



Japan's Power Crisis and Turmoil in the Middle East/North Africa: Impact on Global Oil and Gas Market Dynamics

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By

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I. JAPAN: THE FUKUSHIMA CRISIS

- The 9.0 magnitude earthquake, followed by tsunamis, hit northeast Japan on March 11, 2011 and damaged the basic infrastructure of many power plants.
- The following went offline:
 - 9.7 GW of nuclear power capacity
 - 9 GW of thermal power capacity
 - 620 kb/d of oil refining capacity (14% of Japan's total)
- The electric utilities affected:
 - Tokyo Electric Power Co. (TEPCO)
 - Tohoku Electric Power Co.
 - Japan Atomic Power Co.

Japan: TEPCO's Power Supply Shortage

- TEPCO is Japan's largest electric utility.
 - Supplying 29% of Japan's total electricity, including Tokyo.
- TEPCO's output remains roughly 30% below normal peak demand for this time of year.
- TEPCO can buy only 1 GW from other utilities.
 - Japan's power grid operates on two different frequencies.
 - East (TEPCO and Tohoku) runs on 50 hertz power.
 - West (Kansai Electric and Chubu Electric) is on 60 hertz.
- TEPCO is short of power supply capacity and has started a program of rolling blackouts.

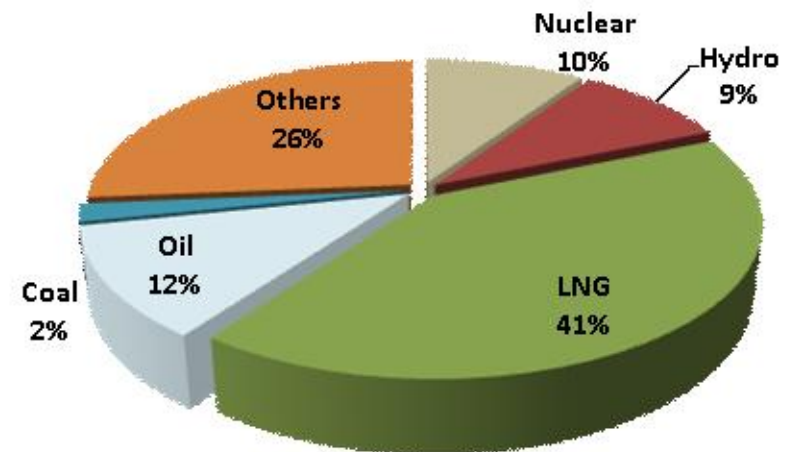
Japan: TEPCO's Summer Supply Outlook (1)

- In 2010, Tokyo's peak summer electricity demand was 60 GW.
 - Summer 2010 was abnormally hot.
- This year, TEPCO hopes to increase its supply capacity (including purchases from others) to 52 GW by summer from the current 47 GW in April.
- The government will likely restrict summer 2011 electricity use.
- Expected restrictions on electricity use:
 - Big companies to cut by 25%
 - Small companies to cut by 20%
 - Residential users to cut by 15%

Japan: TEPCO's Summer Supply Outlook (2)

- To make up for the loss of base-load nuclear capacity:
 - TEPCO ramped up generation at its functioning plants and started up backup plants.
- By summer, LNG-fired output is forecast to account for 41% of TEPCO's total output.
- Monthly fuel consumption:
 - LNG: 2.1 mmt (up 16% y-o-y)
 - Oil: 165 kb/d (up 5% y-o-y)
 - Coal: 227 kt (down 41%*)

Outlook: TEPCO's Power Generation by Source in Summer (52 GW)



**TEPCO's Fukushima-based coal-fired powerplant will remain closed indefinitely.*

Japan: Adverse Impacts on the Economy

- The following key factors will adversely affect the economy for 2011:
 - A rolling blackouts program is affecting industrial activities, as well as consumer spending in the Kanto district.
 - Damaged infrastructure such as roads, port facilities, sewage systems, hospitals, and other public offices are affecting the distribution of goods and services.
 - Subdued consumer spending is envisaged.
 - Rearrangement of the government budget for FY2011, as Japan needs funds for reconstruction projects.

Japan: Nuclear Power Targets

- The government has long set an ambitious nuclear policy.
- Currently, Japan has 55 nuclear units that provide 49.6 GW of capacity, almost 30% of Japan's power needs.
- This strategy aimed to achieve Kyoto climate change goals and diversify Japan's energy mix away from oil, thereby reducing its energy reliance on the Middle East.
- The current targets call for nuclear power to comprise 50% of Japan's total power generation by FY2030:
 - Build 12-14 additional nuclear units.
 - Boost the utilization ratio of operating units from the pre-disaster level of 71% to 85-90%.

Japan: Longer-Term Policy Implications (1)

- Both the expansion of existing nuclear plant capacities and the construction of new plants will face stricter safety regulations and approval processes, if they are able to overcome public opposition at all.
- Several salient aspects will be critical for the Japanese government to review:
 - Stricter regulations on protective measures against natural disasters for new construction of power plants.
 - The viability of Japan's nuclear fuel cycle program.
 - Japan's 25% greenhouse gas emission reduction target by 2020 and more realistic means of achieving this.
 - The government's plans to eliminate Japan's "excess" oil refining capacity, as Japan continues to face unexpected nuclear power shutdowns.

Japan: Longer-Term Policy Implications (2)

- There is a dire need for an integrated energy policy in Japan based on realities, not unreachable targets.
- Japan's policy towards electricity supply and the role of fossil fuels needs to be integrated with a realistic assessment of all renewable energy, including nuclear power.
- Prior to the disaster, METI had required closure of 1.3 mmb/d by end fiscal year 2013, with a longer term goal of as much as 2 mmb/d of refining capacity to be closed by 2020 from the 2010 level.
- The policy then needs to be integrated with how much refinery capacity closures are required and whether such closures are consistent with an overall realistic integrated policy towards future energy use in Japan.

II. TURMOIL IN THE MIDDLE EAST/ NORTH AFRICA

- **Libya:** Fighting will be protracted – **1.6 mmb/d of production and 1.2 mmb/d of exports** mostly out.
- **Egypt, Tunisia, and Yemen:** Limited impact on oil supplies.
- **Bahrain:** Limited impact on oil supplies **but psychologically important.**
- **Algeria: Wild card** – currently produces 1.2 mmb/d and exports ~800 kb/d of crudes.
- There is **zero chance** of a threat to key oil producers Saudi Arabia, Kuwait, the UAE, and Qatar **as millionaires do not go to the street and face bullets.**
- The wind of change is upon us and protests will continue for a number of years. **But we cannot panic with every protest or crisis after crisis.** We must get used to it.
- **There is no US\$200/b in front of us in the near term** as the overall stock level is still high and Saudi Arabia has more than 3 mmb/d of spare capacity.
- **But, oil prices will be more volatile.**

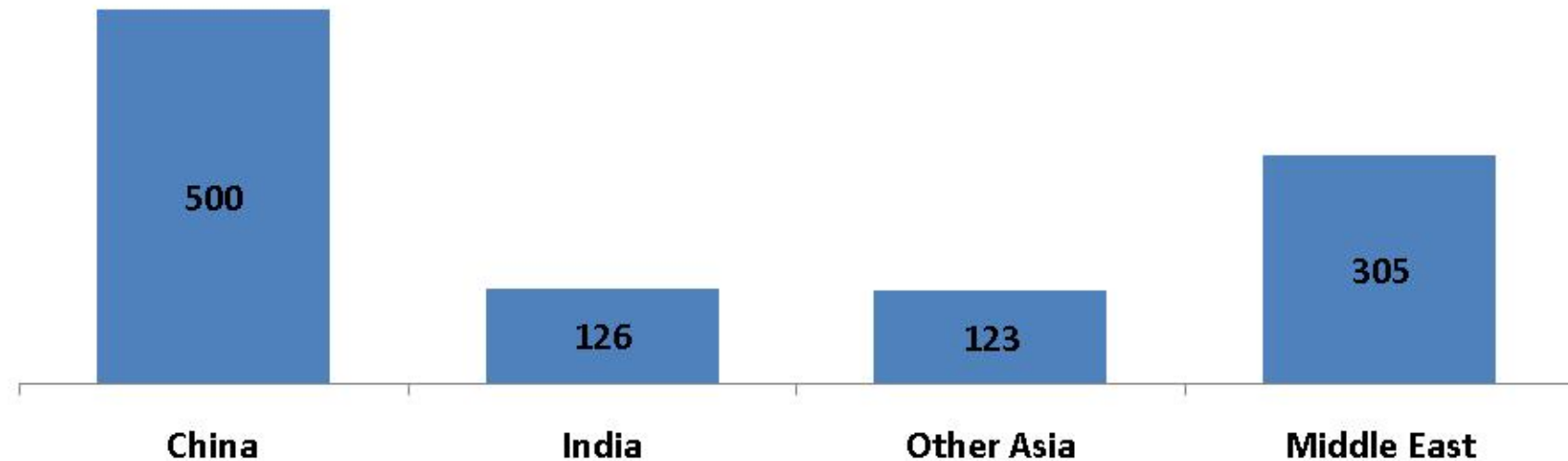
OIL Market

The Market Fragility: OPEC & US Can Do More?

- The market fragility is demonstrated by the price response to a small loss in Libyan oil industry.
- OPEC could and must raise production further and be vocal and public about it.
- OPEC is “too quiet,” so is the US.
- Emphatic statement on the expected price range by OPEC, and the US threat of potential use of SPR can cool the market.
- Paper markets respond positively to strong Saudi positions.

Long Term: Market Tightness Will Return

Annual “Base-Load” Demand Growth: 2010-2020, kb/d



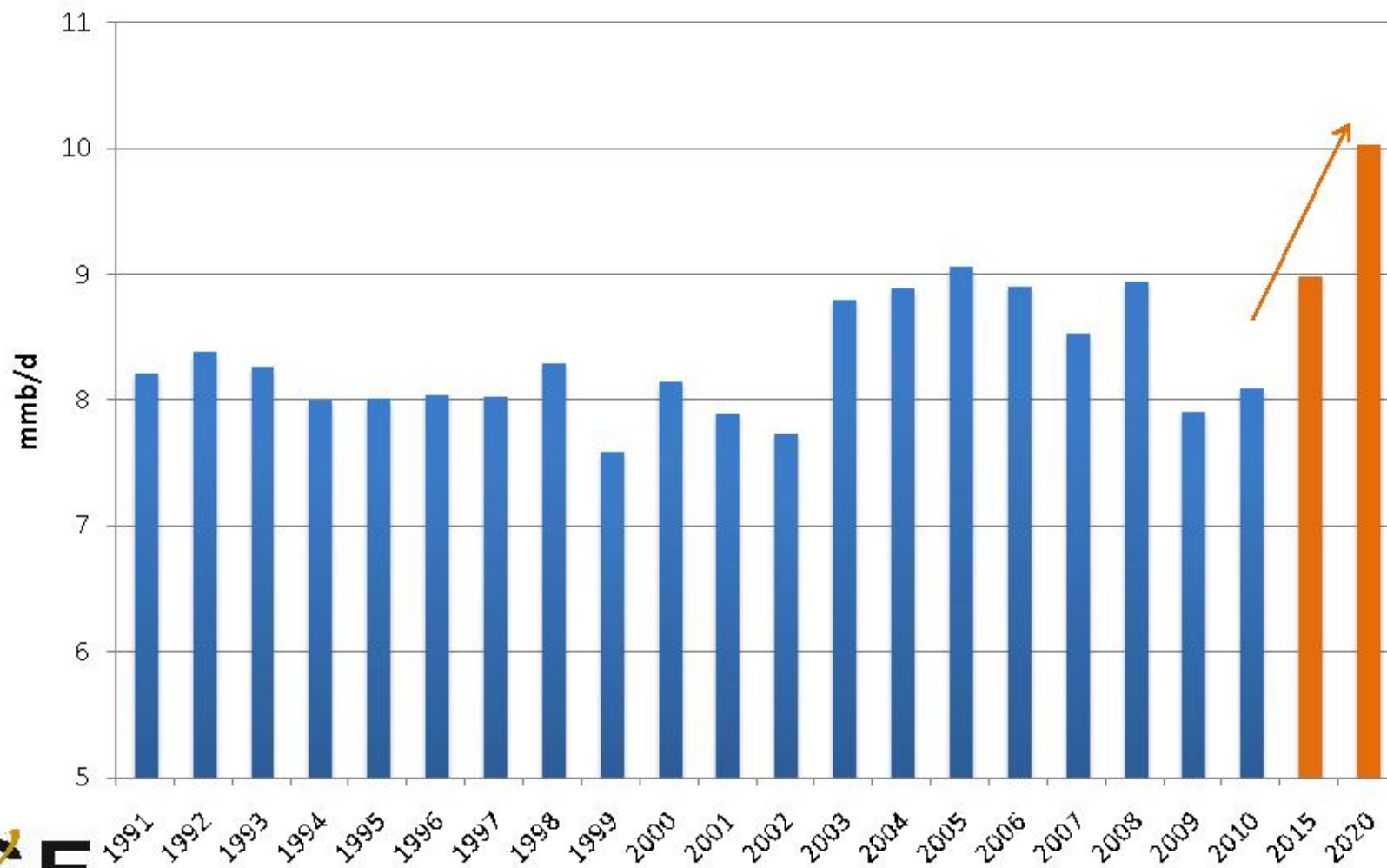
Structural Demand Shift:

- OECD countries – Oil demand has peaked.
- Non-OECD countries – Strong “base-load” demand growth of **1.0-1.1 mmb/d** in the next decade.

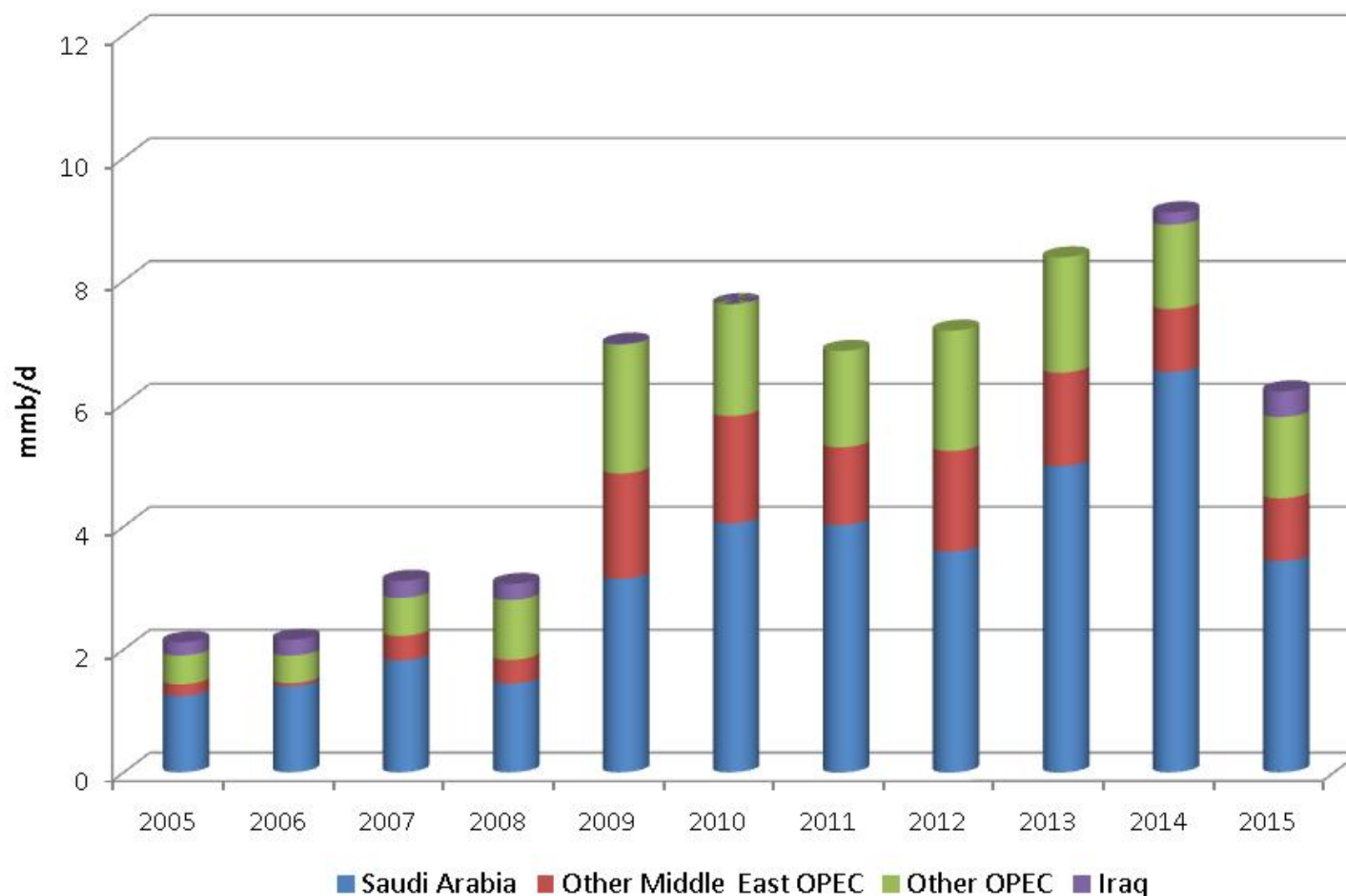
Saudi Arabia Has to Increase Future Production

In the past twenty years, Saudi Arabian production has not changed much, but it will have to increase its production significantly to meet future demand.

Saudi Arabia Crude Production

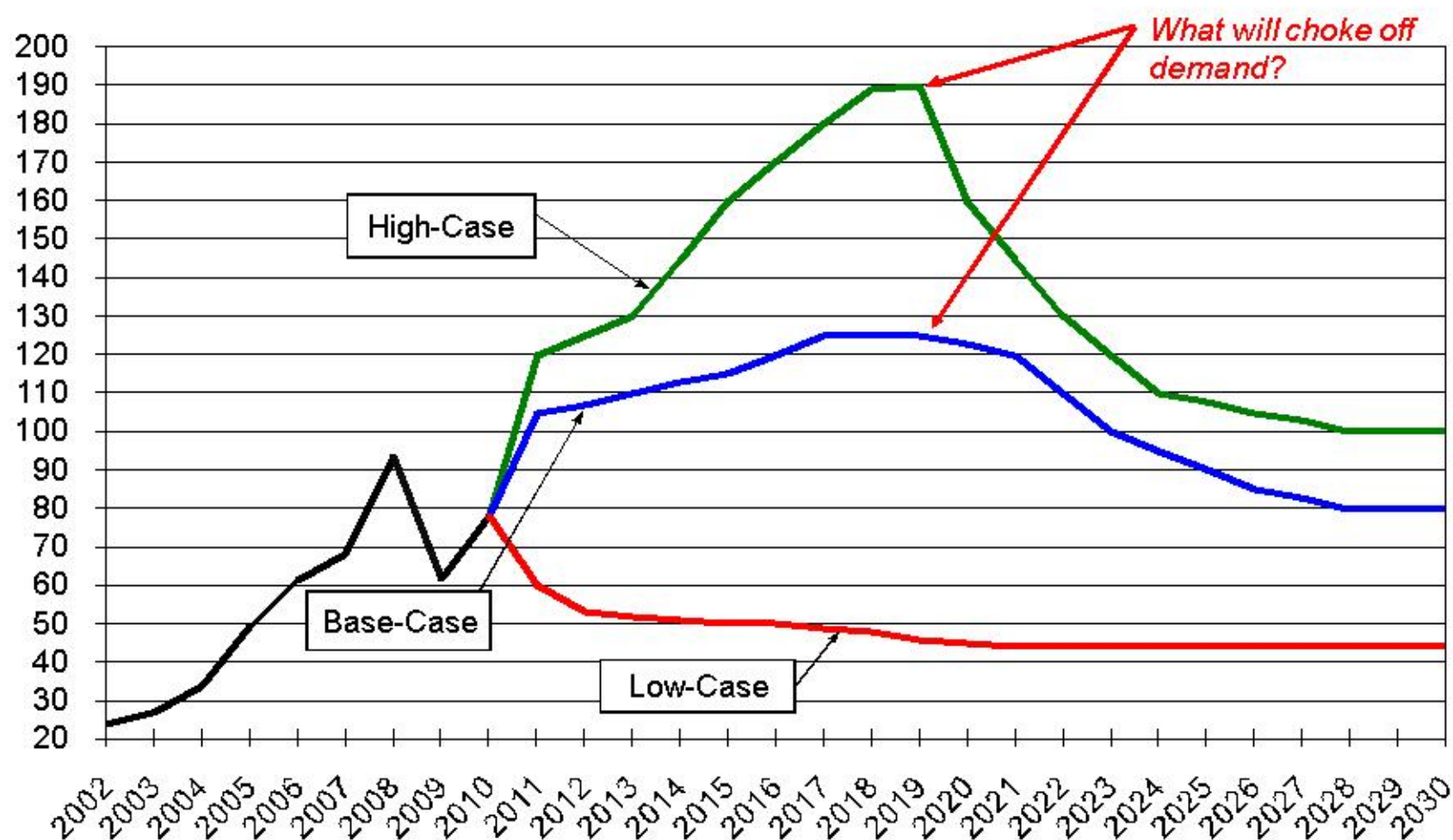


Wild Card: Sustained OPEC Spare Capacity?



Longer-Term Oil Market Still Seen as Bullish

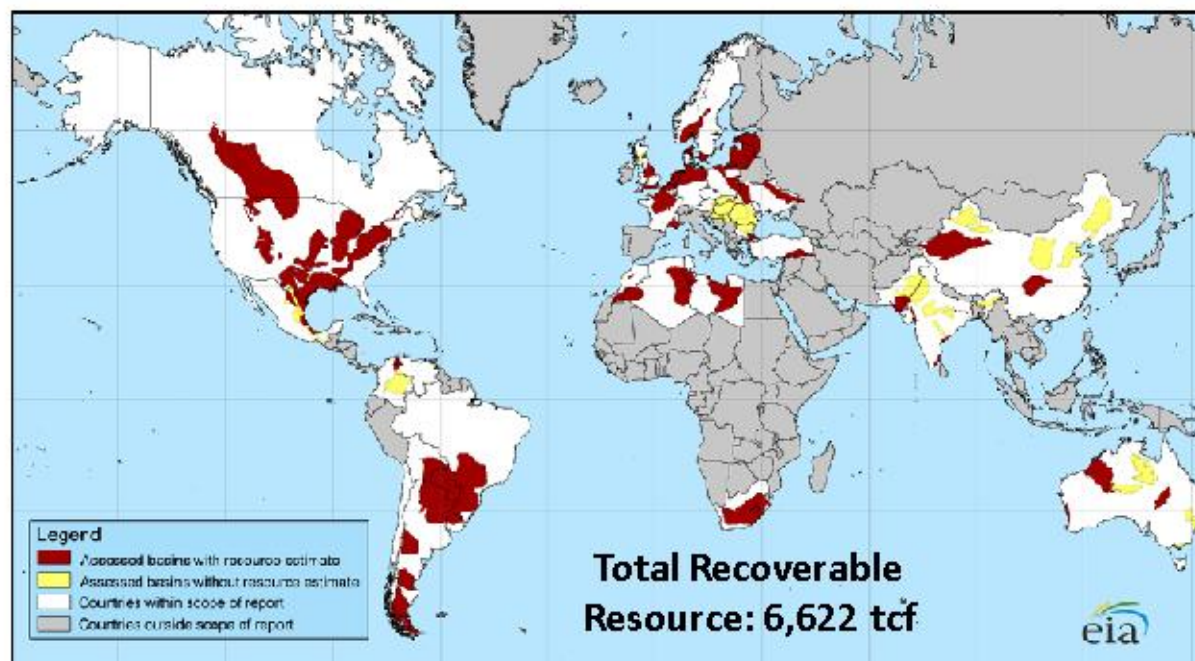
High, Base, and Low Price Forecasts for Dubai, US\$/b



Note: Actual up to 2010 and forecasts in 2011\$ thereafter.

LNG Market

EIA Latest Shale Study



Europe	Proven	Technically
	Natural Gas Reserves (tcf)	Recoverable Shale Gas Resources (tcf)
France	0.2	180
Germany	6.2	8
Netherlands	49	17
Norway	72	83
UK	9	20
Denmark	2.1	23
Sweden		41
Poland	5.8	187
Turkey	0.2	15
Ukraine	39	42
Lithuania		4
Others*	2.71	19
Total		639

* Bulgaria, Hungary, and Romania.

South America	Proven	Technically
	Natural Gas Reserves (tcf)	Recoverable Shale Gas Resources (tcf)
Venezuela	178.9	11
Colombia	4	19
Argentina	13.4	774
Brazil	12.9	226
Chile	3.5	64
Uruguay		21
Paraguay		62
Bolivia	26.5	48
Total		1,225

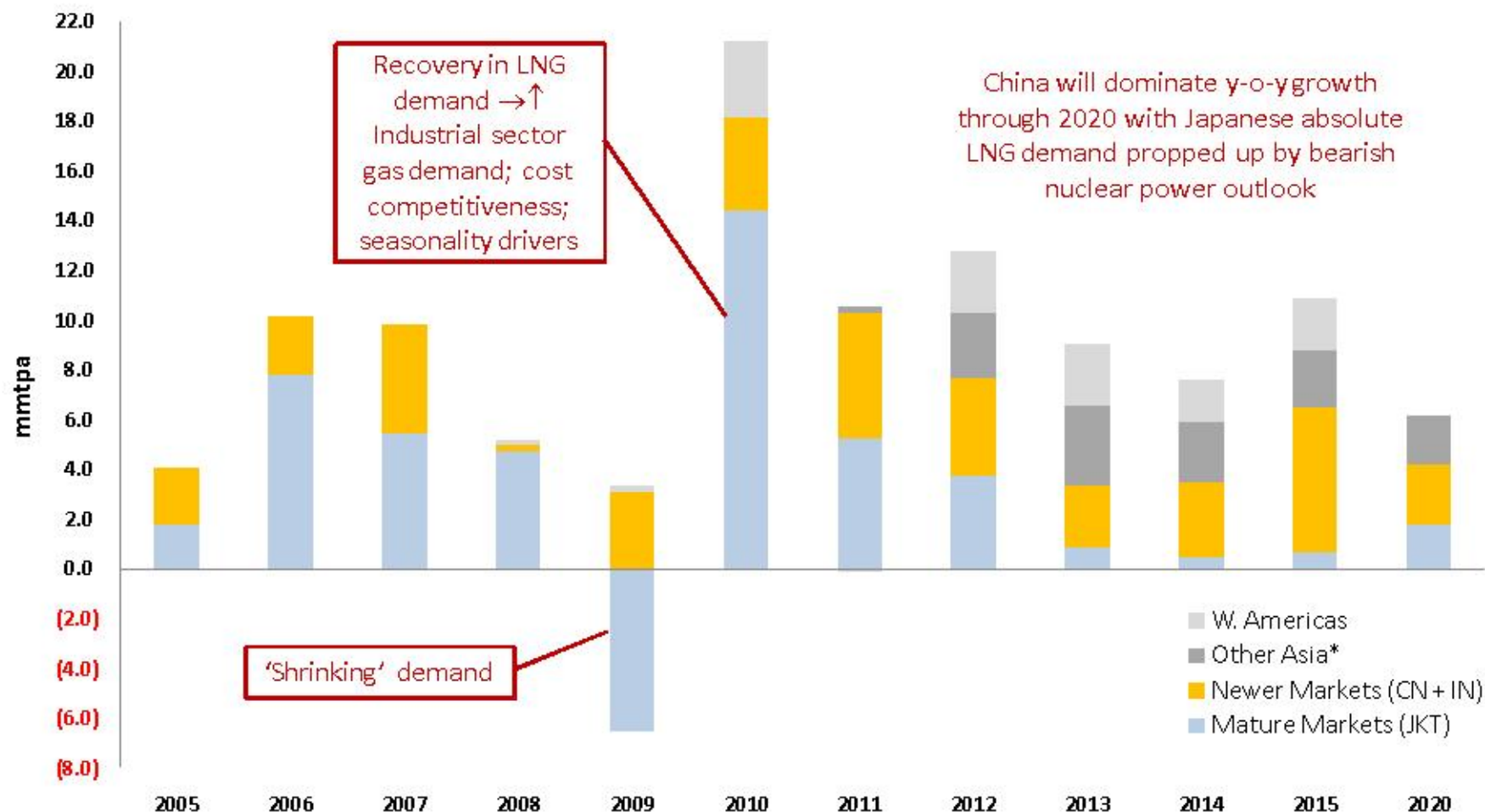
Africa	Proven	Technically
	Natural Gas Reserves (tcf)	Recoverable Shale Gas Resources (tcf)
South Africa		485
Libya	54.7	290
Tunisia	2.3	18
Algeria	159	231
Morocco	0.1	11
Western Sahara		7
Mauritania	1	0
Total		1,042

Asia (incl. AU)	Proven	Technically
	Natural Gas Reserves (tcf)	Recoverable Shale Gas Resources (tcf)
China	107	1,275
India	37.9	63
Pakistan	29.7	51
Australia	110	396
Total		1,785

North America		
US	272.5	862
Canada	62	388
Mexico	12	681
Total		1,931

Longer-Term Outlook: Who Leads the Growth?

Asia Pacific LNG Imports by Country (Year-on-Year Change)



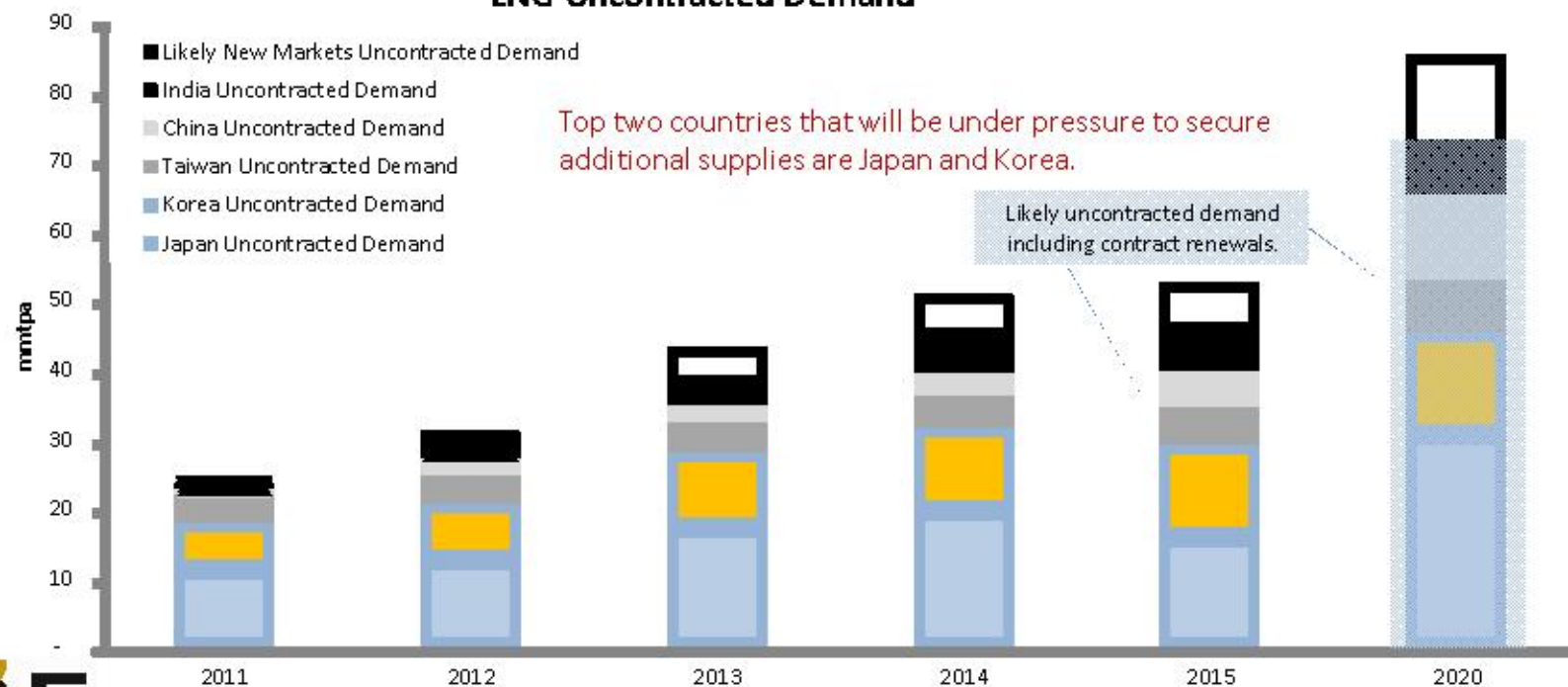
* Includes Indonesia, Malaysia, Pakistan, Singapore, and Thailand.

Asia Overview: Imports and Uncontracted Demand

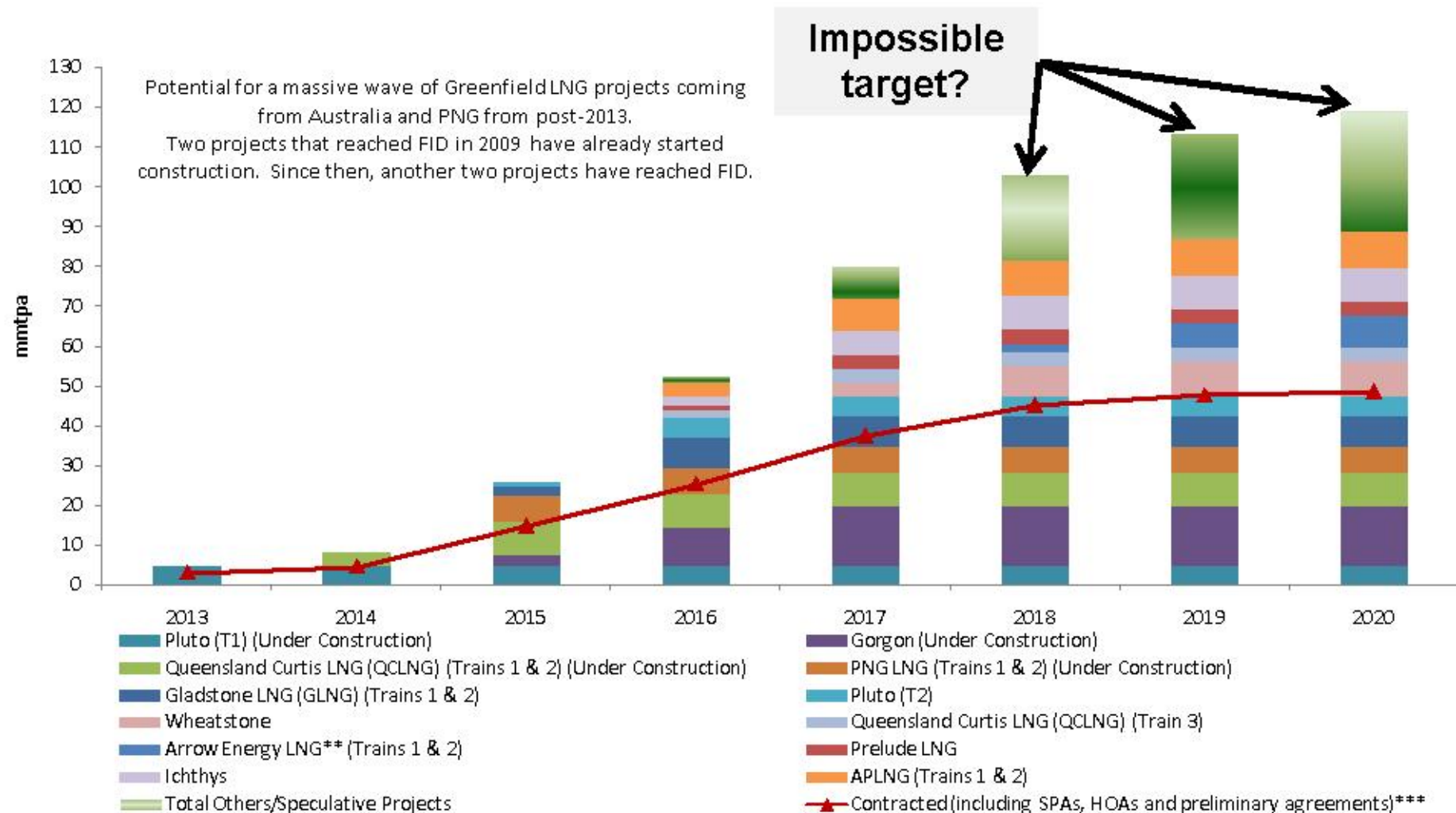
Asia Pacific LNG Import Forecasts Scenarios (mmtpa)											
Base Case							Total Asia Pacific				
	Japan	South Korea	Taiwan	India	China	Likely New Markets*	Mature Markets	Emerging/ New Markets	Total Asia	West American Coast	Total Asia Pacific
2008	69.3	27.3	9.0	8.2	3.3	0.0	105.5	11.5	117.0	0.2	117.2
2009	64.6	25.8	8.6	9.1	5.5	0.0	99.0	14.6	113.6	0.5	114.1
2010	70.0	32.6	10.8	8.9	9.4	0.0	113.5	18.3	131.8	3.6	135.4
2011	72.6	34.7	11.4	10.3	13.0	0.3	118.7	23.6	142.3	3.5	145.8
2012	75.3	35.9	11.3	10.8	16.4	2.9	122.5	30.1	152.6	6.0	158.6
2015	76.2	36.7	11.7	13.3	25.2	10.8	124.6	49.3	173.9	12.3	186.2
2020	79.7	40.1	14.3	15.1	37.5	20.3	134.1	72.9	207.0	14.3	221.3

*Includes Indonesia, Malaysia, Pakistan, Singapore, and Thailand.

LNG Uncontracted Demand



Massive Wave of Planned Australasia Projects*

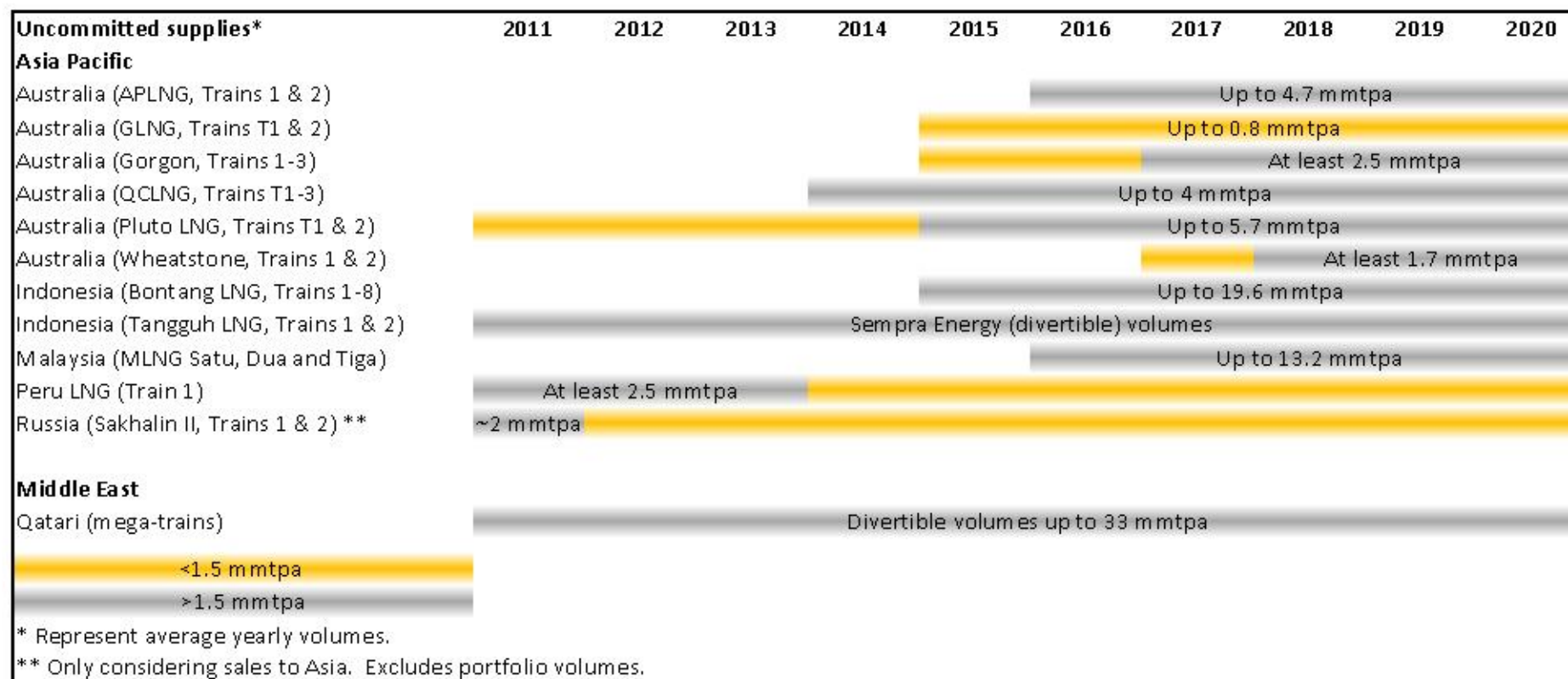


* Indicative commissioning dates and non-exhaustive list.

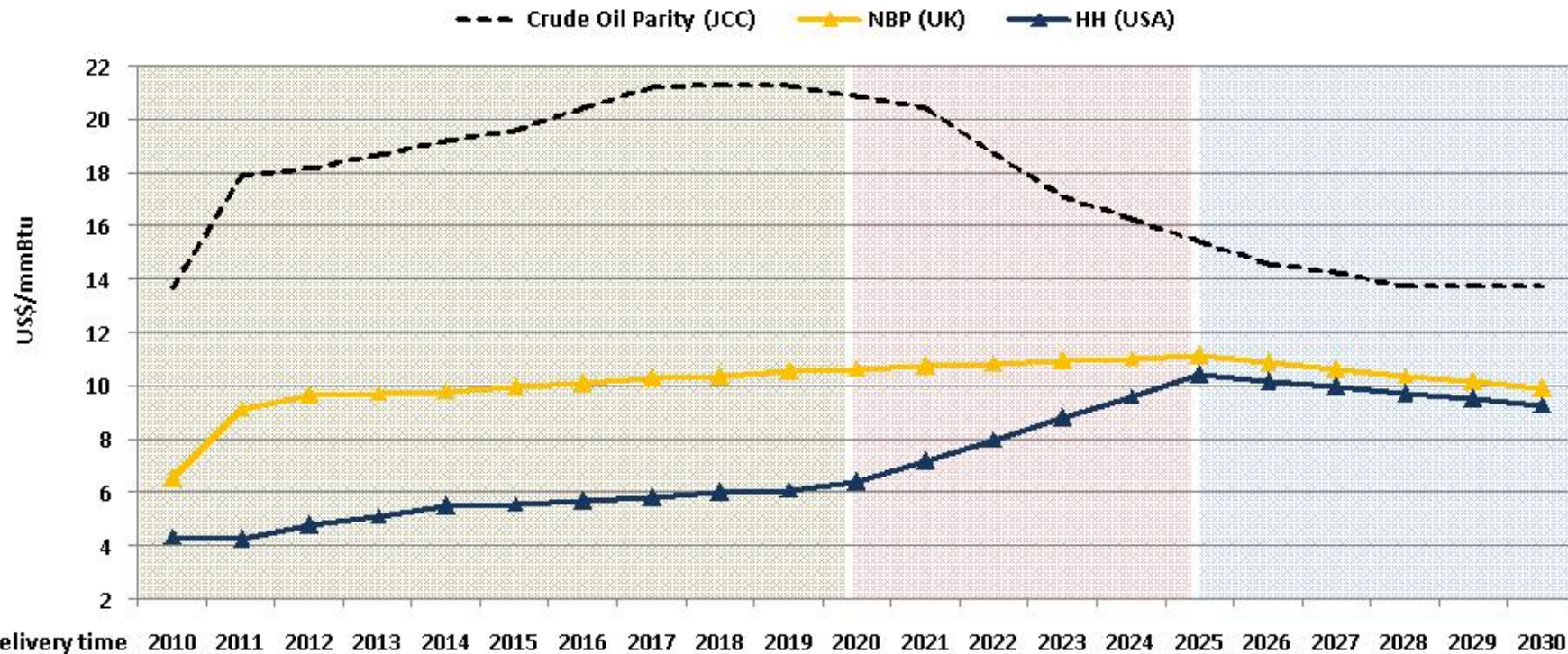
** Shell-PetroChina.

*** Excludes LNG from Asian buyers' equity stake in LNG projects.

Supplies: Where Can East of Suez Buyers Turn To?



Projected Price HH, NBP, and JCC (\$2011)



Delivery time 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030

2010-2020

- Widening differential between oil and gas prices.
- Driven by gas-on-gas competition.
- While US shale gas production is expected to grow, FGE's projections are less bullish compared to EIA's.

2020-2025

- Market starts adjusting itself after years of disconnect between oil and gas prices.
- Steeper upward trend in HH reflective of higher costs from rising oil prices and limit on domestic surplus situation.
- More shale gas production expected but increasingly "unfriendly" investment environment increases costs.
- Potential LNG exports may also contribute to narrowing in HH differentials.

2025-2030

- Gas prices in the US start to track oil product prices more closely—as they have in the past.
- Forecasts follow a more methodological approach: dual product-price-based method, closely linked with FGE projections of gasoil and fuel oil prices.

III. CONCLUSIONS

- The oil market is fragile and nervous. Prices do not reflect fundamentals.
- OPEC/Saudi and US role critical in calming markets.
- Japan crises leads to a review of nuclear policy—all over the world.
- In the short to medium term, nuclear plans will be slowed down, but more will re-emerge in the longer term. There really is no choice.
- In the near to medium term, there will be more oil and more LNG, and even more coal...concerns about carbon must give way to market realities.
- LNG markets are in a state of confusion after the Japanese crisis. But, there is plenty of LNG scheduled to enter the market.
- Major problem is expected huge delays in Australian conventional and non-conventional LNG. This might lead to a near-term shortage. We must clearly distinguish between short term and long term availability.
- US shale gas growth is here to stay and LNG exports from the US are a serious possibility.

Thank You

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