

Global Gas Demand, Regas & FSRUs



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The Leader in Energy Market Simulation Systems

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- Investment and M&A Strategy
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Today's Topics

- Global NG Demand
- Regas Capacity Growth in Europe and Asia
- North American LNG Flows
- FSRU's how they operate and market share
- Modeling a mobile gas import facility

Global Natural Gas Demand

Natural Gas Demand by Region and Sector: Largest to Smallest Consuming Regions



Most of the demand growth for natural gas is expected to come from Asia

Middle East demand is also expected to see strong growth

Growth in European markets is expected to decline

Protentional for growth in Africa; currently a relatively small market

Conversion: 1,000 BCM = ~ 96.8 Bcfd

Global Regas Capacity by Region

LNG Regas Capacity by Region: Largest to Smallest Regional Capacity

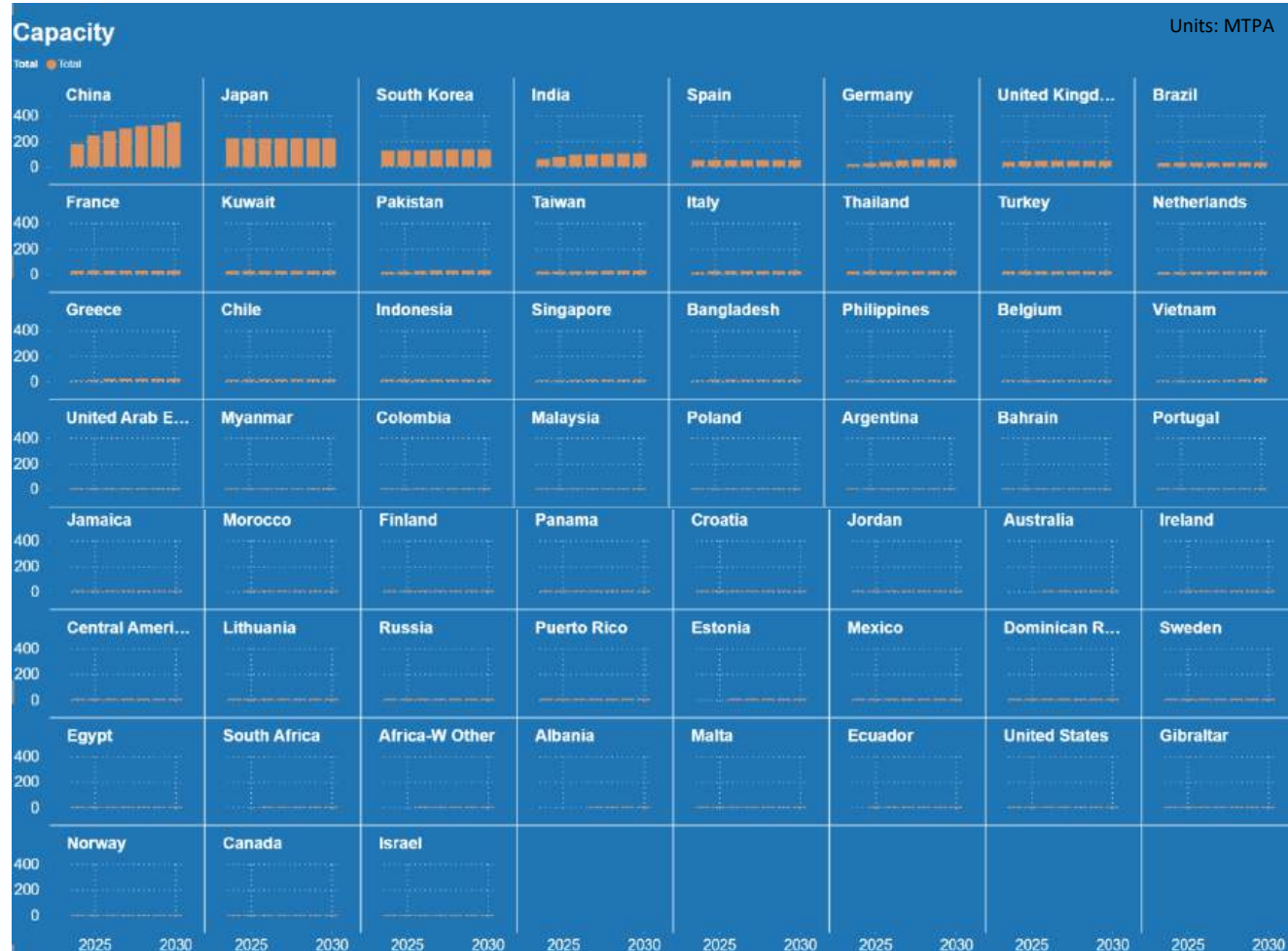


- Growing Asian demand driving regas capacity build-out
- Loss of pipeline imports and declining local production driving LNG demand in Europe

Conversion: 1,000 MTPA = ~ 131.6 Bcfd

Global Regas Capacity by Country

LNG Regas by Country: Largest to Smallest Capacity by Country



Many countries have the ability to import LNG

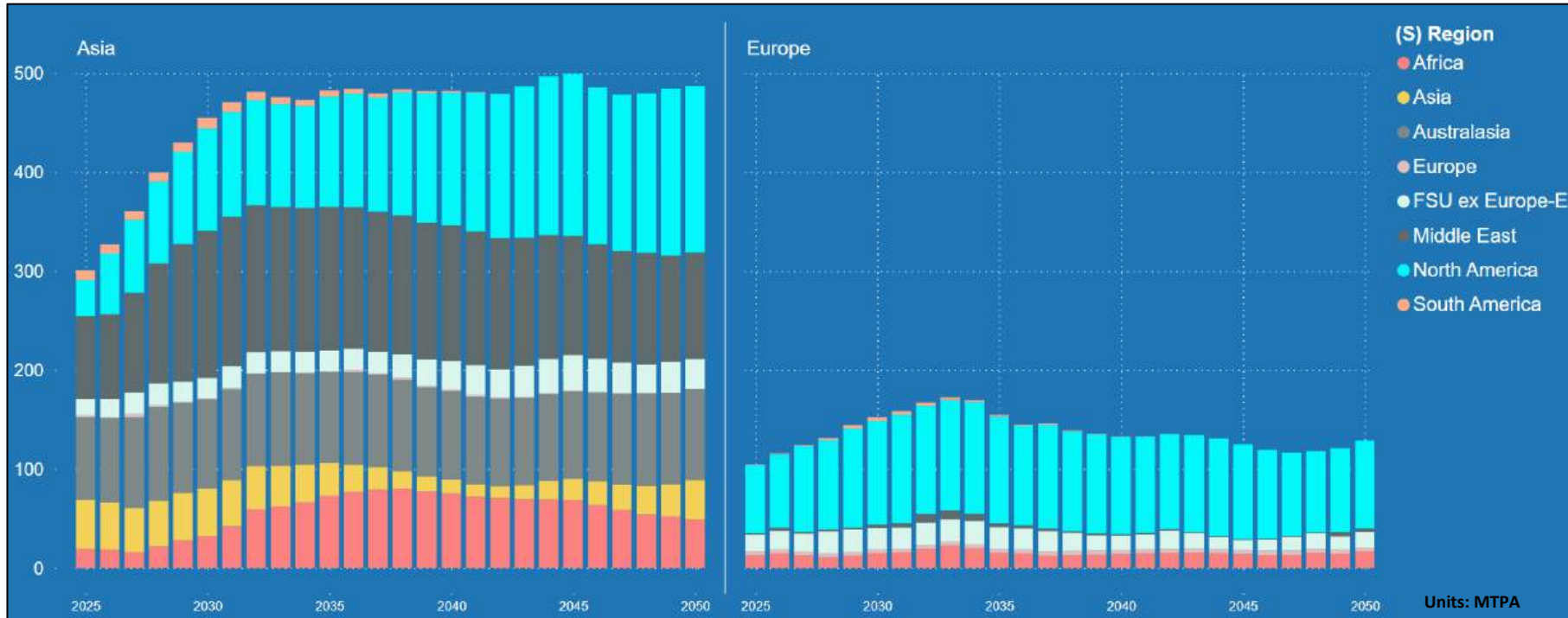
China is the expected to be the largest importer, taking over Japan in 2025

Germany is a new entrant to the market in 2023 and is expect to be a top importer in the next few years

Conversion: 400 MTPA = ~ 52.6 Bcfd

LNG Imports by Region and Source Region

Regional LNG Imports by Source Region



Globally, Asia is the largest LNG importing region

Europe's LNG imports are expected to grow significantly through 2030

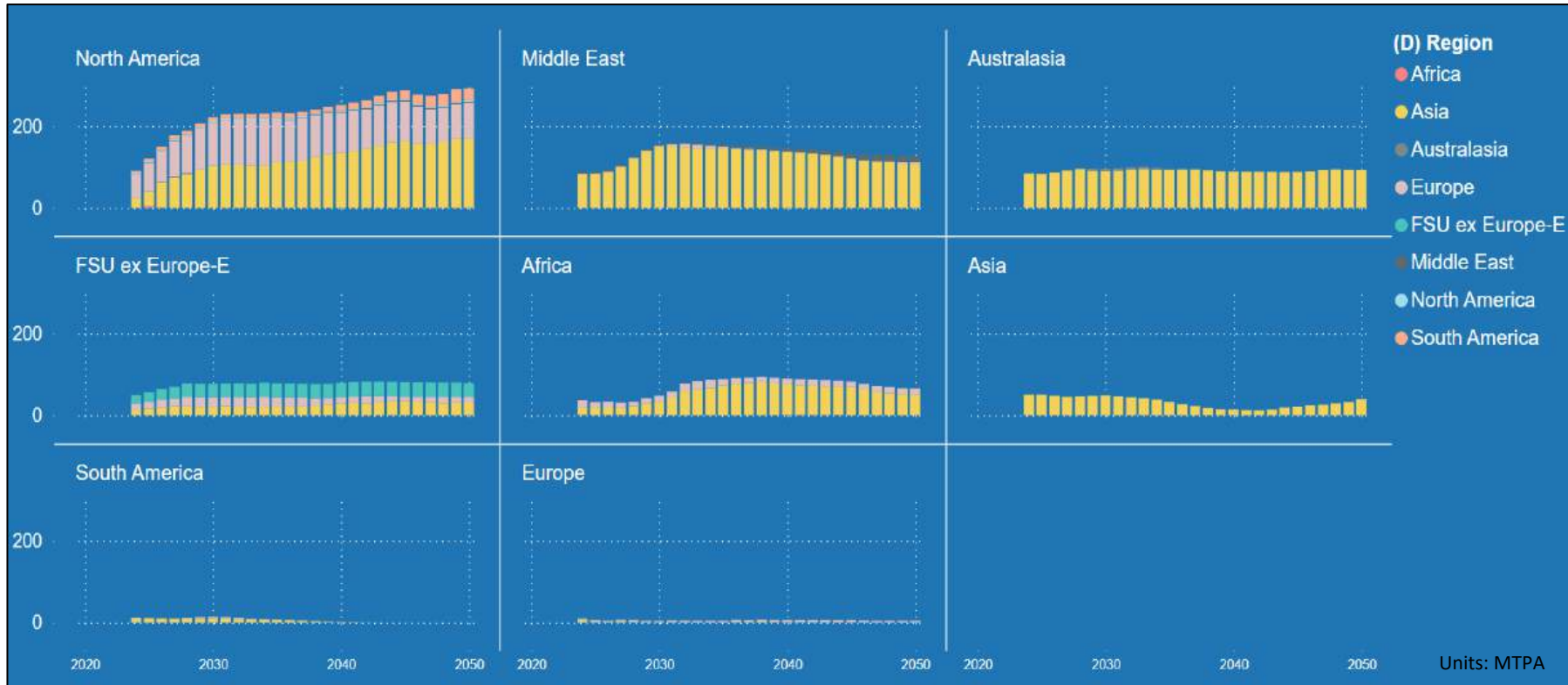
North America Supplies a significant amount of gas to both regions

Conversion: 500 MTPA = ~ 66 Bcfd

Conversion: 180 MTPA = ~ 23.7 Bcfd

LNG Exports by Region & Destination Region

Regional LNG Exports by Destination Region



North American is the largest regional exporter of LNG

Sends gas to both European and Asian markets

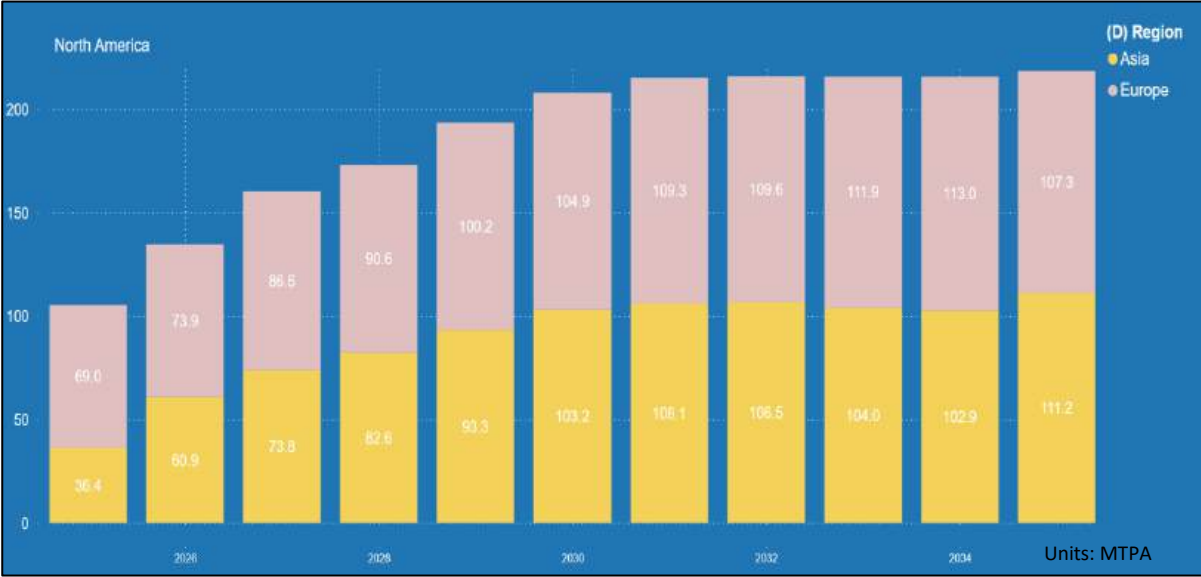
Conversion: 200 MTPA = ~ 26 Bcfd

Asia & Europe LNG Demand

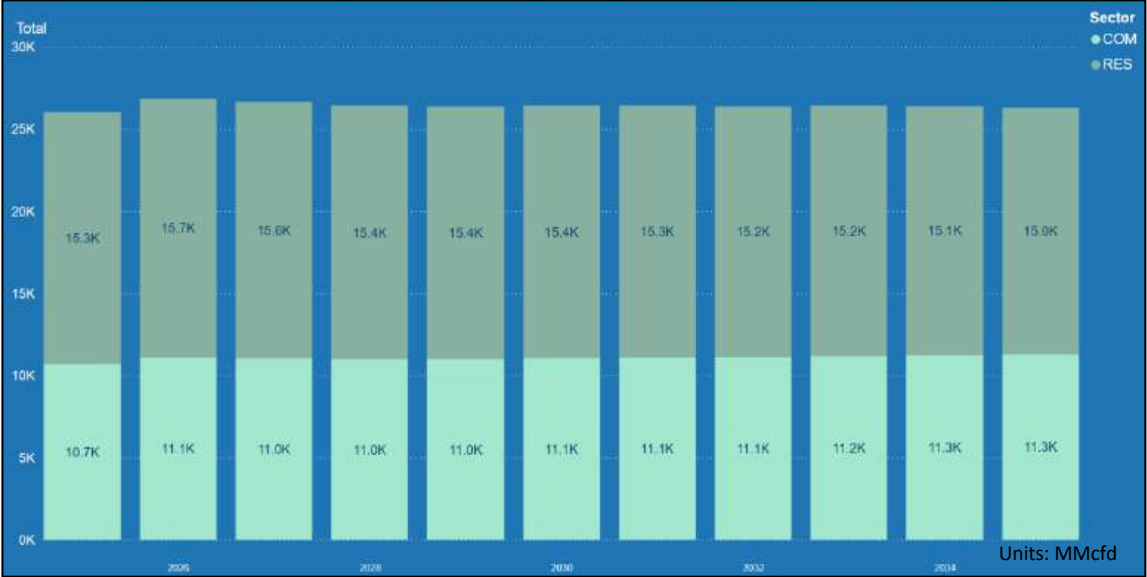
Asia & Europe Demand for North American Gas
will Surpass Residential and Commercial Demand
for North American Gas

2030 Demand for North American Gas			
	Asia	Europe	Total
MTPA	103.2	104.2	207.4
Bcfd	13.6	13.7	27.3
	N. America COM	N. America Res	Total
MTPA	117.1	84.5	201.6
Bcfd	15.4	11.1	26.5

Demand for North American Gas from Asia & Europe



North American Commercial & Residential Demand



US LNG Exports the Largest Sector by 2030

U.S. Natural Gas Demand by Sector



U.S LNG Exports Comparison

2025: Larger than Com & Res

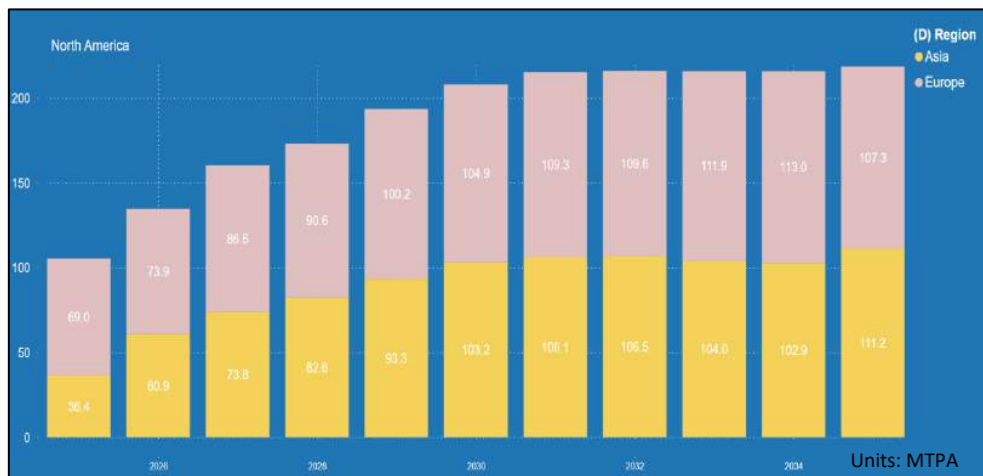
2028: Larger than Industrial

2030: Larger than Electric Gen.

2030: Largest demand sector in the U.S.

Germany and China Drive Regional Growth

Demand for North American Gas from Asia & Europe



Conversion: 200 MTPA = ~ 26 Bcfd

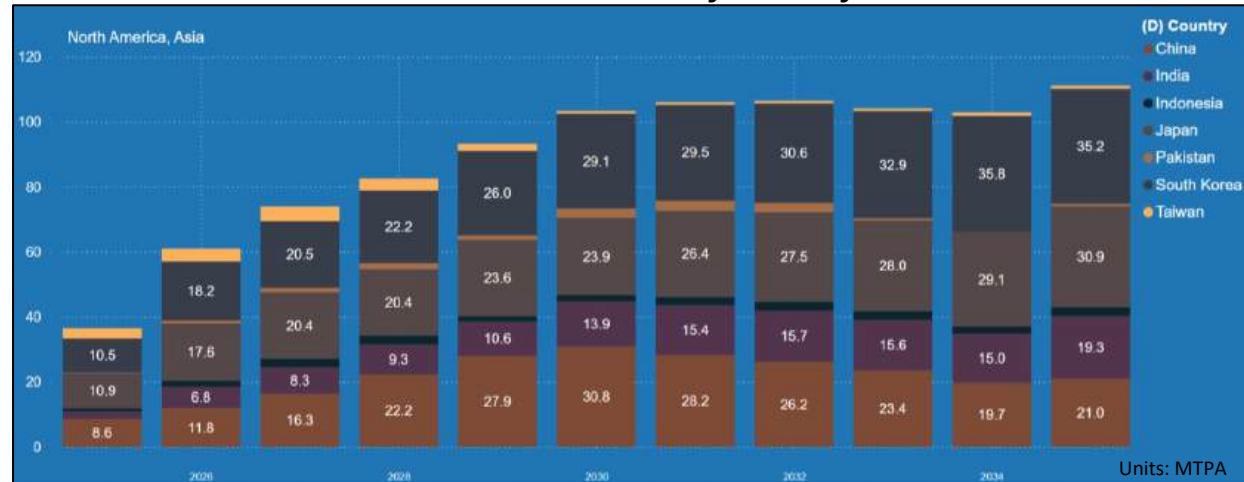
Europe: Germany is a new importer of gas

Asia, China demand for North American gas is driving growth in LNG exports

Demand for North American Gas from Europe by Country



Demand for North American Gas from Asia by Country



China Demand by Supply Type

Gas Balance for China



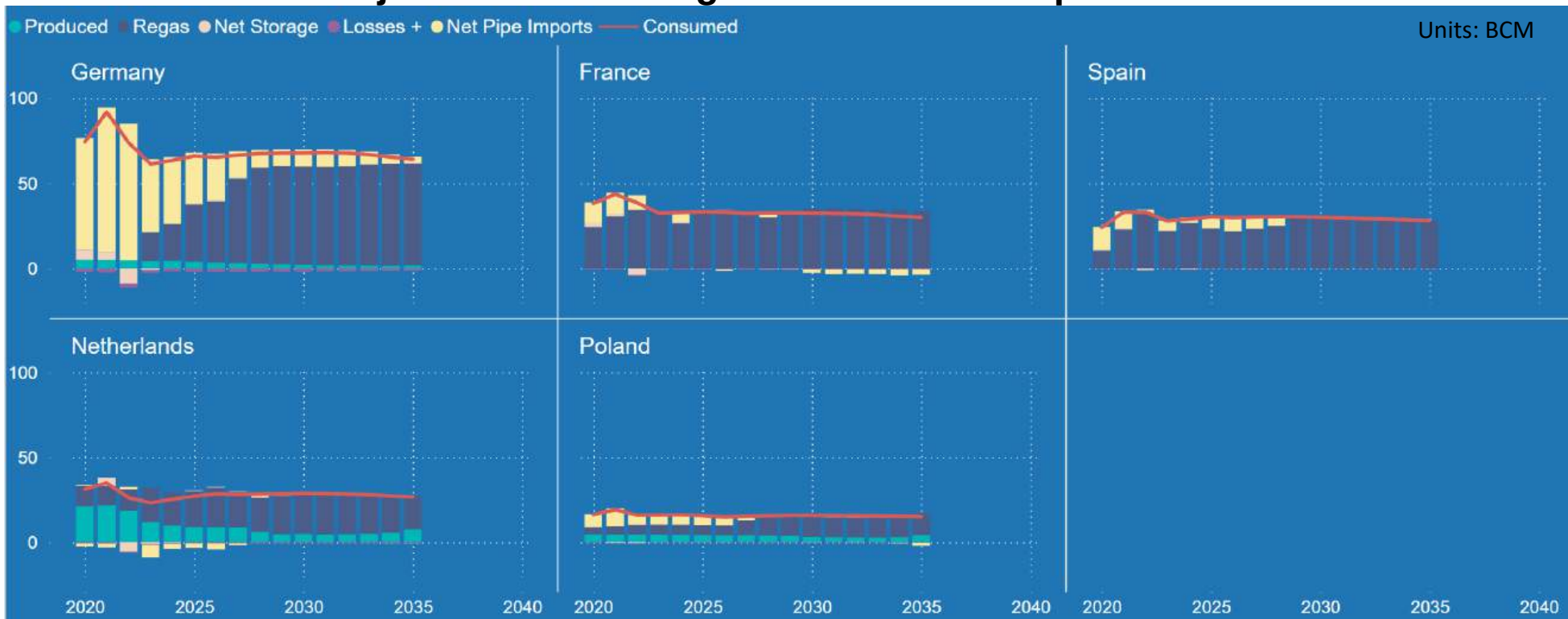
China has a diverse supply portfolio

- High Levels of production
- Access to Pipeline Imports
- Growing Regas capacity

Conversion: 600 BCM = ~ 58 Bcfd

Major LNG Importing Countries Europe

Gas Balance for Major NG Consuming Countries in Europe



European countries are losing both production and access to pipeline imports

Becoming more heavily reliant on LNG Imports

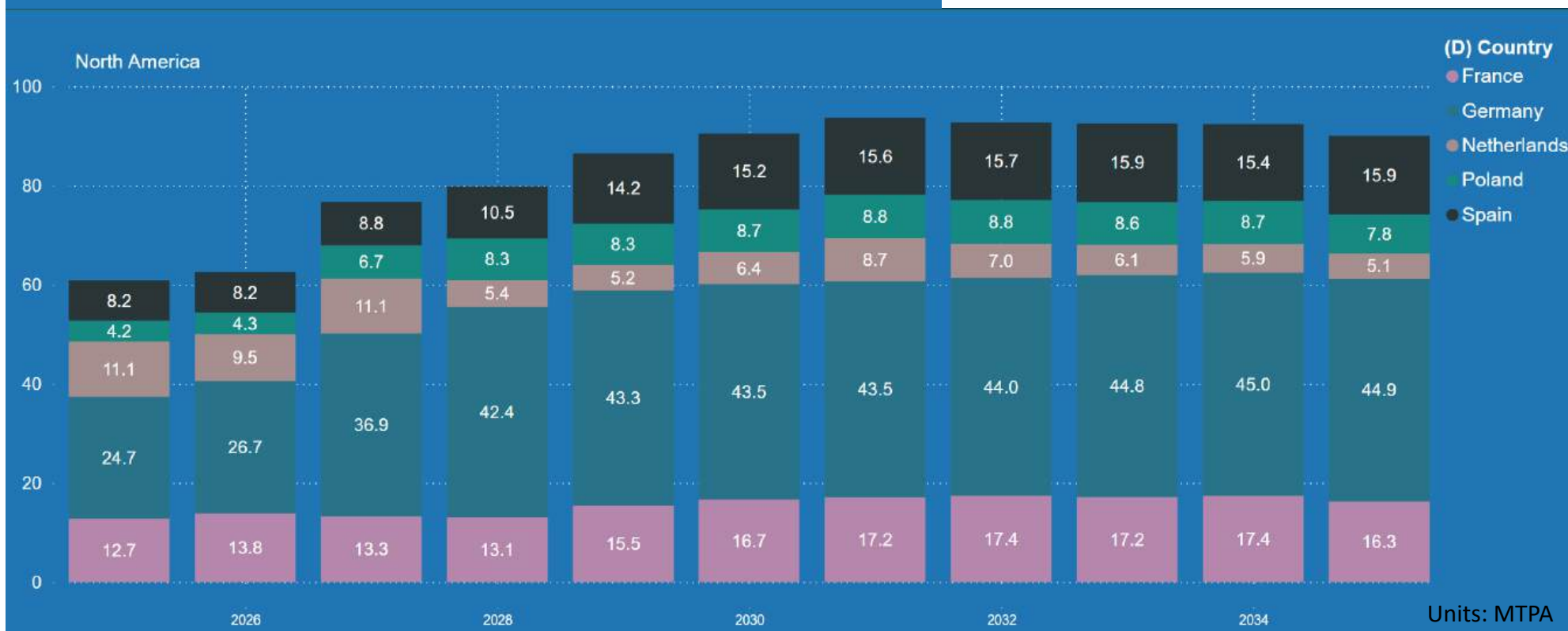
Conversion: 100 BCM = ~ 9.7 Bcfd

North American LNG Exports to Select EU Countries

Conversion: 93.7 MTPA = ~ 12.3 Bcfd

(S) Region	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
North America	60.9	62.5	76.7	79.8	86.5	90.4	93.7	92.7	92.5	92.4	90.0
France	12.7	13.8	13.3	13.1	15.5	16.7	17.2	17.4	17.2	17.4	16.3
Germany	24.7	26.7	36.9	42.4	43.3	43.5	43.5	44.0	44.8	45.0	44.9
Netherlands	11.1	9.5	11.1	5.4	5.2	6.4	8.7	7.0	6.1	5.9	5.1
Poland	4.2	4.3	6.7	8.3	8.3	8.7	8.8	8.8	8.6	8.7	7.8
Spain	8.2	8.2	8.8	10.5	14.2	15.2	15.6	15.7	15.9	15.4	15.9

Europe's declining production and pipeline imports driving growth in North American LNG



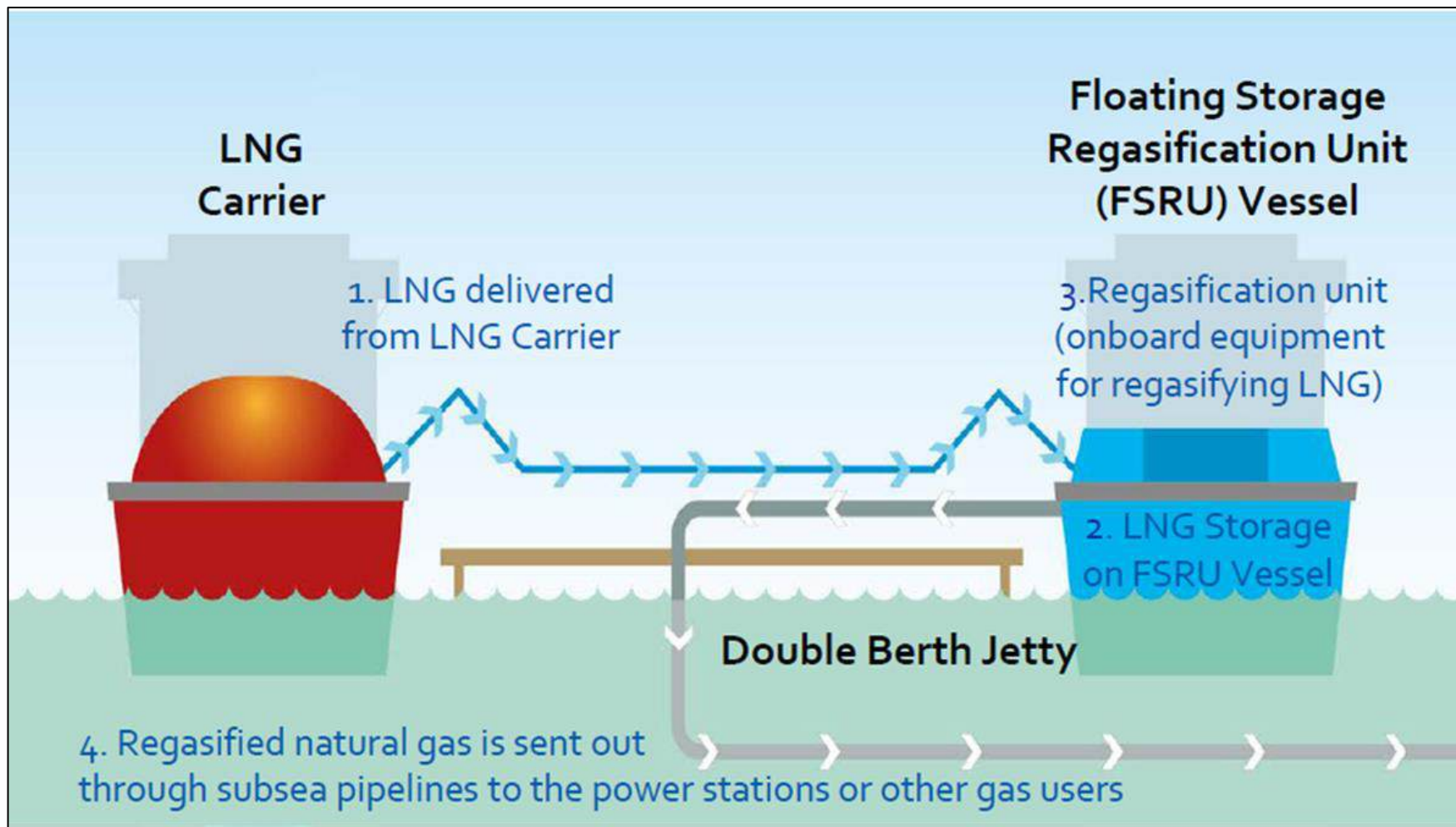


Floating Storage and Regasification Units (FSRU)



The world's largest floating storage and regasification unit (FSRU), *FSRU Bauhinia Spirit*, in Hong Kong April 13, 2023 (Source: MOL)

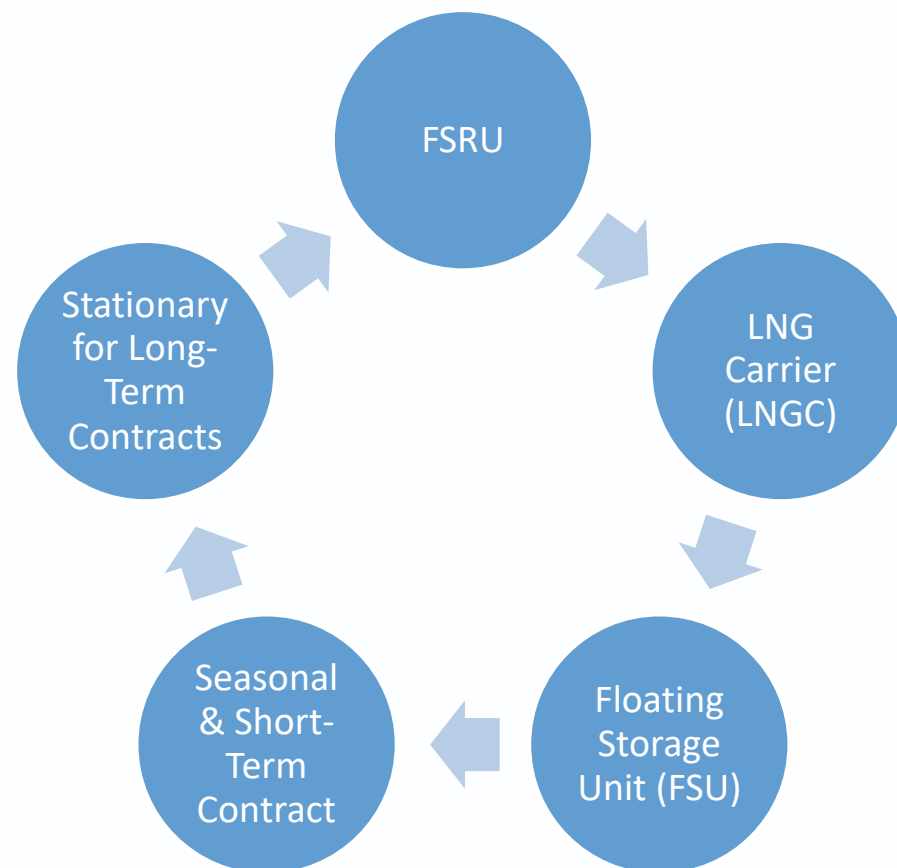
FSRU Set-up



- FSRUs are generally moored near demand locations
 - Industrial complexes
 - Electric generation plants
 - Major gas delivery pipeline
- FSRU are stationary when in operation and receive gas from LNG Carriers
- The gas can be stored or regasified and delivered to market

FSRU Versatility

Many FSRUs are Operationally Flexible



Movement of FSRU - Bauhinia Spirit



4/29/2021
United States
Loaded Cargo at Sabine Pass

May 2021
China
Unloading

Name Change	Max Capacity (mmcf/d)
MOL FSRU Challenger	720
Bauhinia Spirit	800 (upgraded send out)

11/1/2017

Turkey
Arrival

3/15/2022
Suez Canal
Transit

10/1/2022
Singapore
Upgrade

6/13/2023
China Hong Kong
First Commissioning load

Still located at shipyard 1/9/2023

FSRU

LNGC

Unknown

FSU

Maintenance

Unknown/Transit

Test

Comm.

FSRU

4/1/2021

Turkey
Com. Operation

Turkey
Departure

4/11/2022
Singapore
Arrival

12/17/2022
Singapore
Maintenance Finished

4/13/2023
China Hong Kong
Arrival

9/21/2023
China Hong Kong
Commercial operation

Long term contract

Moved to a new place

12/01/2023 Name	2018	2019	2020	2021	2022	2023
☒ Bauhinia Spirit (ex MOL FSRU Challenger)	4.10	4.10	4.10	4.10	4.10	4.10
Hong Kong					4.10	4.10
LNGC Hong Kong				4.10		
Turkey	4.10	4.10	4.10			
Total	4.10	4.10	4.10	4.10	4.10	4.10

6-month contract
(storage)

Source: GIIGNL 2019-2024 capacity in mtpa

How Big of a Market Share are FSRUs

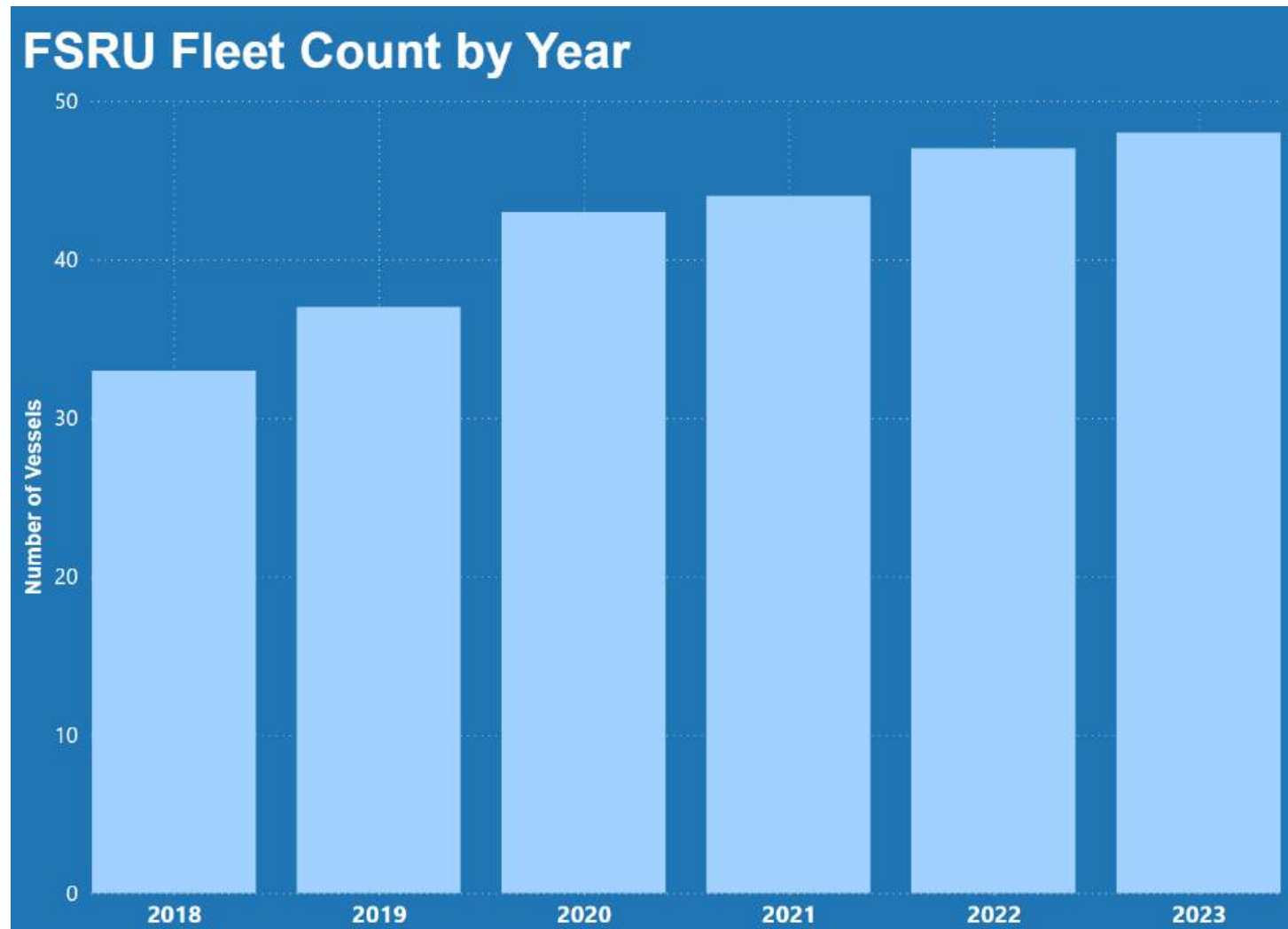
- In terms of total send out capacity, FSRUs represent about 20% of market share
- FSRUs operational flexibility means that not all send out capacity will be available for Regas
- A portion of the market will likely be in transition, under maintenance or used as and LNGC

Annual Regas Capacity		2018	2019	2020	2021	2022	2023
Scenario		<i>mtpa</i>	<i>mtpa</i>	<i>mtpa</i>	<i>mtpa</i>	<i>mtpa</i>	<i>mtpa</i>
24Q1Base	Total Regas	755.6	777.6	809.4	837.1	905.2	1,031.0
GIIGNL	FSRU	129.5	154.6	171.6	172.1	177.3	185.5
	FSRU %	17.1%	19.9%	21.2%	20.6%	19.6%	18.0%

Fleet Size is steadily Growing

12/01/2023 Name	2018	2019	2020	2021	2022	2023
Alexandroupolis (ex Gaslog Chelsea)					4.1	4.1
Bauhinia Spirit (ex MOL FSRU Challenger)	4.1	4.1	4.1	4.1	4.1	4.1
BW Batangas (ex BW Paris)		4.2	4.2	4.2	4.2	4.2
BW Integrity	5.0	5.0	5.0	5.0	5.0	5.0
BW Magna		5.7	5.7	5.7	5.7	5.7
BW Singapore	5.7	5.7	5.7	5.7	5.7	5.7
BW Tatiana (ex Gallina)					2.0	2.0
Cape Ann (ex GDF Suez Cape Ann)	3.7	3.7	3.7	3.7	3.7	3.7
Eemshaven LNG (ex S188)	4.6	4.6	4.6	4.6	4.6	4.6
Energos Celsius (ex Golar Celsius)					6.0	6.0
Energos Eskimo (ex Golar Eskimo)	3.8	3.8	3.8	3.8	3.8	3.8
Energos Freeze (ex Golar Freeze)	3.6	3.6	3.6	3.6	3.6	3.6
Energos Igloo (ex Golar Igloo)	5.8	5.8	5.8	5.8	5.8	5.8
Energos Nanook (ex Golar Nanook)	5.5	5.5	5.5	5.5	5.5	5.5
Energos Winter (ex Golar Winter)	3.8	3.8	3.8	3.8	3.8	3.8
Ertugrul Gazi				4.1	4.1	4.1
Excelsior			6.0	6.0	5.6	5.6
Excellence	3.8	3.8	3.8	3.8	3.8	3.8
Excelsior	3.5	3.5	3.5	3.5	3.5	3.5
Exemplar	4.8	4.8	4.8	4.8	4.8	4.8
Expedient	4.5	5.2	5.2	5.2	5.2	5.2
Experience	6.0	6.0	6.0	6.0	6.0	6.0
Explorer	6.0	6.0	6.0	6.0	6.0	6.0
Express	4.8	3.8	3.8	3.8	3.8	3.8
Exquisite	4.8	4.8	4.8	4.8	4.8	4.8
FSRU Toscana	2.8	2.8	2.8	2.8	2.8	2.8
Golar Spirit	1.8	1.8	1.8	1.8	1.8	1.8
Golar Tundra	5.5	5.5	5.5	5.5	5.5	5.5
Høegh Esperanza	3.0	6.0	6.0	3.7	3.8	3.8
Høegh Gallant	2.8	2.8	2.8	2.8	2.8	2.8
Høegh Galleon		3.7	3.7	3.7	3.7	3.7
Høegh Gannet	5.5	5.5	5.5	5.7	5.7	5.7
Høegh Glent	3.7	3.7	3.7	3.7	3.7	3.7
Høegh Grace	3.0	4.0	4.0	2.8	2.8	2.8
Hua Xiang (ex Hua Xiang 8)			0.1	0.1	0.1	0.1
Independence	2.9	4.0	4.0	2.9	2.9	2.9
Jawa Satu			2.4	2.4	2.4	2.4
KARMOL LNGT Powership Africa (ex Dwi putra)					1.0	1.0
KARMOL LNGT Powership Asia (ex Northwest Shearwater)					2.7	2.7
Karunia Dewata	0.4	0.3	0.4	0.4	0.4	0.4
LNG Croatia (ex Golar Viking)			1.9	1.9	2.1	2.1
Marshal Vasilevskiy	2.0	2.0	2.0	2.0	2.0	2.0
Neptune (ex GDF Suez Neptune)	3.7	3.7	3.7	3.7	3.8	3.8
Nusantara Regas Satu (ex Khanun)	3.0	3.0	3.0	3.0	3.0	3.0
PGN FSRU Lampung	1.8	2.9	2.9	2.7	2.7	2.7
Summit LNG (ex Excelsior)	3.8	3.8	3.8	3.8	3.8	3.8
Torman			2.0	2.0	2.0	2.0
Turquoise P		5.7	5.7	5.7	5.7	5.7
Vasant 1			5.0	5.0	5.0	5.0
Total	129.5	154.6	172.1	171.6	177.3	185.5

Source: GIIGNL, RBAC



Modeling Complexities

- Operational Flexibility allows FSRUs to move between regas and LNGC markets
- Varying contract duration: Seasonal, Short-Term and Long-Term contracts all possible
- During transit and maintenance periods these vessels are not part of the LNGC or regas markets

In Conclusion

- Demand for Natural Gas is Growing Primarily in the Middle East and Asia
- Growth in European and Asian markets is driving North American LNG Exports
- North American LNG Exports will become the largest sector in the US by 2030
- FSRUs are increasingly becoming an integral part of the growing global regas market



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