LNG imports into Japan in 2019 will almost level off from $10.5/MMBtu in 2018 to $10.2-11.4/MMBtu. Though depending on weather factors such as cold snaps, spot LNG prices for Northeast Asia will tend to slip below average import prices.
- ✓ Although LNG market liquidity has improved as indicated by growing spot transactions, it may take more time for any pricing benchmark to be developed. To ease destination clause restrictions, Japanese competition policy authorities could cooperate with their counterparts in other Asian countries such as China and Korea.
- ✓ New entrants' share of the Japanese city gas market is expected to gradually increase through alliances across traditional service territories.

Natural gas demand

Demand in major consuming regions



Demand changes (year on year)

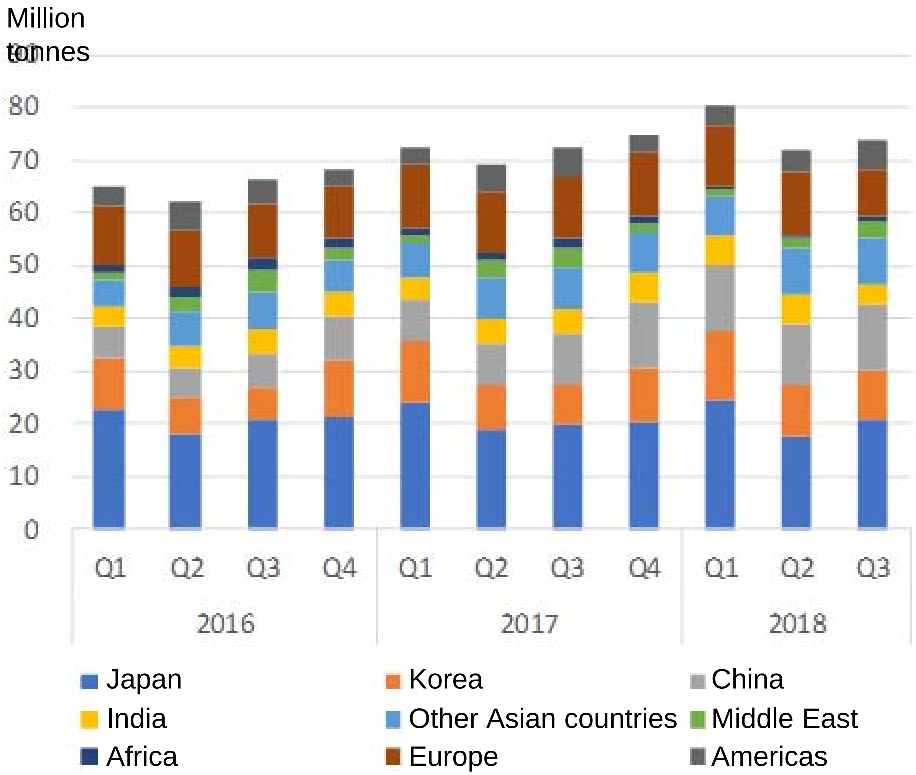


(Sources) IEA "Monthly Gas Statistics," China OGP, PPAC

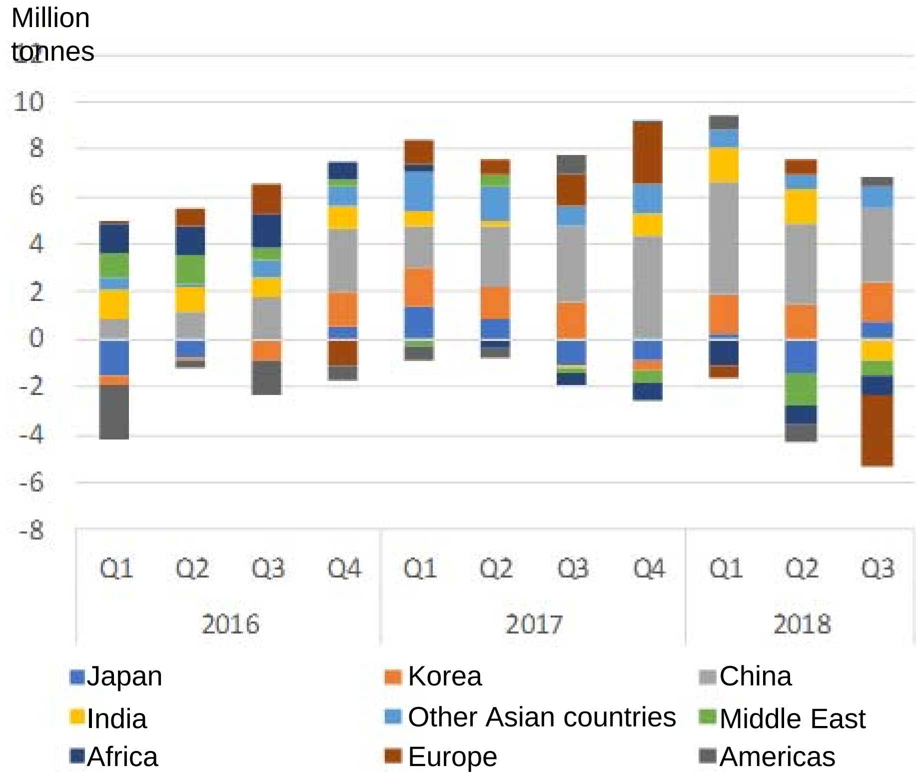
- Natural gas demand in the first three quarters of 2018 for the OECD countries, China and India increased by 96 bcm or 6.7% to 1,527 bcm.
- Demand growth was driven by the OECD Americas and China.

LNG demand

Imports



Import changes (year on year)

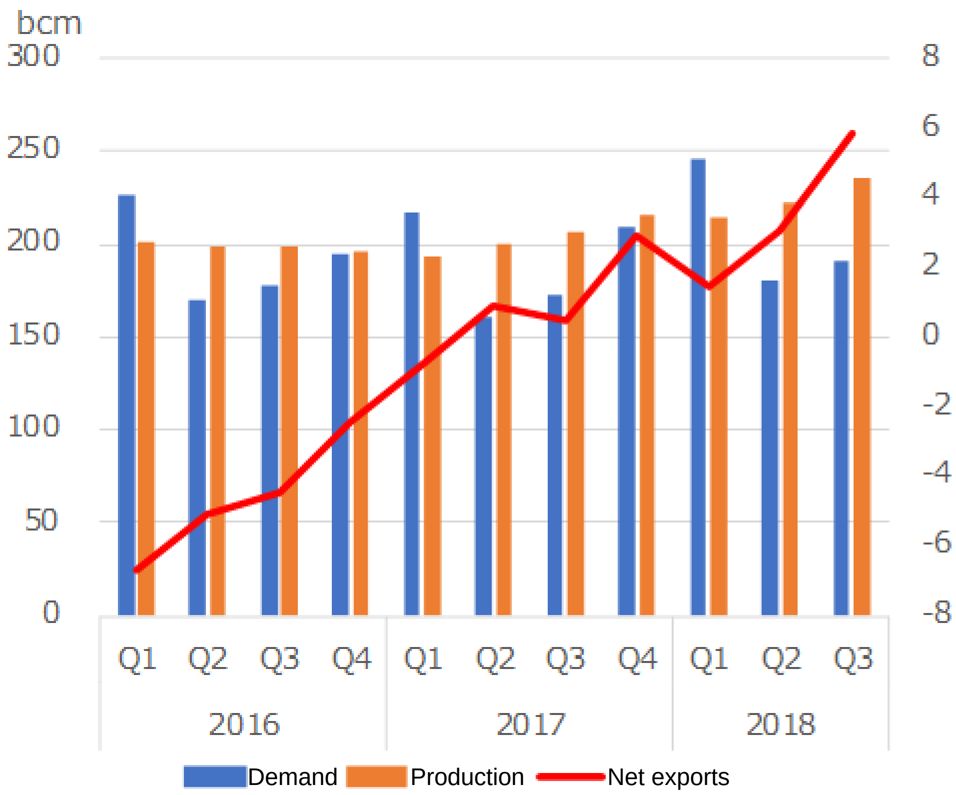


(Sources) Cedigaz "LNG Service - Monthly Bulletin," PPAC

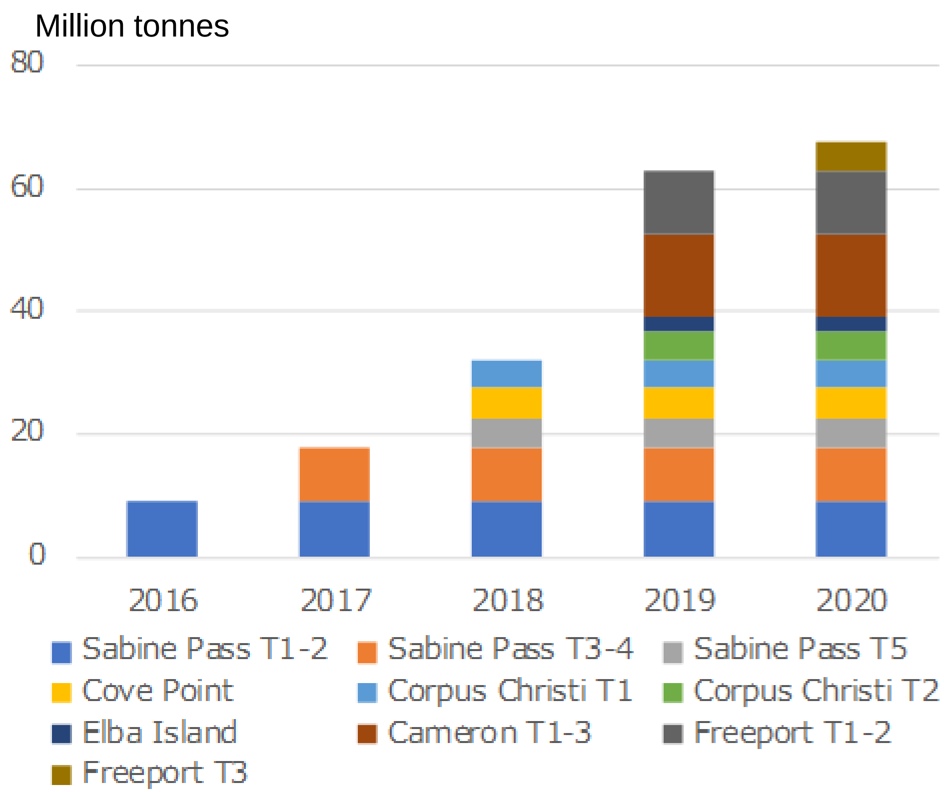
- LNG imports in the first three quarters of 2018 increased by 13.1 million tonnes or 6.2% year on year to 226.8 million tonnes.
- China's import growth (11.3 million tonnes or 44.2%) was remarkable.

U.S. natural gas supply/demand and LNG production capacity

Supply and demand



LNG production capacity

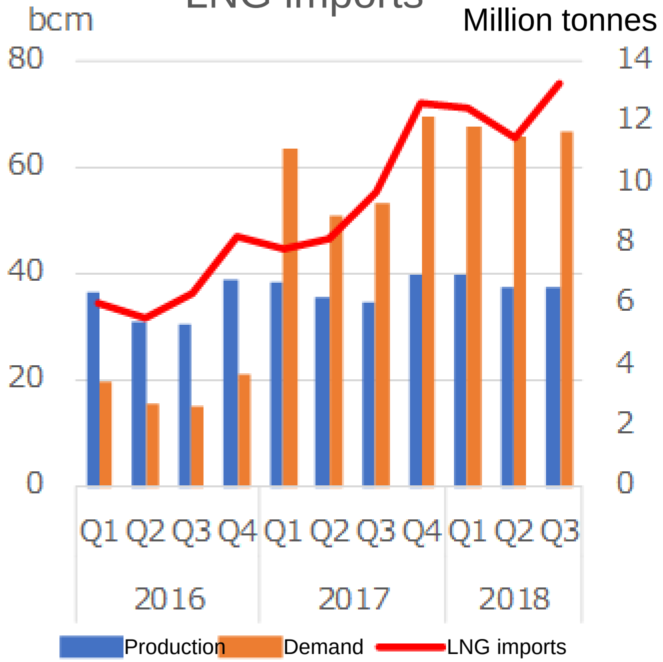


(Source) EIA statistics

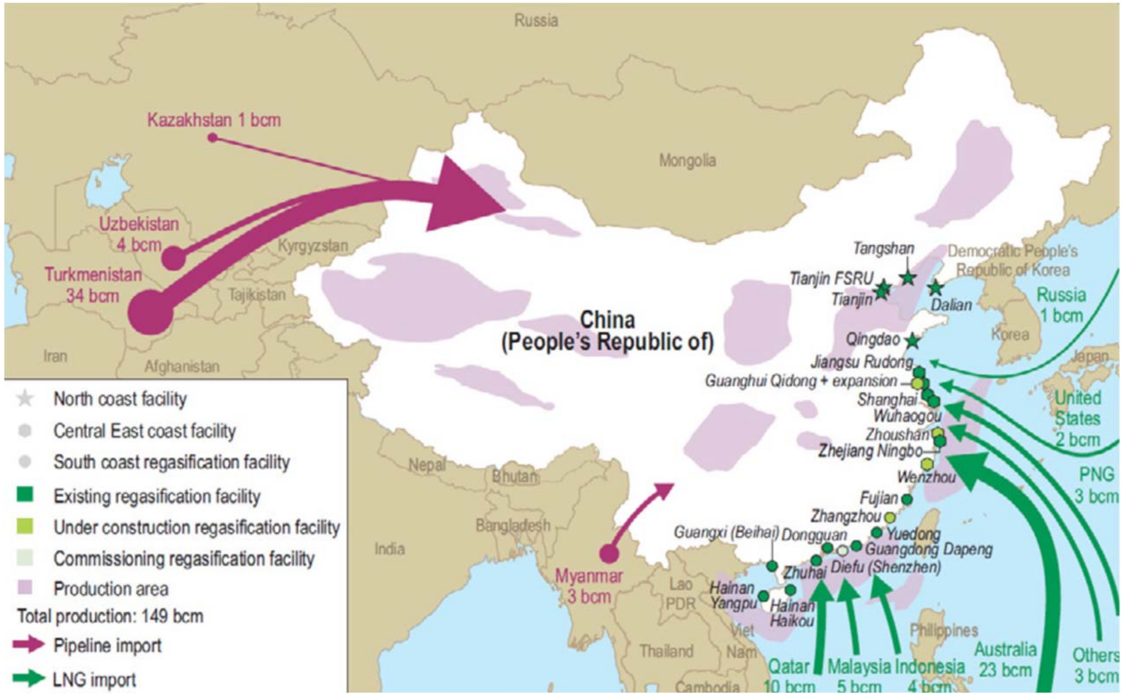
- Natural gas production in the first three quarters of 2018 expanded by 71 bcm or 11.8% year on year to 672 bcm.
- LNG production capacity is expanding rapidly, surpassing 60 million tonnes in 2019.

China's natural gas supply/demand and gas infrastructure

Supply/demand and LNG imports



Gas infrastructure

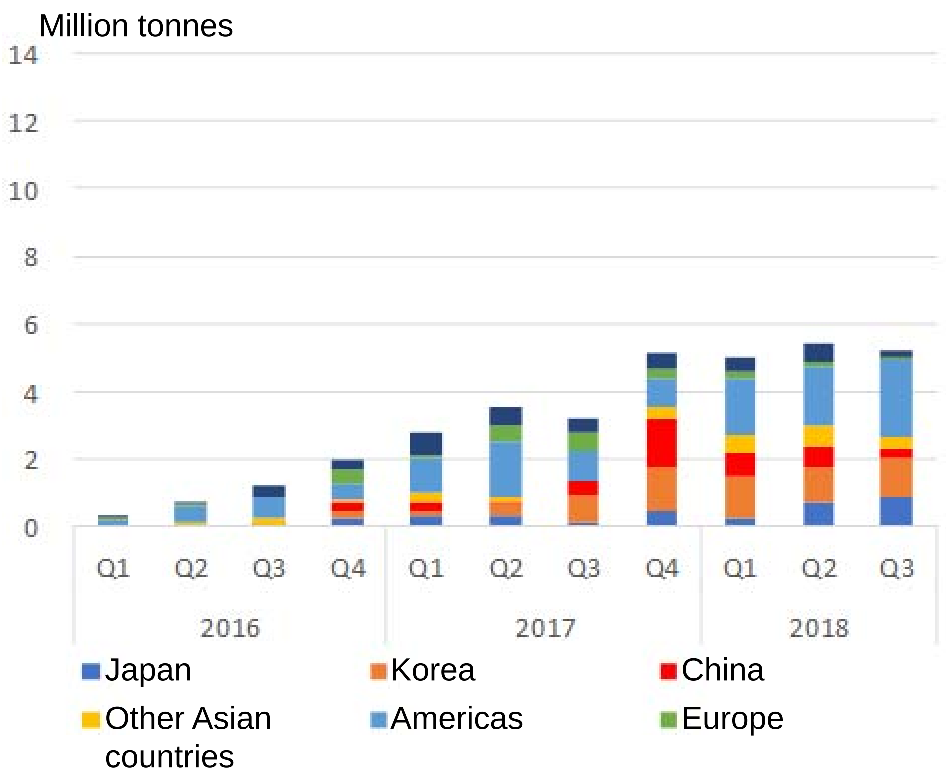


(Sources) China OGP, Cedigaz statistics, IEA "Gas 2018"

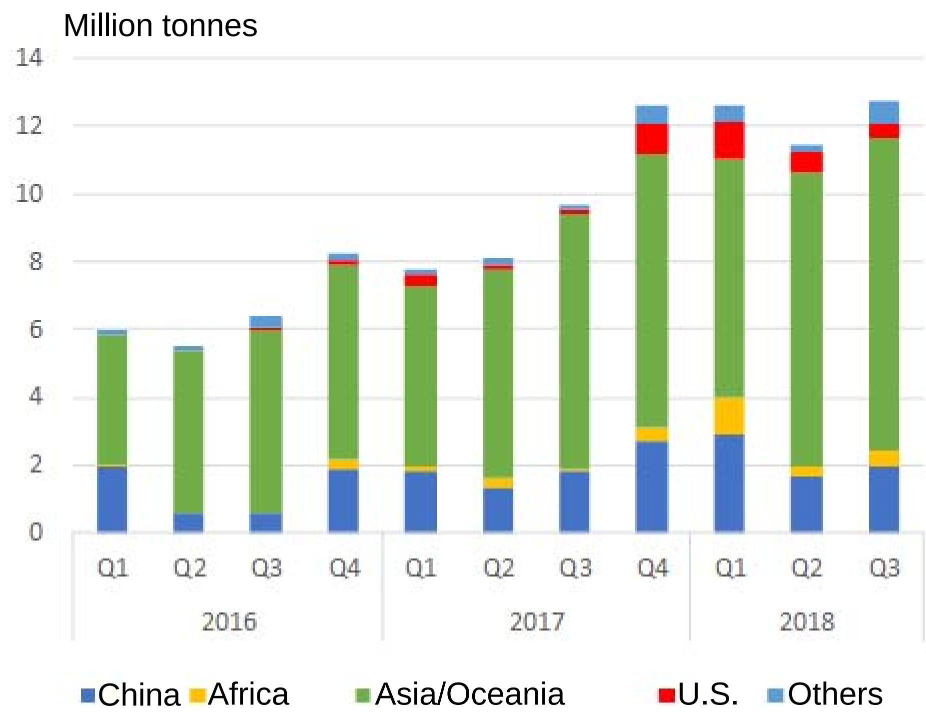
- Natural gas demand in the first three quarters of 2018 increased by 33 bcm or 19.5% year on year to 200 bcm. LNG imports expanded by 11.3 million tonnes or 44.2% to 36.8 million tonnes.
- While LNG demand increased rapidly, seasonal fluctuation narrowed in 2018. Procurement for winter demand has started earlier than in the past, indicating that spot LNG price volatility for 2018-2019 winter would be less than for the previous winter.
- LNG demand will total 53 million tonnes in 2018 and 60 million tonnes in 2019.

U.S.-China trade war and LNG imports/exports

U.S. LNG exports



China's LNG imports

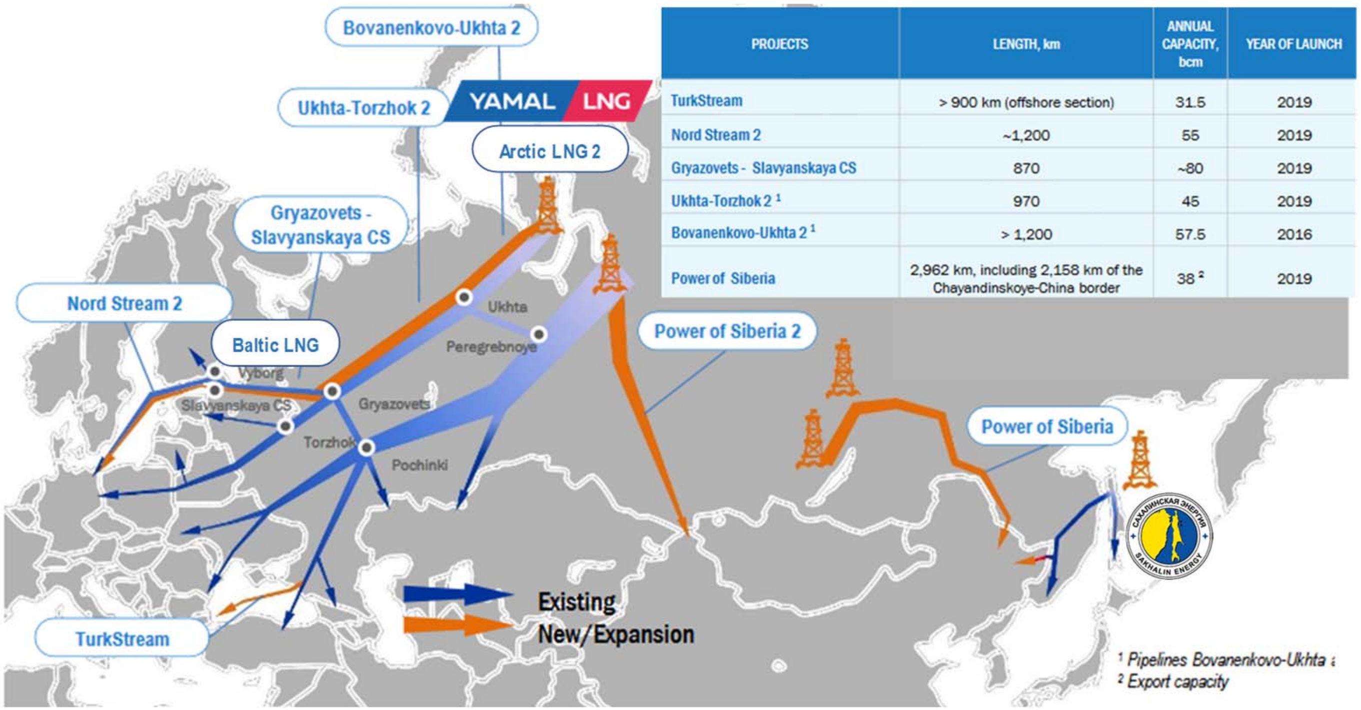


(Sources) EIA and Cedigaz statistics

- China imposed a 10% tariff on U.S. LNG imports in September and apparently cut U.S. LNG imports to zero in October.
- While China depends only a little on U.S. LNG and easily switches to other LNG exporters, the trade war is feared to affect new LNG projects in the U.S.

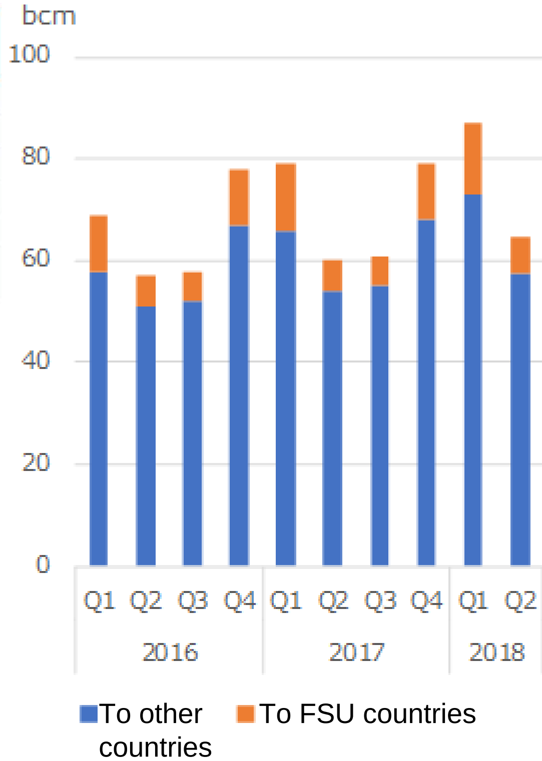
Russia’s natural gas exports

Export projects



PROJECTS	LENGTH, km	ANNUAL CAPACITY, bcm	YEAR OF LAUNCH
TurkStream	> 900 km (offshore section)	31.5	2019
Nord Stream 2	~1,200	55	2019
Gryazovets - Slavyanskaya CS	870	~80	2019
Ukhta-Torzhok 2 [1]	970	45	2019
Bovanenkovo-Ukhta 2 [1]	> 1,200	57.5	2016
Power of Siberia	2,962 km, including 2,158 km of the Chayandinskoye-China border	38 [2]	2019

Exports

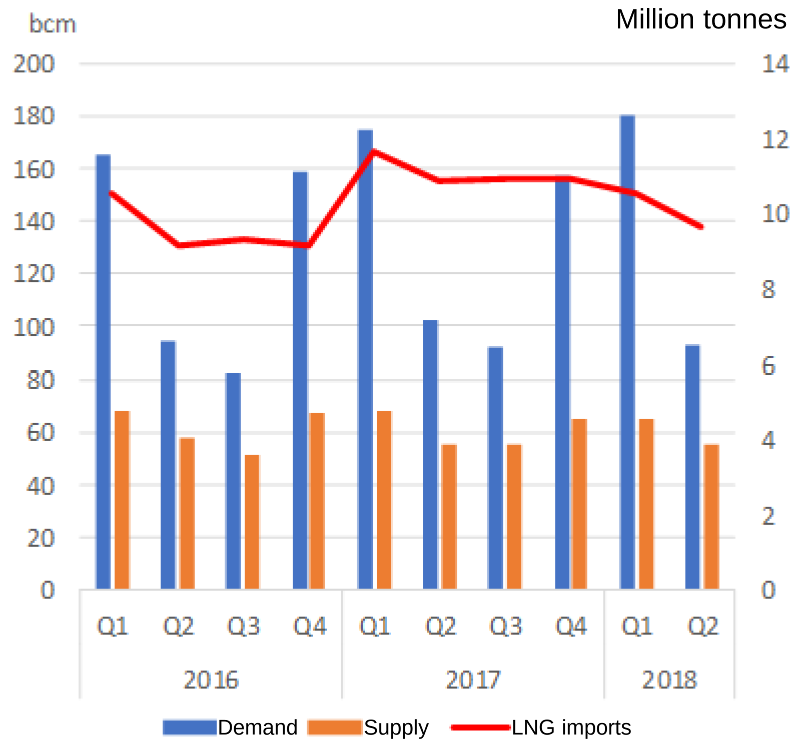


(Source) Gazprom IR documents

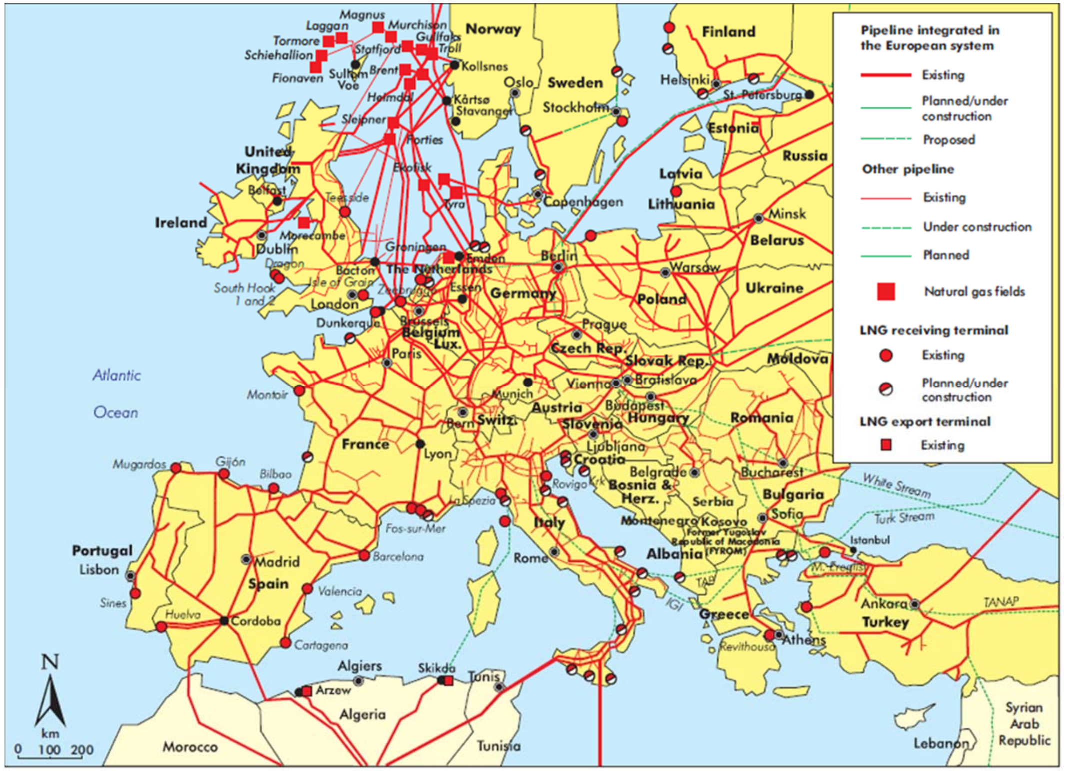
- Natural gas exports in the first half of 2018 increased by 13 bcm or 9.1% year on year to 152 bcm.
- In 2019, Russia plans to add 125 bcm in pipeline gas export capacity with TurkStream, North Stream 2 and Power of Siberia.
- New LNG projects such as Arctic LNG and Baltic LNG are being activated.

Europe’s natural gas supply and demand

Supply/demand and LNG imports



Gas infrastructure

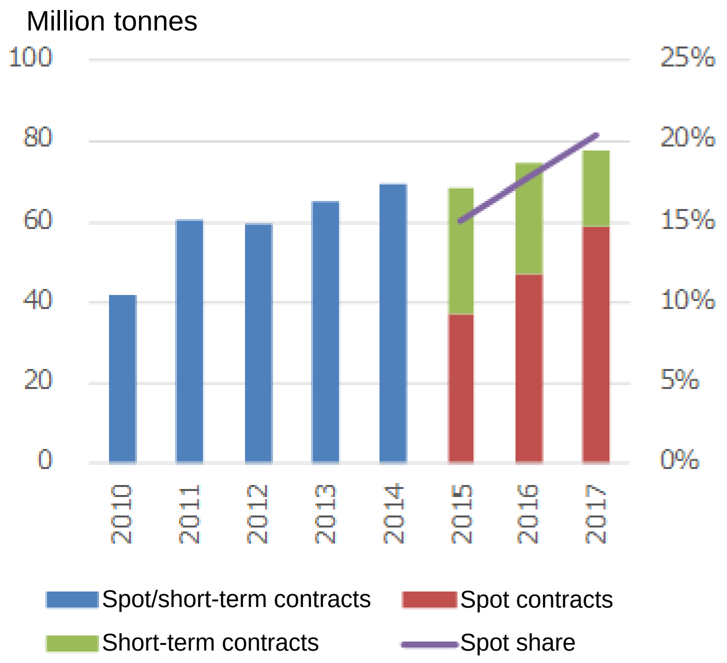


(Sources) IEA “Monthly Gas Statistics,” ”Natural Gas Information”

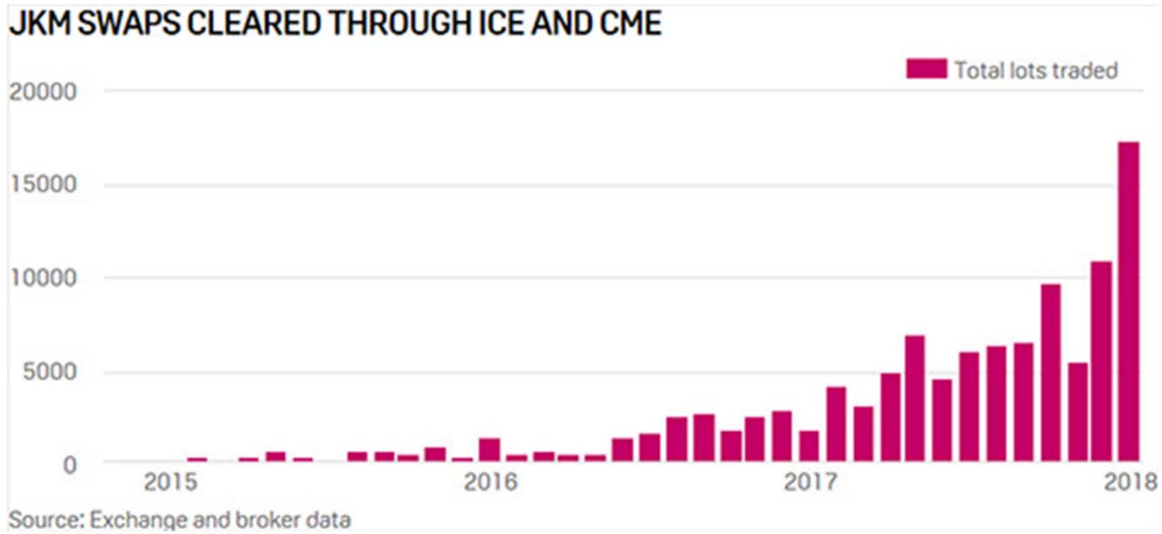
- In the first half of 2018, natural gas demand increased by 4 bcm or 1.5% year on year to 273 bcm. LNG imports decreased by 2.3 million tonnes or 10.2% to 20.2 million tonnes.
- Regional production decreased while seeing no demand growth, Europe remains to be a last resort market for LNG failing to sell in other regions.

LNG market liquidity

LNG trade under spot and short-term contracts



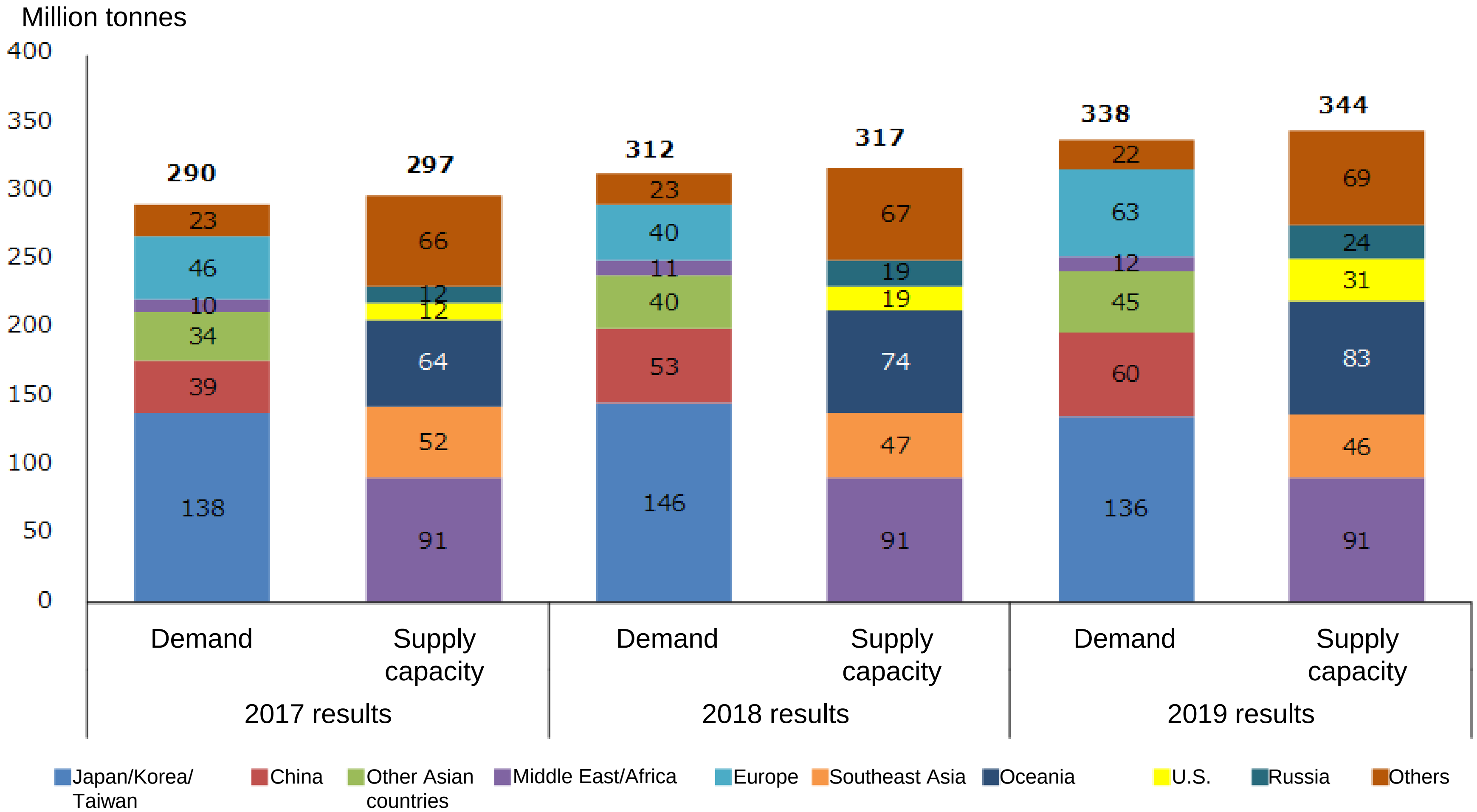
JKM LNG swap trade



(Sources) GIIGNL, Platts

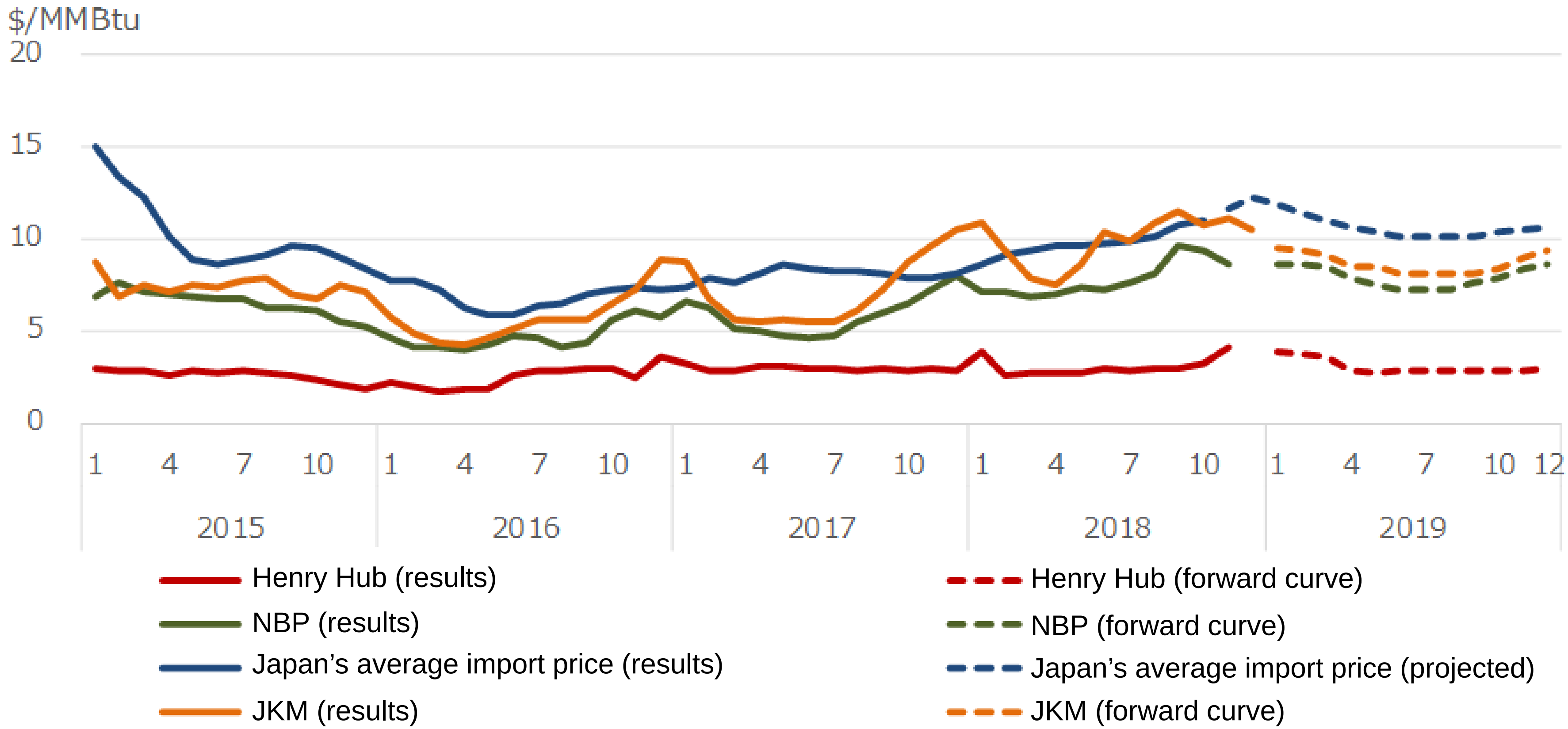
- Spot LNG trade reached 59 million tonnes (accounting for 20% of total LNG trade) in 2017 but may decrease in 2018 due to growth in U.S. and Qatari term contract sales.
- JKM LNG swap volumes in the first half of 2018 increased to 78,000 lots (amounting to some 17 million tonnes, accounting for 17% of Northeast Asia LNG demand in the same period), indicating growing LNG market liquidity. However, benchmark prices have yet to be developed.

LNG supply/demand outlook



- LNG demand in 2019 will increase by 26 million tonnes from 2018 to 338 million tonnes. Effective global supply capacity will rise by 27 million tonnes to 344 million tonnes, with liquefaction plant operation conditions taken into account.
- China will drive demand growth, while the U.S. and Australia will lead supply growth.

Japanese LNG import price outlook and forward curves of U.S. and U.K. natural gas and JKM prices



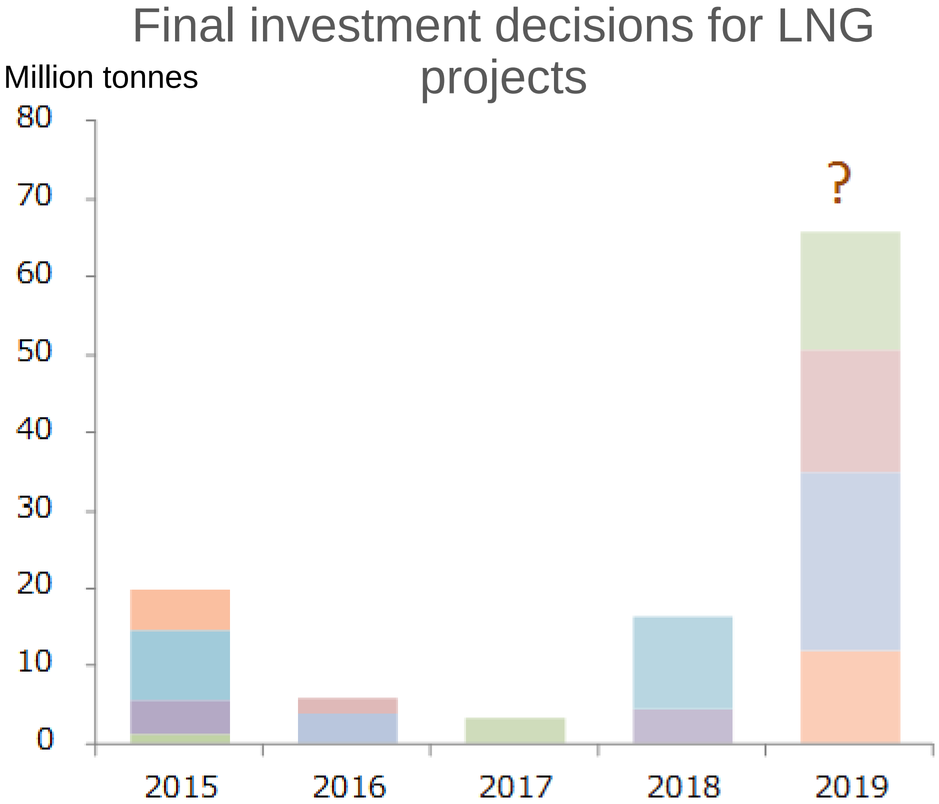
(Note) Forward curves are as of December 14

(Sources) EIA, CME, Ofgem, ICE, trade statistics, IEEJ, Platts

- LNG import prices for Japan in 2019 are forecast to average $10.2-11.4/MMBtu ($9.4-10.9/MMBtu in a lower oil price case).
- Depending on cold snaps and other weather factors, the JKM (Japan Korea Marker) spot LNG price for Northeast Asia will tend to slip below the average LNG import price.

LNG Producer-Consumer Conference

Program	
Session	Title
1	Ministerial keynote speeches
2	CEO/VIP session
3	Policy update and LNG market outlook
4	Security through establishment of a flexible LNG market (Myth or real?)
5	The new role of LNG and new demand
6	How to secure LNG supply



(Sources) LNG Producer-Consumer Conference press releases, etc.

- LNG Producer-Consumer Conference held in October 2018, with more than 1,000 participants including cabinet ministers and business leaders from LNG importing and exporting countries.
- The government will expand support for Japanese companies participating only in gas liquefaction plants and investment and loans for LNG projects for third countries.
- Final investment decisions for LNG projects are recovering. Continuous upstream investment is important for the future stable supply.

Destination clause

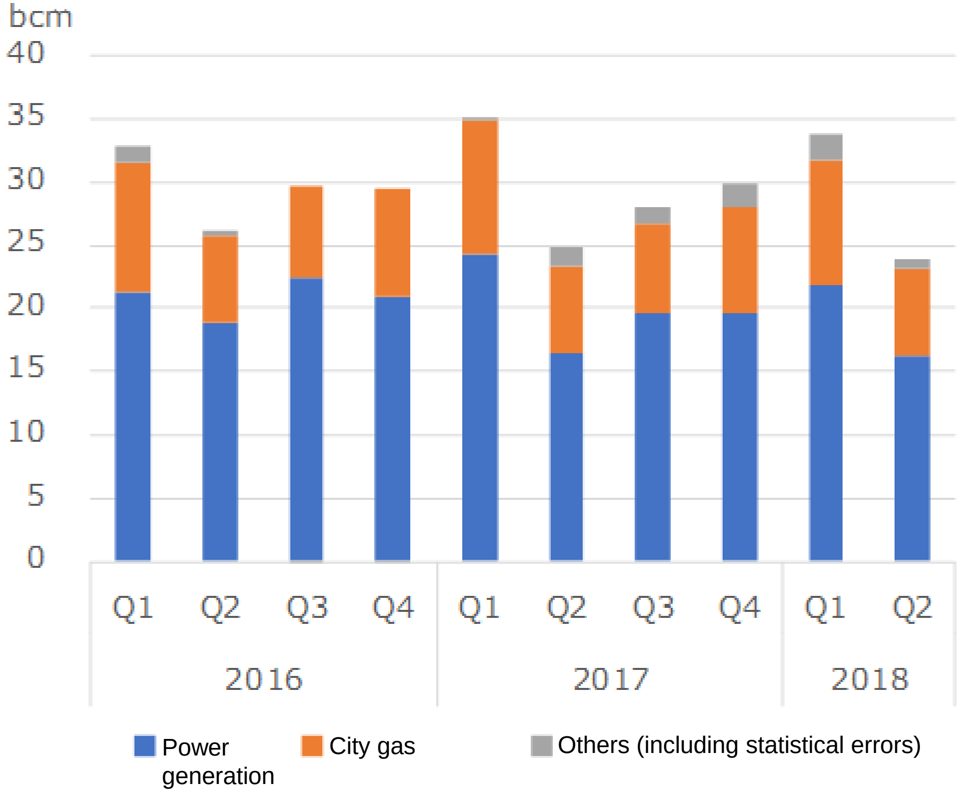
Recent initiatives to ease destination clause restrictions

June 2017	The Japan Fair Trade Commission (JFTC) releases a research report on LNG transactions.
July	The Memorandum of Cooperation is signed between the Ministry of Economy, Trade and Industry of Japan, and the European Commission on Promoting and Establishing a Liquid, Flexible and Transparent Global Liquefied Natural Gas Market in the context of enhancing Japan–EU cooperation on secure and sustainable energy.
May 2018	The European Commission bans destination clauses in Gazprom's contracts for exports to Eastern Europe.
June	The European Commission begins investigations into destination clauses in contracts for Qatari LNG exports.
October	A team of Japanese and European lawyers publishes a model LNG contract.

- Since the JFTC released the report, destination restrictions in new LNG contacts for Japan have been eased. Some 15% of term contracts signed in 2019 for Japan, China and Korea might be free from destination restrictions.
- Japan has developed a framework of cooperation with the European Commission since 2017.
- In the future, the JFTC should cooperate with competition policy authorities in other Asian countries.

Japanese gas market

Gas demand



North Osaka Earthquake and city gas

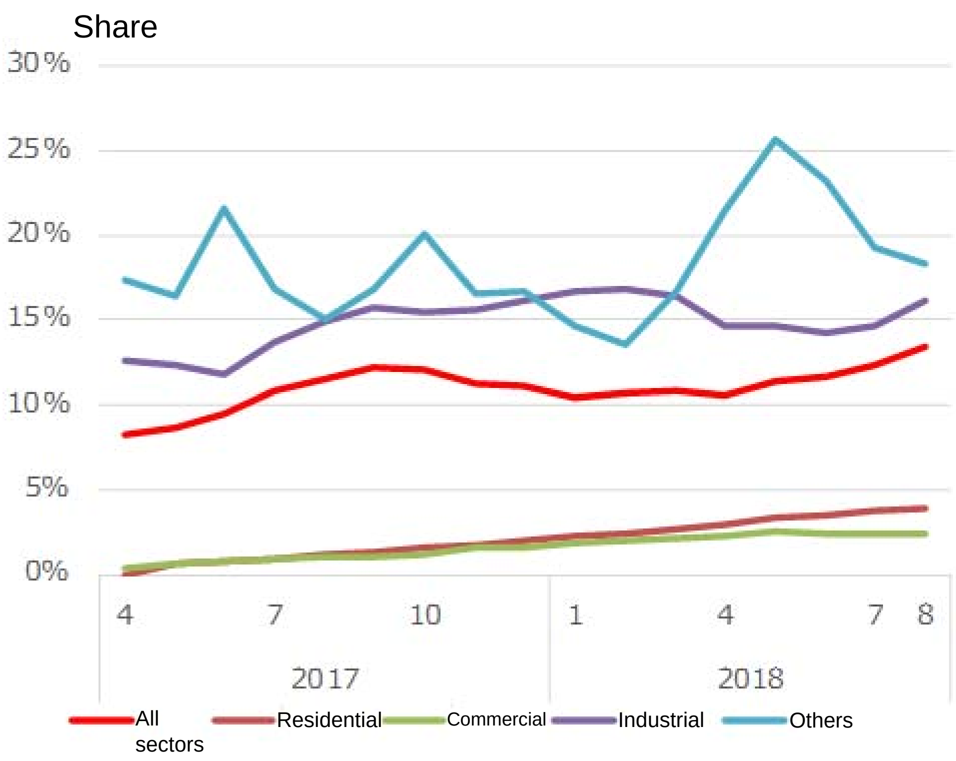
Date	June 18, 2018
Epicenter	Northern Osaka Prefecture 13 km deep
Magnitude	6.1
Number of households subjected to gas supply disruptions	111,951 households
Number of days required for restoration	7

(Sources) Ministry of Economy, Trade and Industry, Osaka Gas Co.

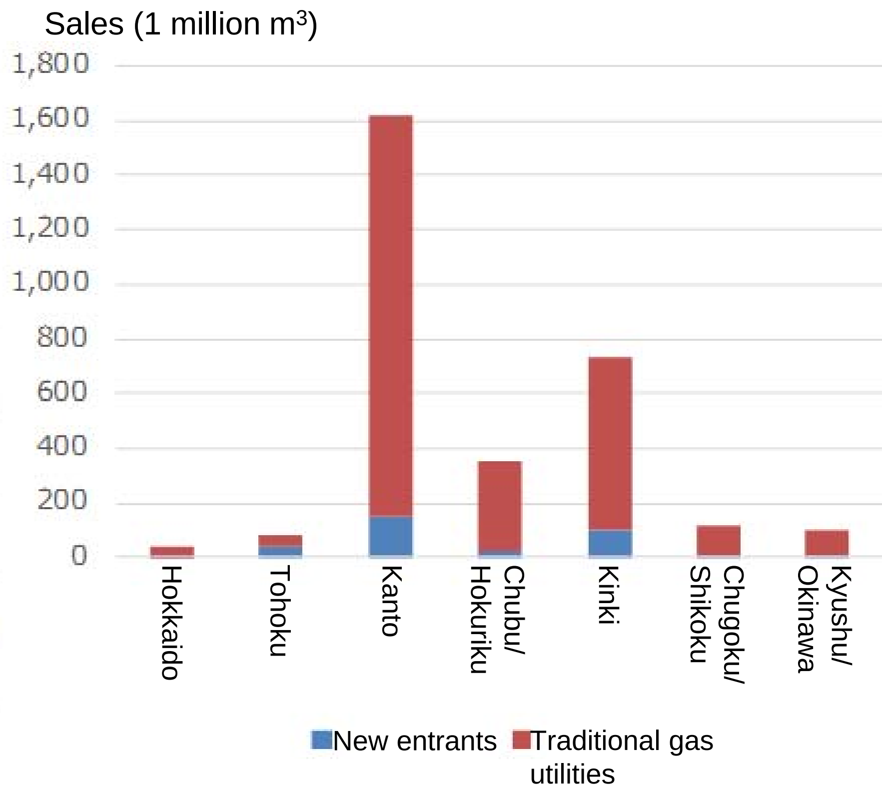
- Demand in the first half of 2018 decreased by 2.2 bcm or 3.7% year on year to 58 bcm. Due to the restart of nuclear power plants and abnormal temperatures, gas demand decreased both for power generation and city gas services. Hokkaido East Iburi Earthquake
- City gas supply was restored in seven days after the North Osaka Earthquake. The Hokkaido Eastern Iburi Earthquake caused no city gas service disruption.

Gas system reform in Japan

New entrants' market shares by sector



City gas sales by region (August 2018)



(Source) Electricity and Gas Market Surveillance Commission

- New entrants' share of the overall city gas market stood at 13.4% as of August 2018. Their share of the residential city gas market came to 3.9%. Competition is seen mainly in the Kanto and Kinki regions.
- New entrants' share of the Japanese city gas market could rise to 14-15% by end 2019 through alliances across traditional service territories.

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