

Asia Gas Pricing Trends:

Global Gas Pricing Trends

Gas Pricing Summit

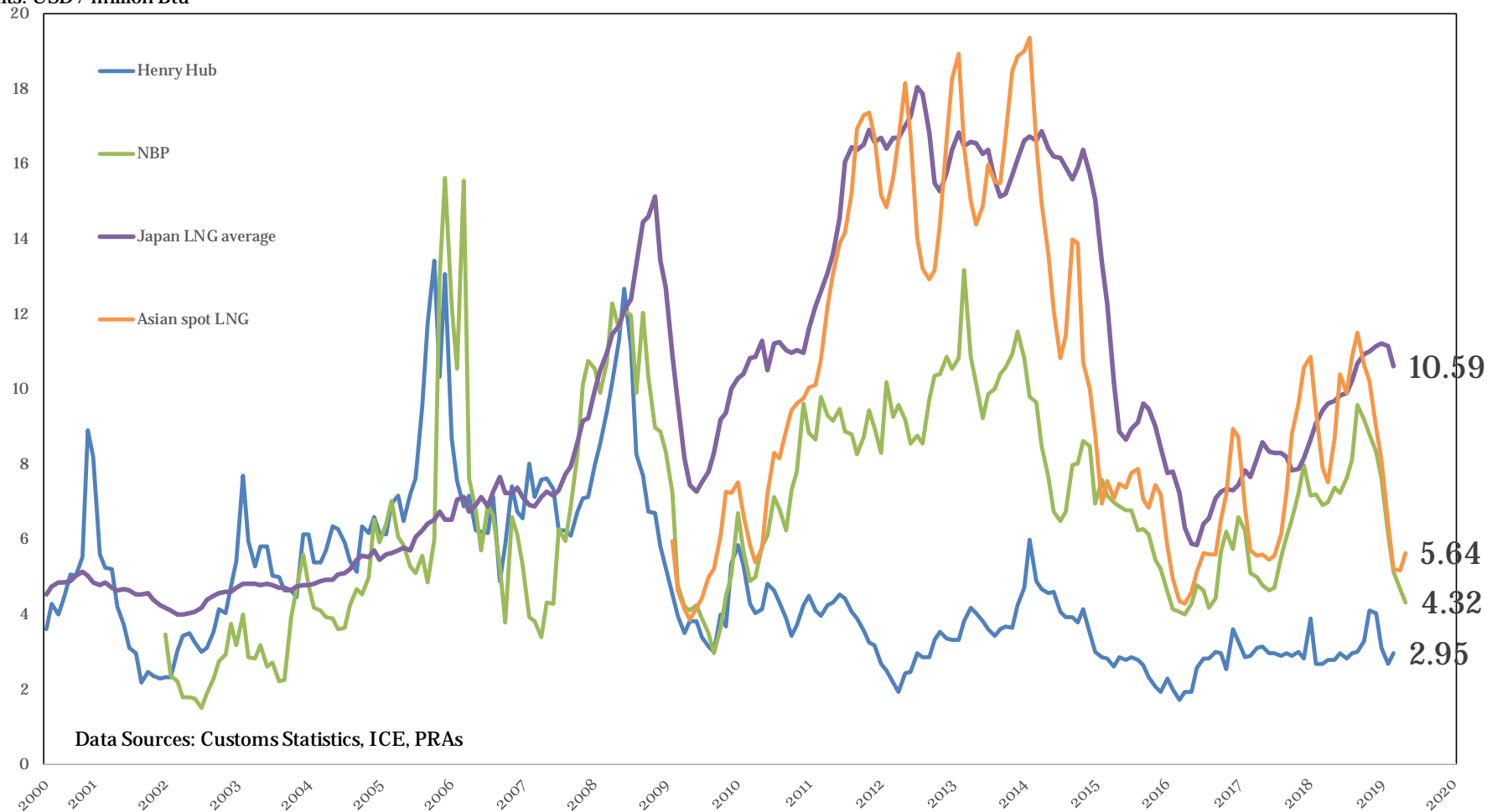
May 13th, 2019

Dr. Ken Koyama

Chief Economist, Institute of Energy Economics, Japan

Asia LNG: Gaps between contract and spot price

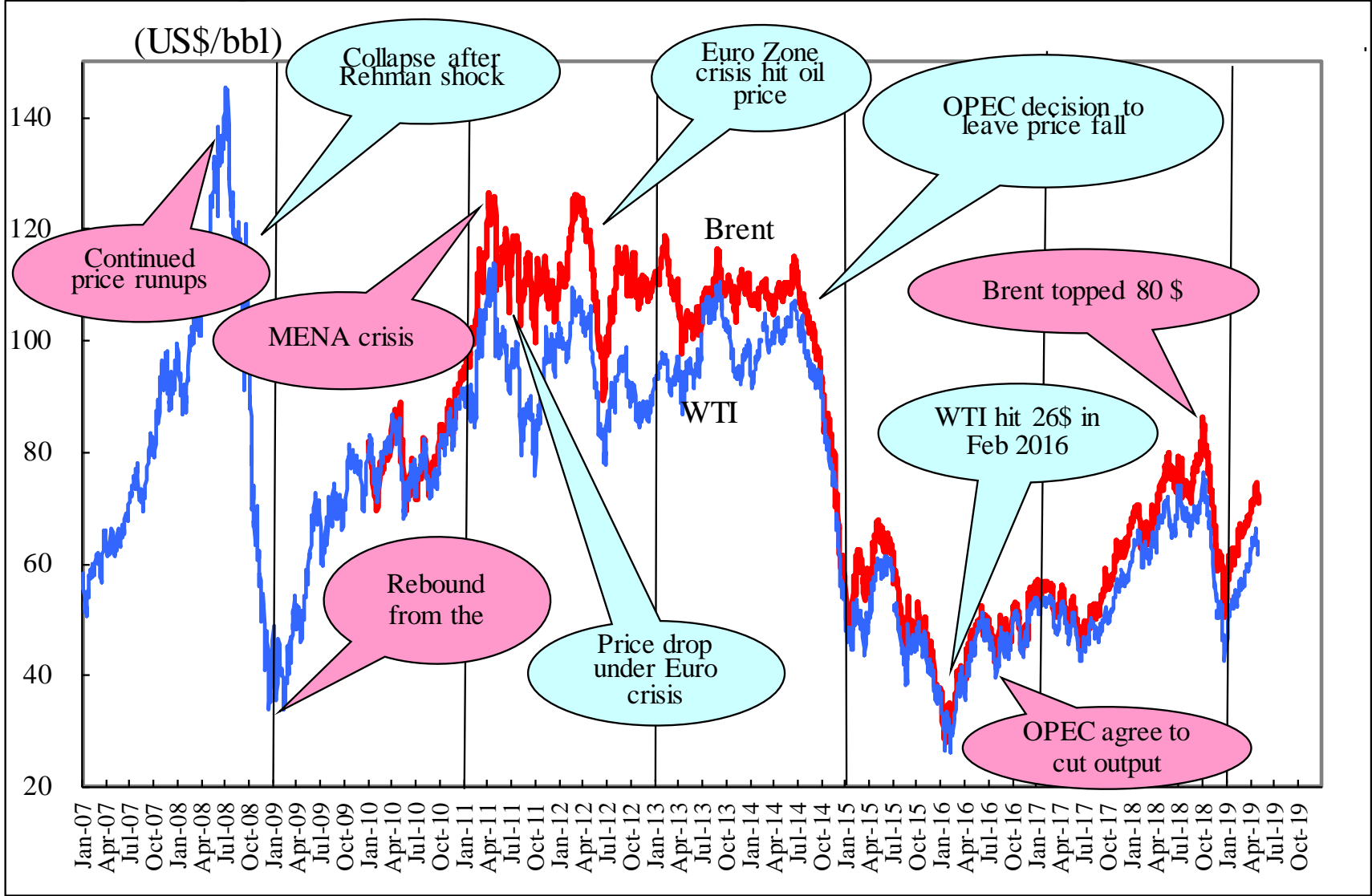
Units: USD / million Btu



Data Sources: Customs Statistics, ICE, PRAs

Source: Prepared from data from US/EIA and others

Crude Oil Price Volatility

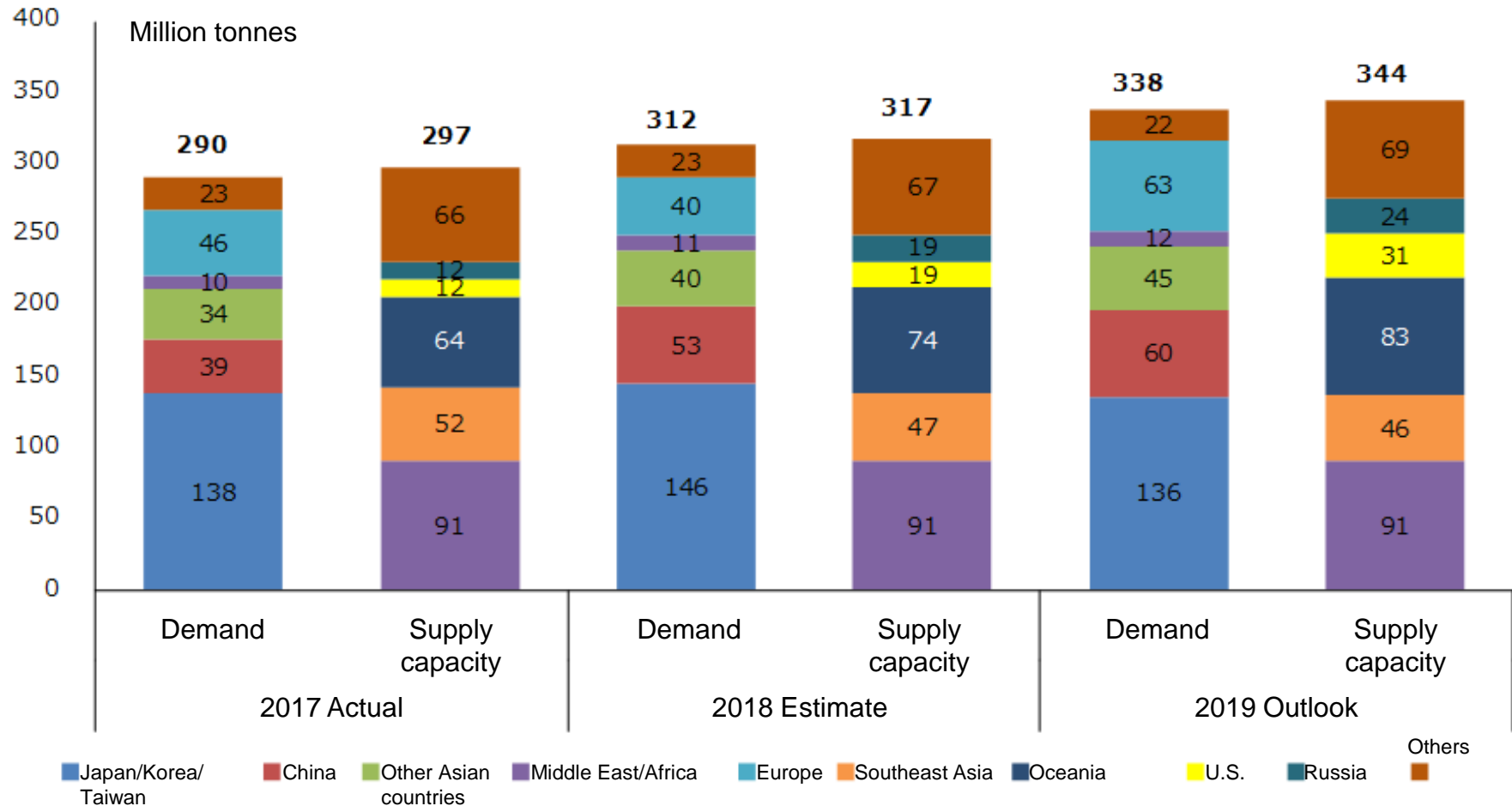


Source: NYMEX data, etc.

Oil Market 2019 and Beyond

- **Shortage or Surplus ?**
- **Major uncertainties for Upside (shortage)**
 - Greater decline in Iranian oil export
 - Greater decline in oil production in Venezuela
 - Other geopolitical problems and supply interruptions
- **Major uncertainties for Downside (surplus)**
 - Accelerated shale production increase
 - Consequences of “Trade war” and global economic slowdown
- **Saudi may adjust supply, but its surplus capacity to be reduced**
- **Oil market becomes continues to be volatile**

LNG supply/demand outlook up to 2019



- 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.

Factors to affect Gas/LNG Demand in Asia

- **Economic growth**
- **Need to protect environment**
- **Lower price**
- **Competition against coal**
- **Future of nuclear power**
- **Competition against renewable energy**
- **Competition with LPG**
- **Impact of power/gas market reform**
- **Pipeline vs. LNG**

Asia Environmental Challenges

- **Climate change, as a long term strategic challenges**
- **Air pollution, as an immediate crisis**

NDC under Paris Agreement

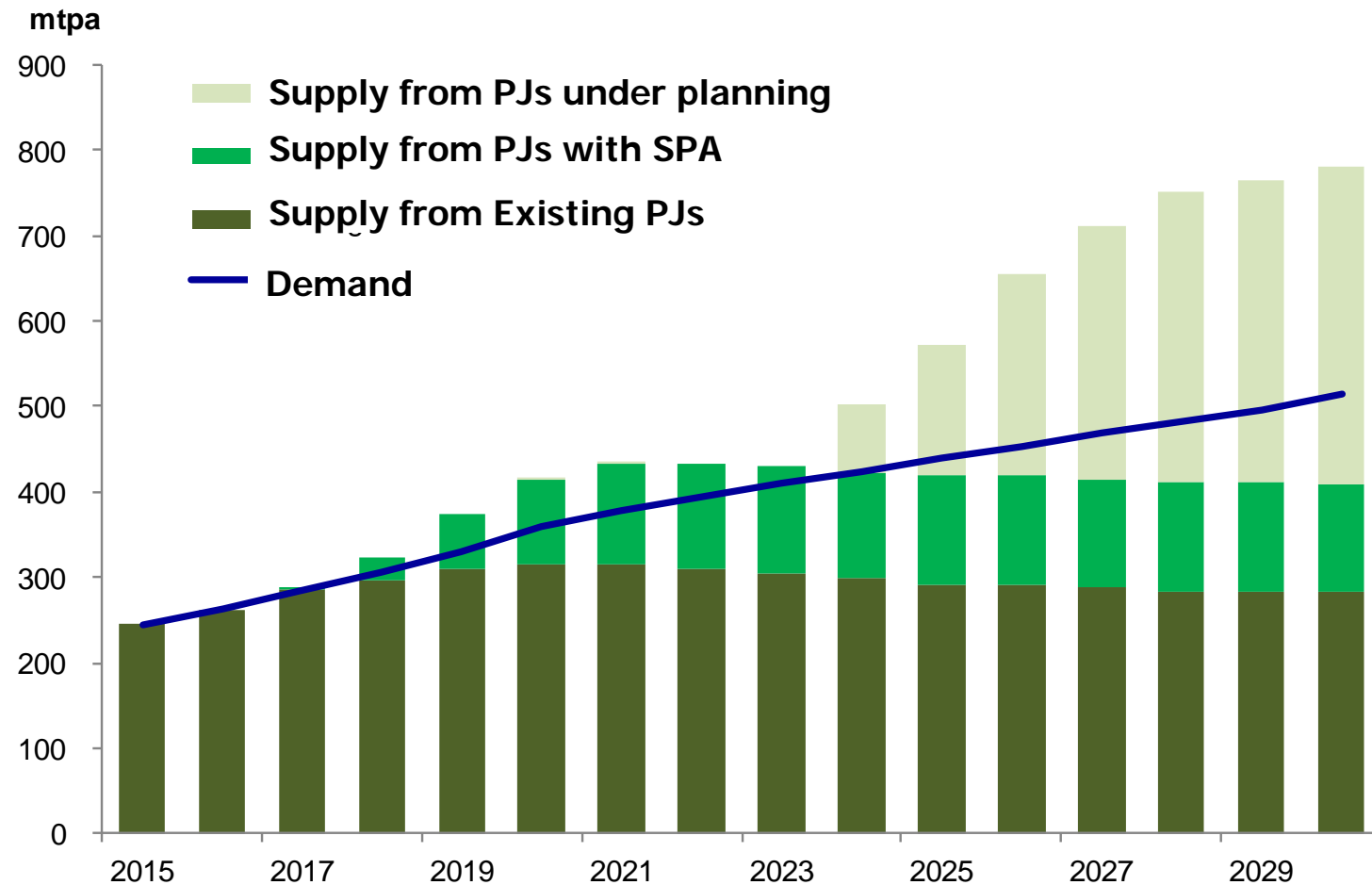
Air pollution in China

Party	Submission date (2015)	Target type	Reduction target	Base year	Target year	Coverage
EU	Mar 6	Absolute emissions	40%	1990	2030	GHG
United States	Mar 31	Absolute emissions	26~28%	2005	2025	GHG including LULUCF
Russia	Apr 1	Absolute emissions	25~30%	1990	2030	GHG
China	Jun 30	GDP intensity	60~65% Total emission peak out before 2030	2005	2030	CO ₂
Japan	Jul 17	Absolute emissions	26%	2013	2030	GHG
Indonesia	Sep 24	Reduction from BAU	29%	BAU	2030	GHG
Brazil	Sep 30	Absolute emissions	37% (43% for 2030)	2005	2025	GHG
India	Oct 1	GDP intensity	33~35%	2005	2030	GHG



Global LNG Supply-Demand

Supply surplus continues until 2022~2023?



Source: Yoshikazu Kobayashi, "The Role of Natural Gas in Japan and Asia" (September 11, 2017)

Issues for LNG Pricing in Asia

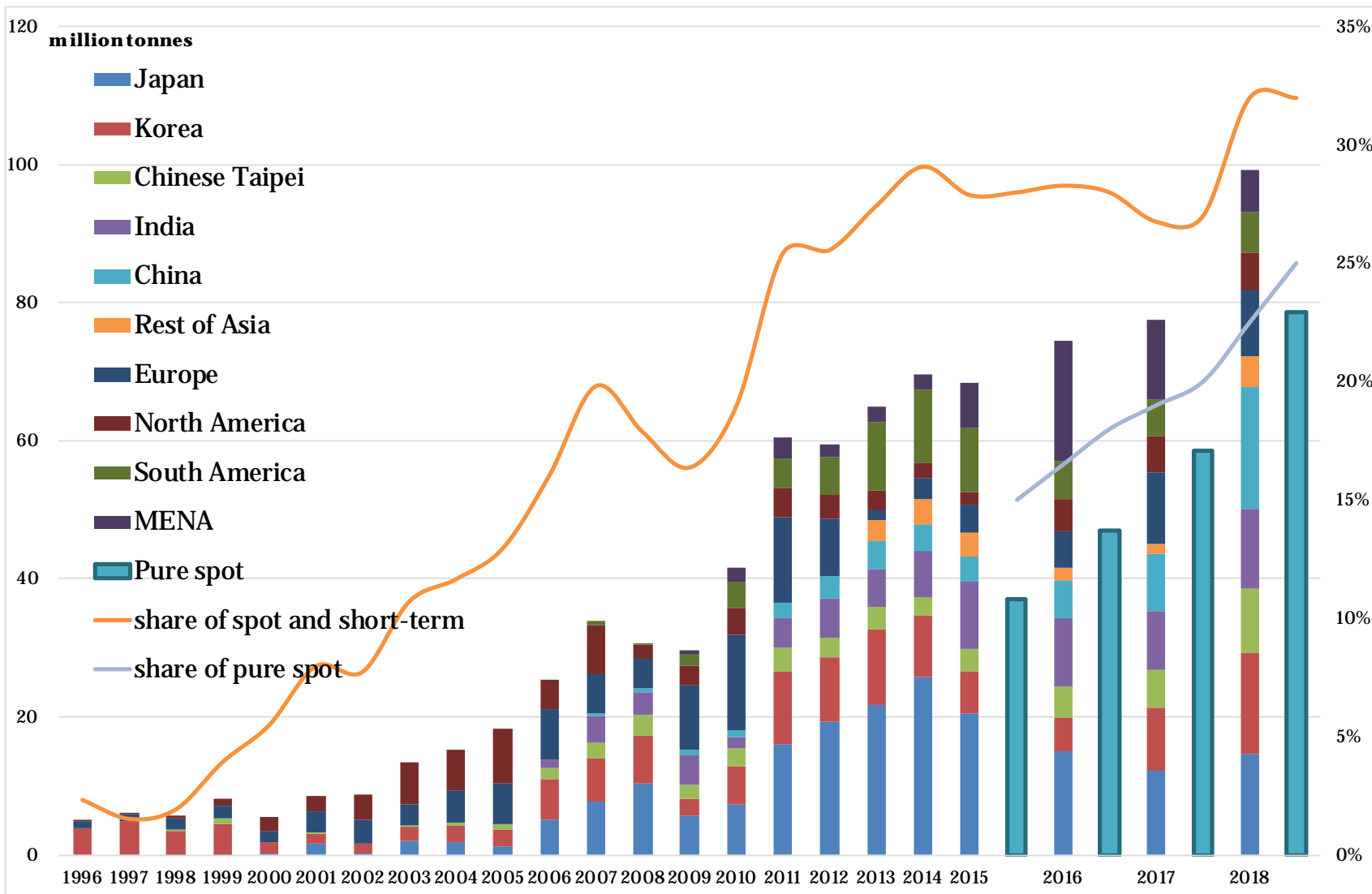
- Given the dominance of the existing contracts, JCC pricing likely to remain dominant mechanism in Asia at least up to early 2020s
- But tide is changing:
 - ✓ Over-supplied market
 - ✓ Inflow of US LNG with HH pricing will increase in Asia
 - ✓ Spot/short-term trading continue to grow
 - ✓ Initiatives to create hubs and new price discovery in Asia
 - ✓ Power and gas market reforms in Japan and Asia
- Major Asian buyers such as JERA have a strategy to diversify pricing
- Buyers continue to search for possible alternatives to JCC and the share of JCC pricing will be reduced
- So far there is no clear answer as to what is the best alternative
- Uncertainties over both prices linked to JCC and spot LNG prices

Latest Deals Suggest More Flexibility

Source	Seller	Market	Buyer	Volume	Start	Years	Note	Status
LNG Canada	DGI (Mitsubishi)	Japan	JERA	1.20	2024	15	DES	HOA
Portfolio	Shell	Japan	Tokyo Gas	0.50	2020	10	DES / partly coal linked	HOA
PNG LNG	PNG LNG	China	Sinopec (Unipecc)	0.45	2019	4	Existing capacity	SPA
Portfolio	Total	China	Guanghui	0.70	2019	10		SPA
Portfolio (Scarborough)	Woodside	China	ENN	1.00	2025	10	Subject to Scarborough	HOA
Arctic LNG 2	Novatek	Iberia	Repsol	1.00	2023	15	DES, non-binding	HOA
Arctic LNG 2	Novatek	Portfolio	Vitol	1.00	2023	15	FOB, Murmansk / Kamchatka	HOA
Driftwood	Tellurian	Portfolio	Total	1.00	2023	15	FOB / JKM based	HOA
Driftwood	Tellurian Marketing	Portfolio	Total	1.50	2023	15	FOB / JKM based	HOA
Rio Grande	NextDecade	Portfolio	Shell	2.00	2023	20	3/4 Brent link	SPA

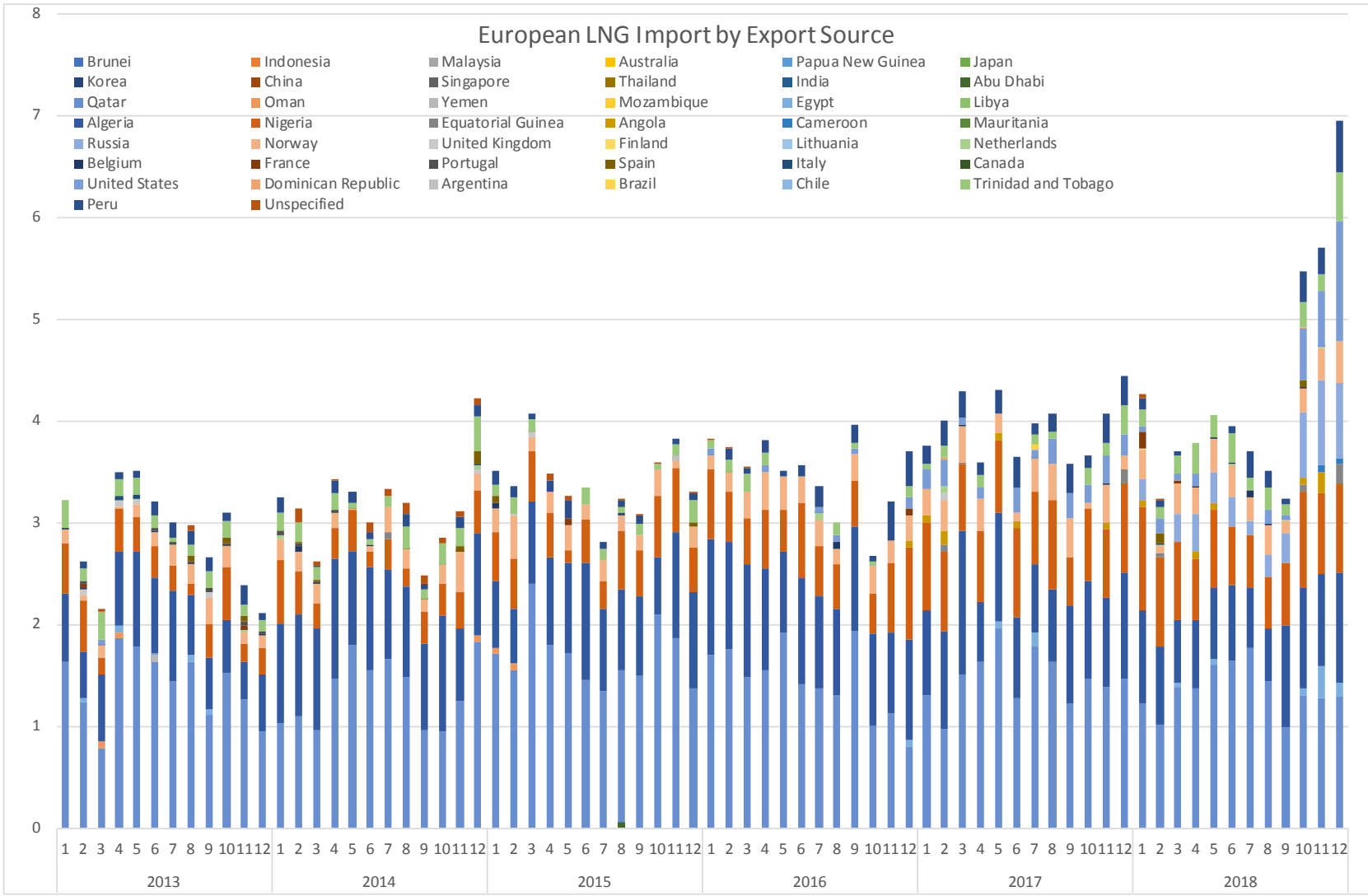
(Source) Hiroshi Hashimoto (IEEJ), "LNG Market and Flexibility Developments", April 18, 2019

More Volumes Are Sold Short Term



(Source) Hiroshi Hashimoto (IEEJ), "LNG Market and Flexibility Developments", April 18, 2019

Flexible Response of LNG



(Source) Hiroshi Hashimoto (IEEJ), "LNG Market and Flexibility Developments", April 18, 2019