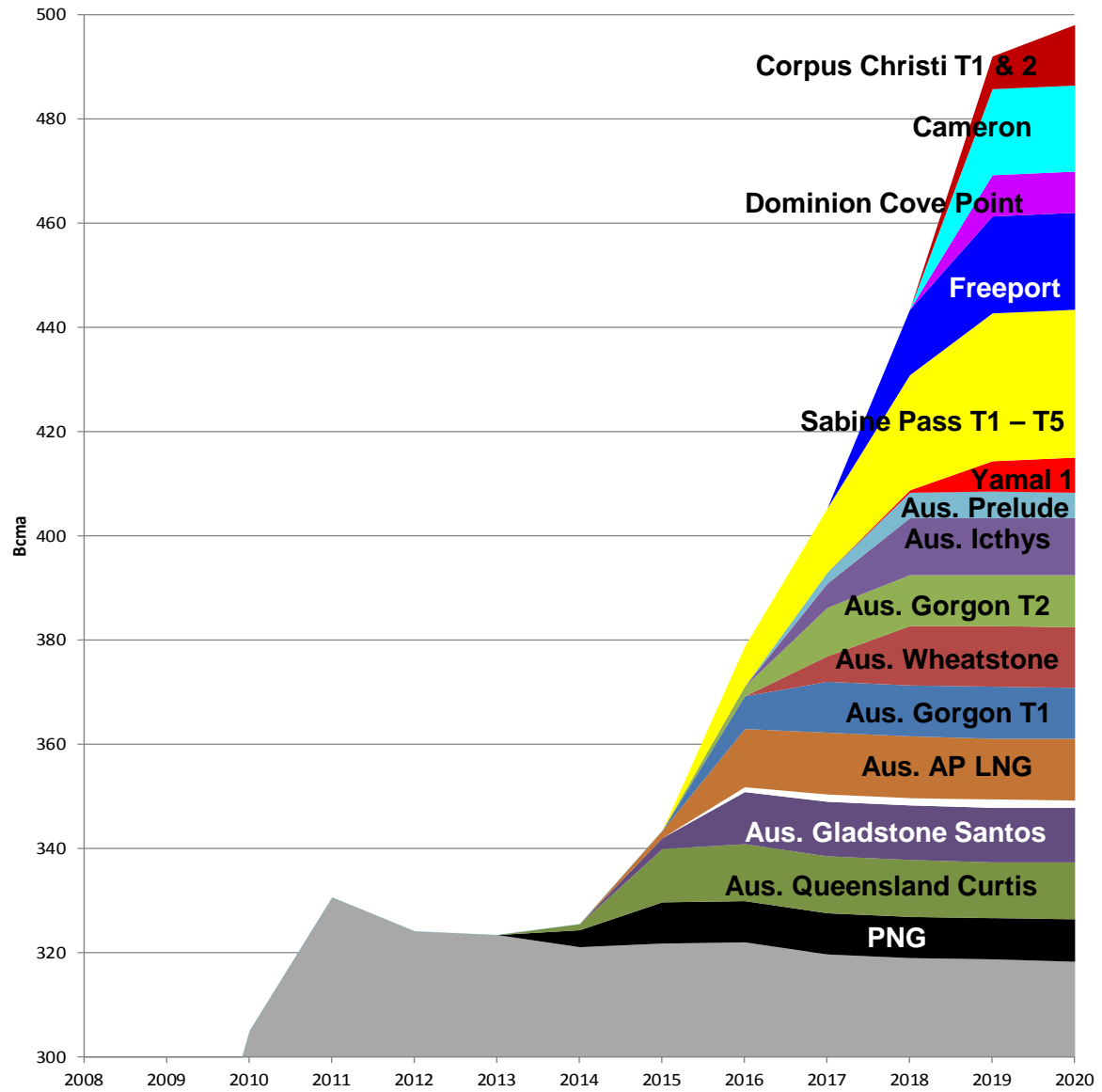


Asian LNG Market Development to 2025: pricing and contractual challenges

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Global LNG Liquefaction capacity – existing & FID'd/under construction 2008 - 2020

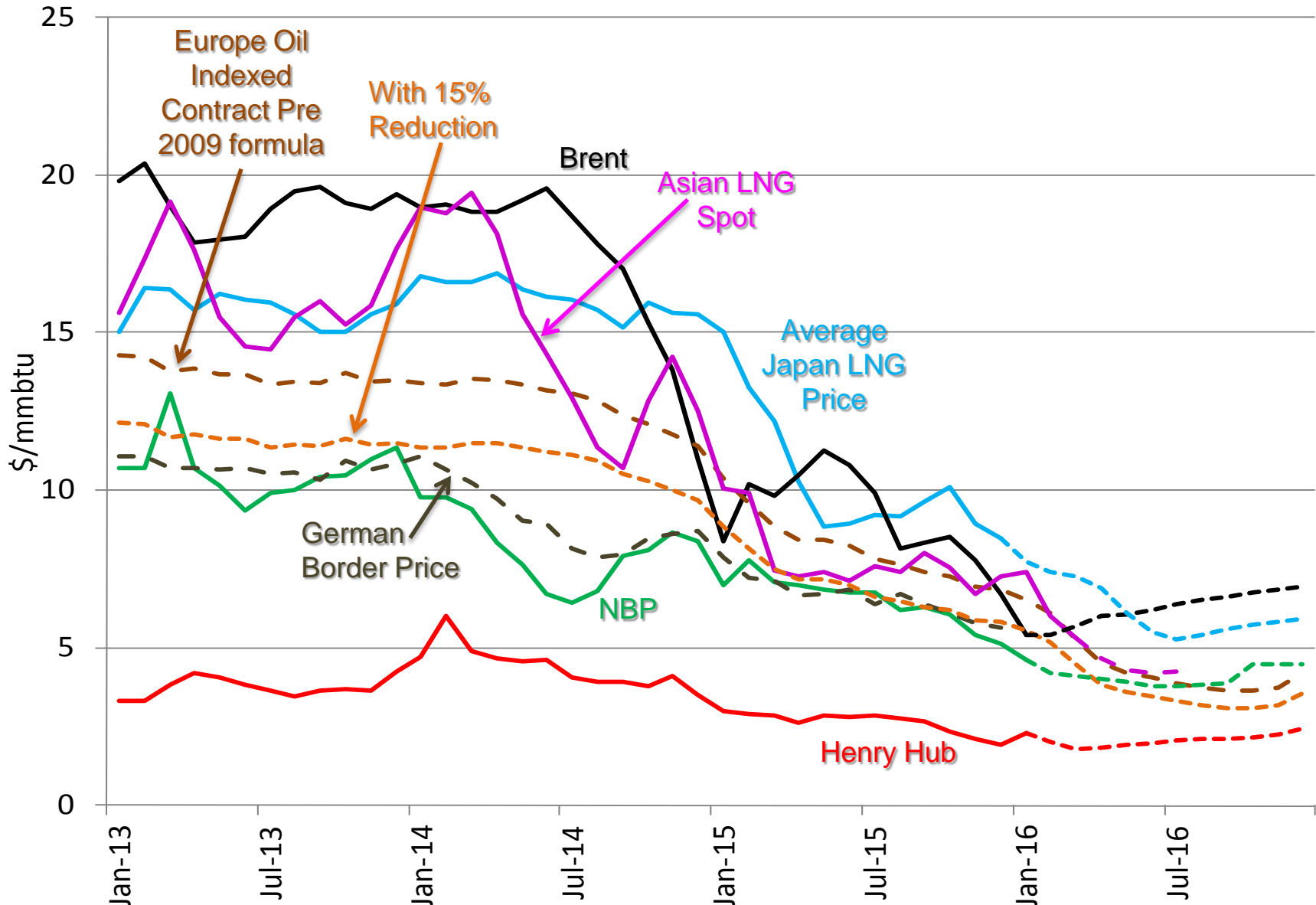


Global export capacity will expand by 50% 2015-2020

- USA - Corpus Christi T1& 2
- USA - Cameron LNG
- USA - Dominion Cove Point
- USA - Freeport
- USA - Sabine Pass T1 - T5
- Russia - Yamal 1
- Australia - CSG Curtis (Shell/Petrochina)
- Australia - Prelude
- Australia - Icthyus
- Australia - Gorgon T2
- Australia - Wheatstone
- Australia - Gorgon T1
- Australia - Asia Pacific LNG (CP)
- Malaysia - Sarawak
- Australia - Gladstone Santos
- Australia - Queensland Curtis
- Papua New Guinea - Hides
- Existing



Since 2014 Gas/LNG prices have fallen and regional price levels have converged (the 'Asian premium' disappears!)



SOURCES: Platts, EIA, Argus, CME, OIES



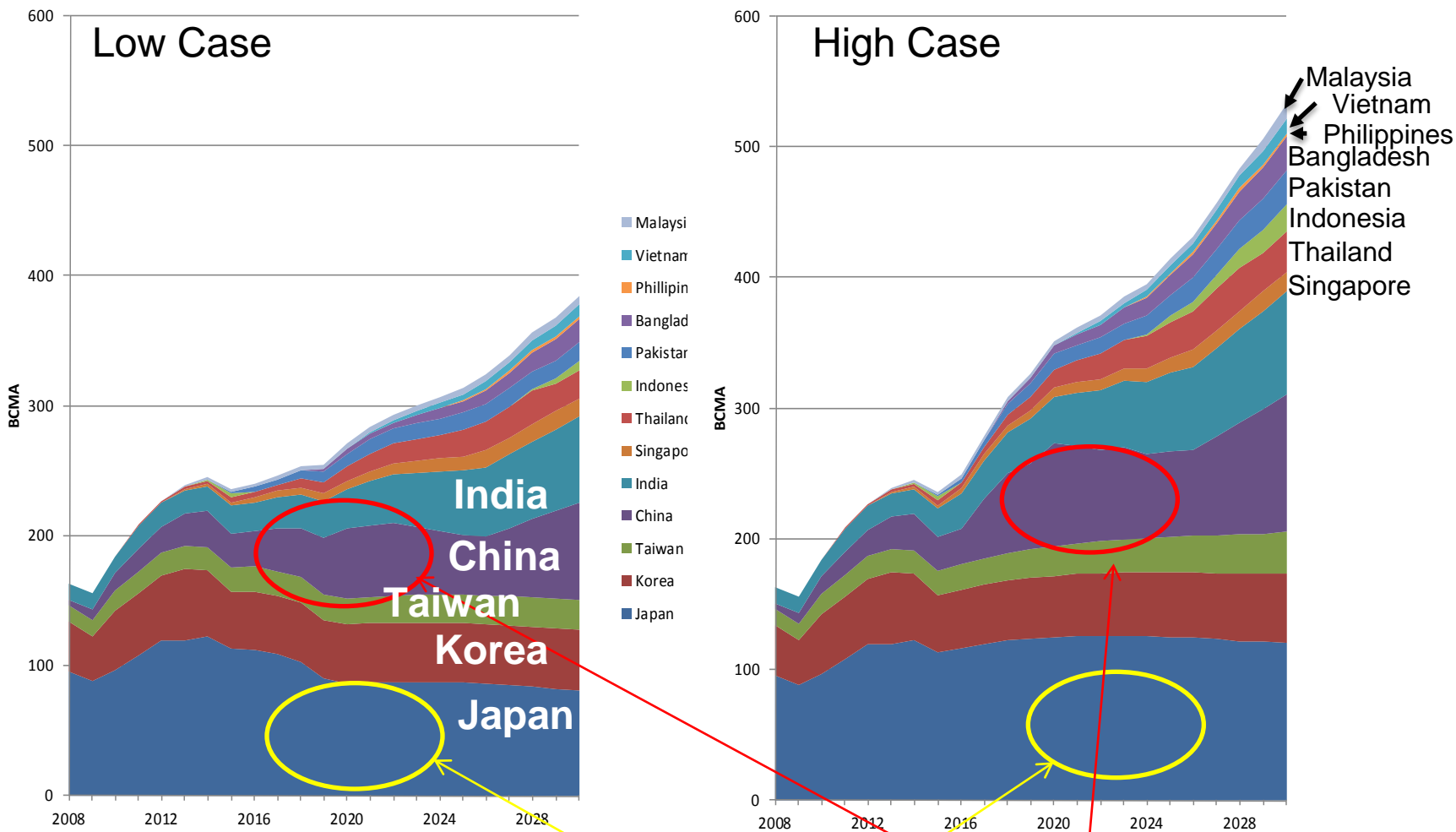
Future Asia-Pacific LNG demand will depend on ENVIRONMENT but also on PRICE

- In many Asia-Pacific countries air quality is a more important environmental issue than carbon reduction
- Many Asia-Pacific countries – not just China and India - have policies to build substantial additional coal-fired and renewable capacity; but if they are to improve air quality they will need substantial additional gas in the cities
- Gas demand increases will be affordable if LNG prices remain at 2016 levels BUT..
- This may only be the case for the next five years

As an analytical community we are very poor at predicting price elasticity of demand



Asian LNG Demand to 2030 – Big Uncertainties



Japan Nuclear restart pace and extent

China gas demand growth & Russian pipeline timing



The move away from JCC to a market price; and from long term contracts to a portfolio

PRICES – transition from JCC to spot/hub prices:

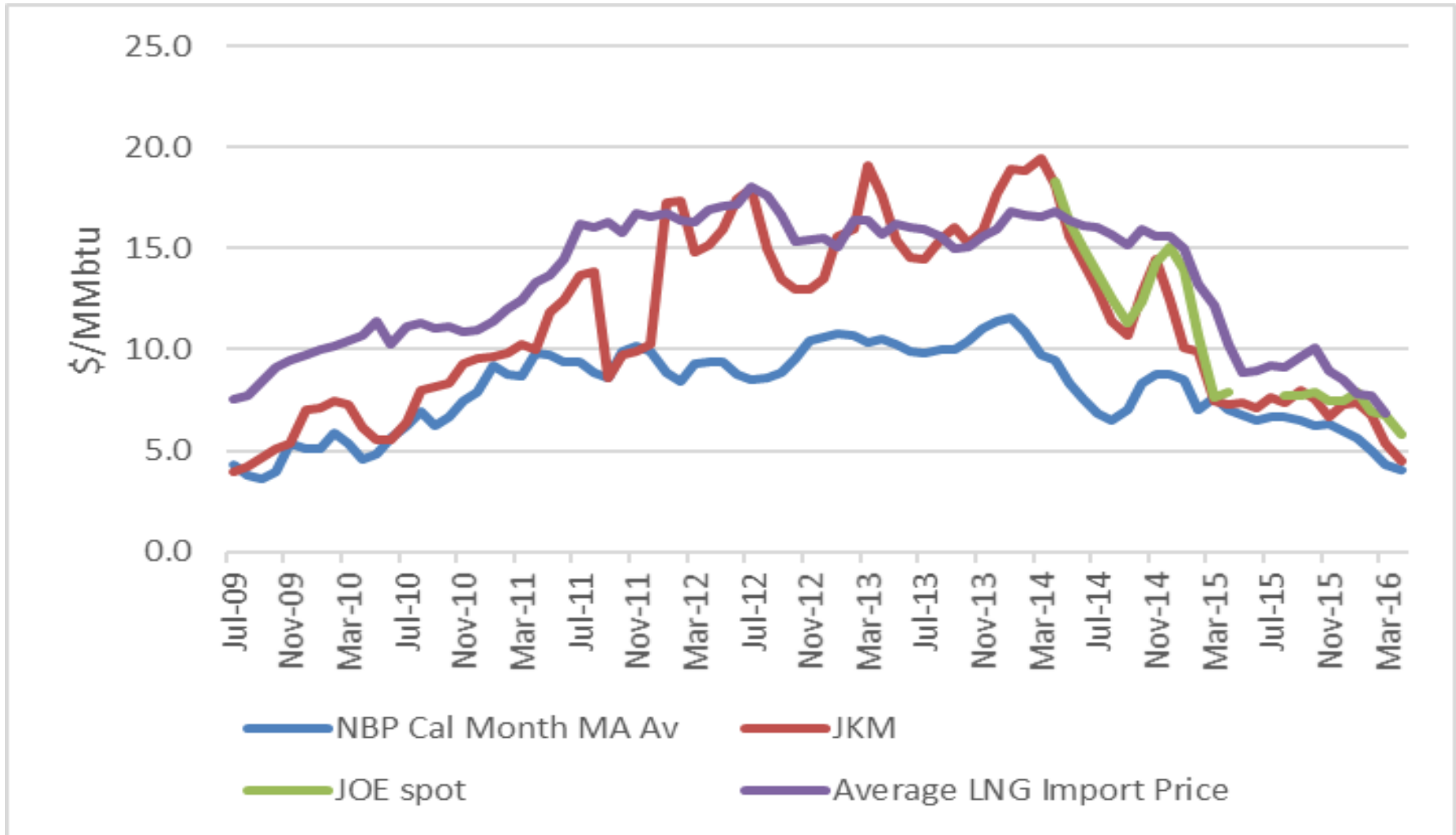
- LNG price indices exist: JKM, RIM, Argus, JOE
- too few cargoes (at least currently) on which to base long term contracts
- Asia can use NBP for hedging
- developing hubs in Asia will take time

CONTRACTS – not the end of long term contracts **BUT:**

- a more balanced portfolio – long, medium and short
- greater flexibility of destination and volume
- regular price review with precise criteria

This is much easier with new contracts; changing existing contracts is more problematic

Japanese LNG Import Prices 2009-16



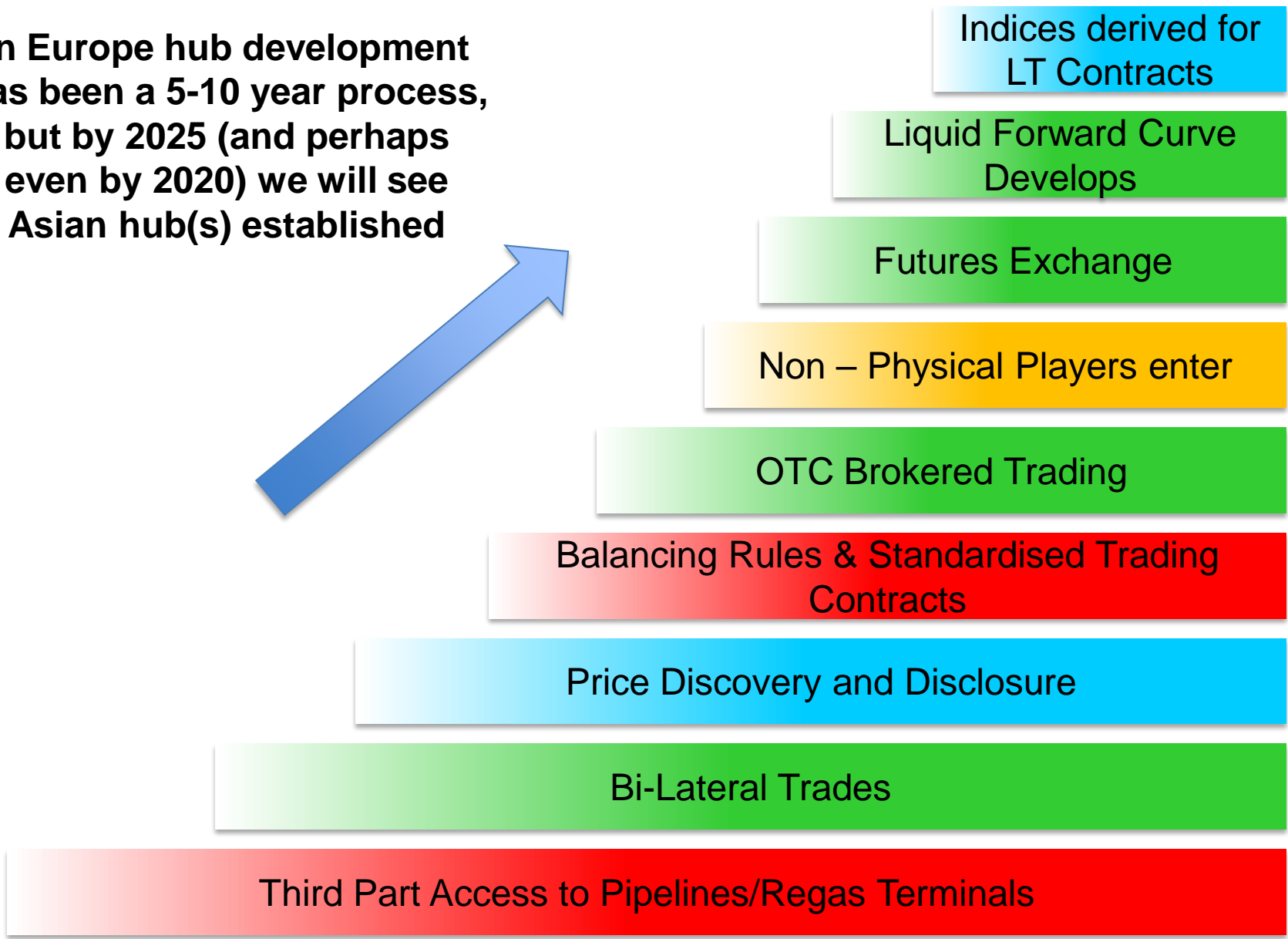
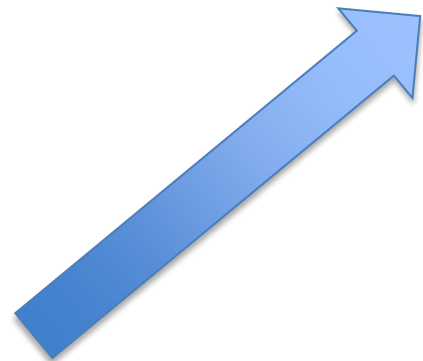
Sources: Platts, Argus, METI

In 2016 JKM and NBP have converged



Stages of Hub Development: Singapore, Shanghai or Tokyo (or all three?)

In Europe hub development has been a 5-10 year process, but by 2025 (and perhaps even by 2020) we will see Asian hub(s) established





Asian Hubs: Gas or LNG? Physical or Virtual?

SINGAPORE HUB:

- **physical LNG hub, strong `first-mover` advantage, limited domestic growth potential; could become a virtual LNG hub for SE Asia**

SHANGHAI HUB:

- **physical gas hub – huge growth potential – domestic gas production+pipeline and LNG imports**
- **a `benchmark` not a supply/demand price (yet)**

TOKYO (OSAKA?) HUB (to be created):

- **LNG hub – physical (due to lack of national pipeline connections) could become virtual**



Summary: surplus of LNG supply over demand and low prices for 5/6 years

THIS SHOULD PROVIDE IDEAL CONDITIONS FOR:

- Increased demand
- Increase spot trade and over a 5-10 year period, hub development

BUT...

- **This will require liberalization of prices and access to facilities to create competition**
- **It is a very destructive process in terms of utilities and the traditional contractual structure**
- **Governments, regulators and market players will need to revise their view of security of supply**



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