# PACIFIC LNG TRADE: HOW IS THE LNG MARKET PRICED IN ASIA?

# Asian Long Term Contract LNG Prices are Based on Japanese Crude Oil Import Prices

- Since the 1980s the average of Japanese customs cleared crude oil prices (aka Japan Crude Cocktail or JCC) has set the base price
- Traditionally, negotiations are about:
  - the "slope" - how gas prices change in response to crude oil price changes
  - the "S-curve" – whether there is protection for the buyer at high oil prices and for the seller at low oil prices
- Prices reflect the era in which they were signed; by early 2010s, price range was very wide

**This practice dates from the late 1970s/early 1980s in Japan when power companies were replacing crude oil fired with LNG fired generation**

# Traditional Asian LNG Price Formula

$$P(LNG) = A * P(Crude\ Oil) + B$$

**Where:**

**P(LNG) = price of LNG in $/MMbtu**

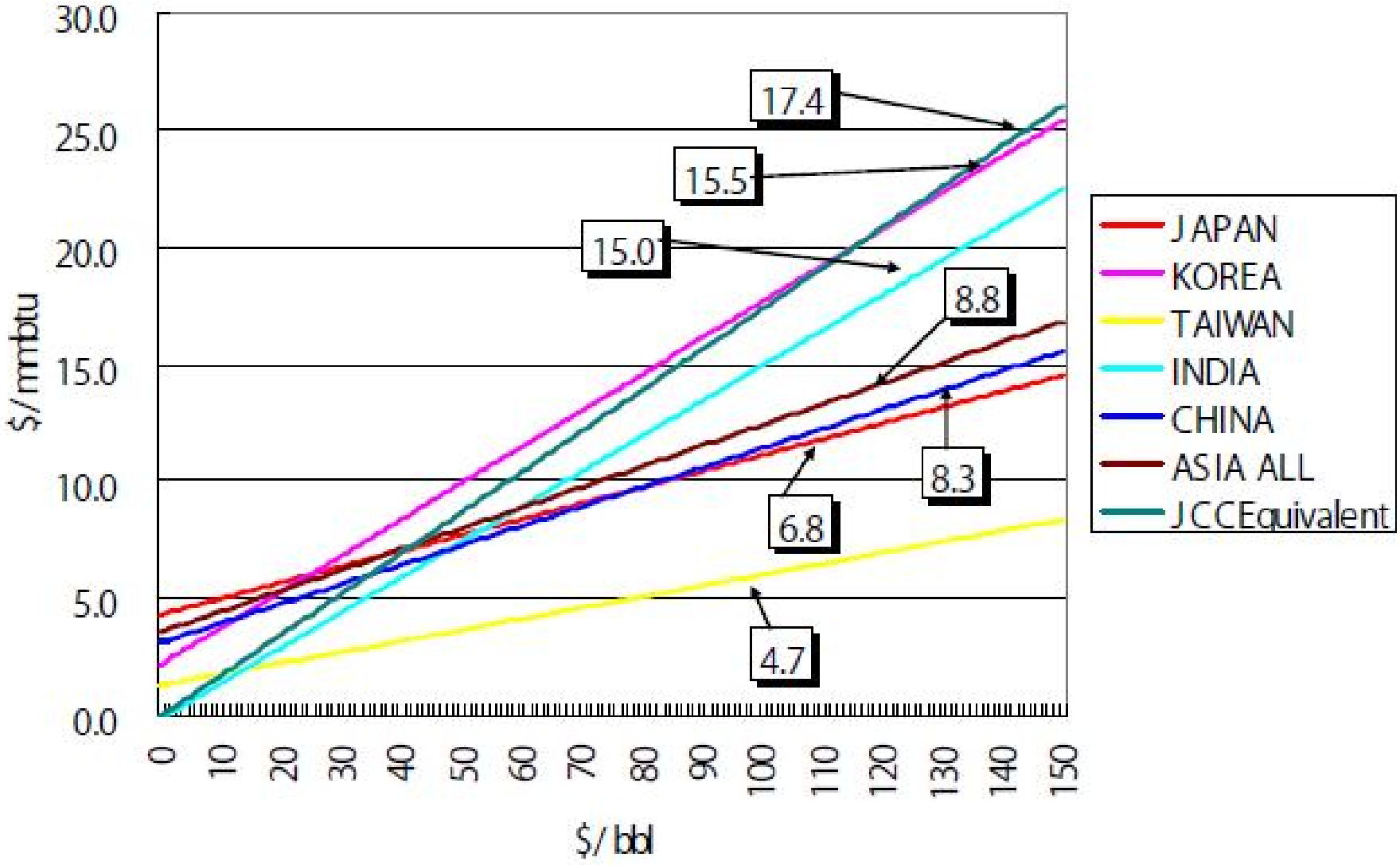
**P is the base price = price of crude oil in $/Bbl**

**A is the index, B is a transportation factor**

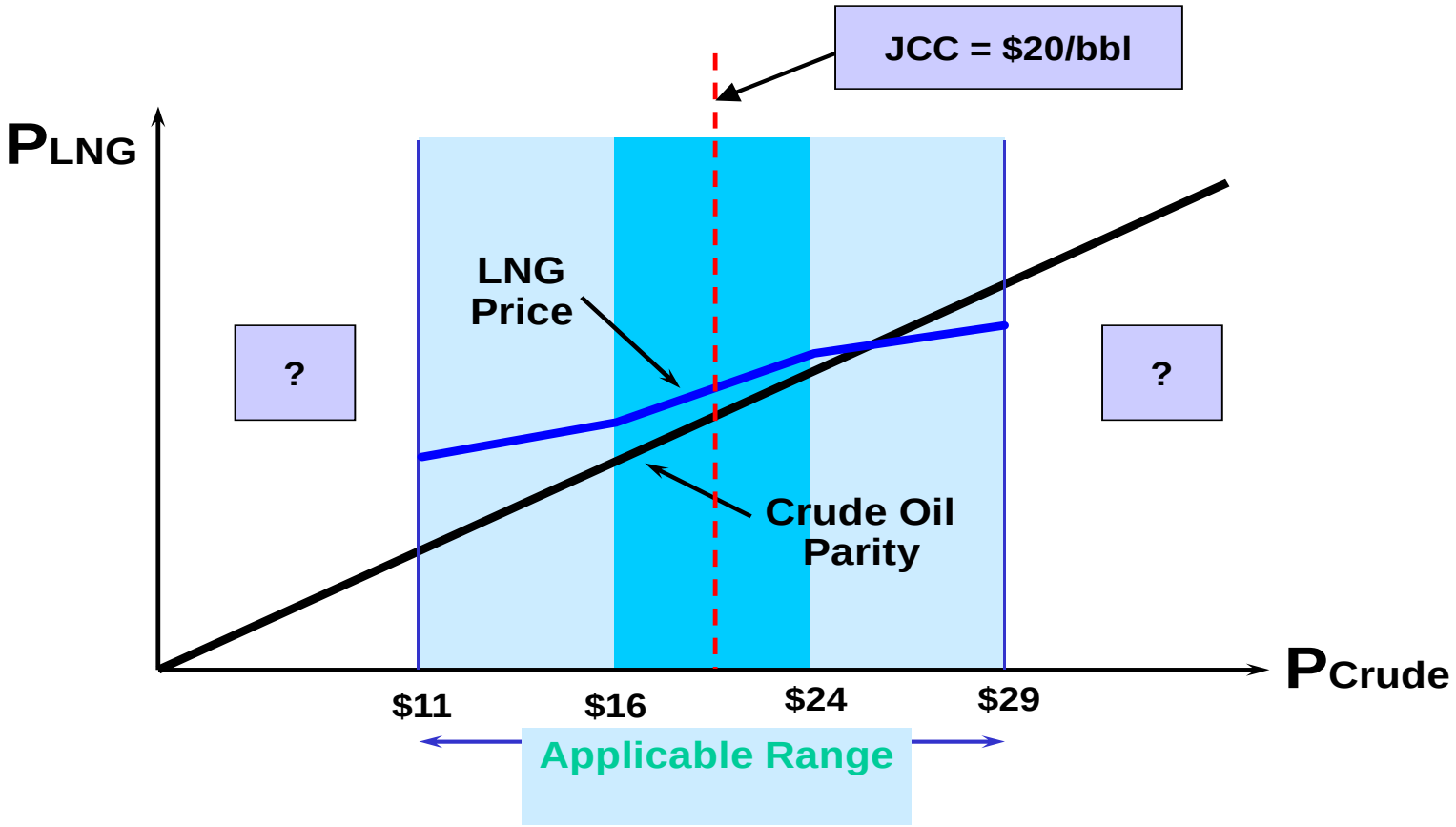
**The constant A is usually referred to as "the slope" (ie the index) and in long-term contracts currently in operation ranges from 0.05 to 0.183 or 5% to 18.3% which is crude oil parity**

# Typical "Slopes" in Asian LNG Price Formulae in the early 2010s

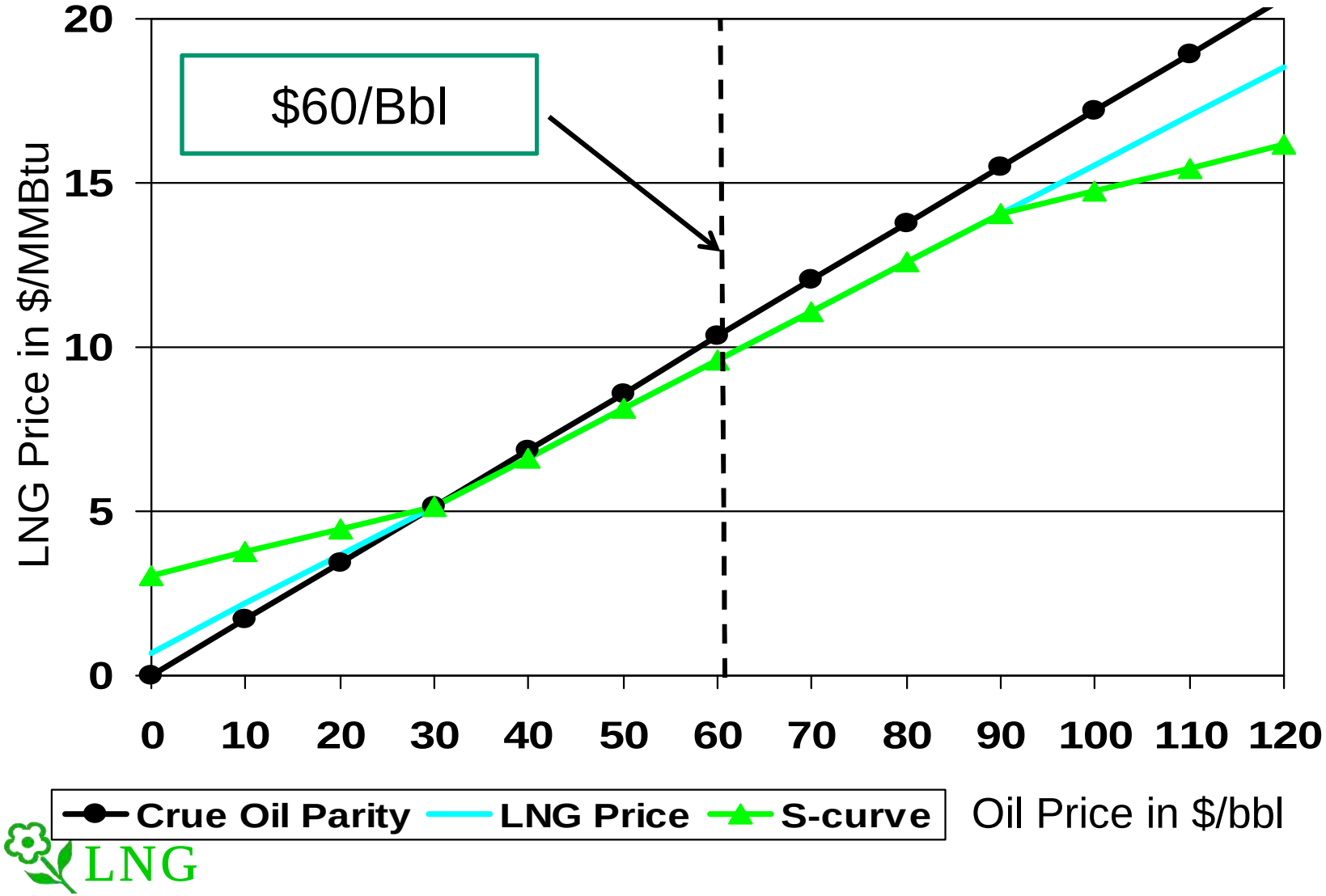
Source: Miyamoto/Ishiguro: OIES



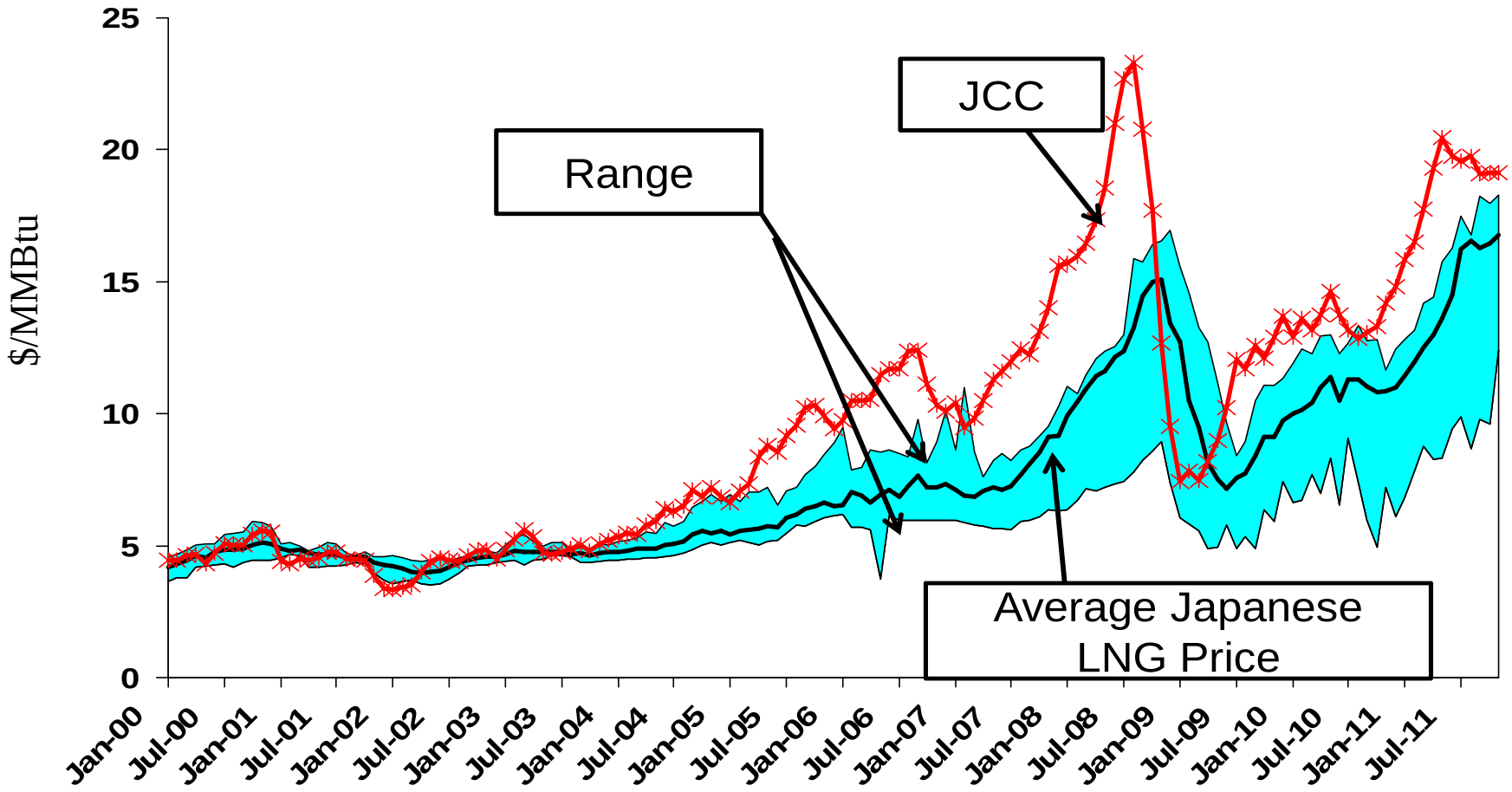
# The "S Curve" in Pacific LNG Projects of the 1980s and 90s



## Figure 3: The 2010s Version of the "S"-Curve



## Figure 5: Japanese Price Range in Long-term Contracts January 2000 – November 2011




LNG

Source: Ministry of Finance, Japan

**JCC system has created a wide range of prices in Asia**

# Financing Traditional Asian LNG Projects: a banker's dream!

- Massive projects: Gorgon LNG $60bn; Curtis and Gladstone LNG (based on coal seam gas) $25-30bn
- Bankers queue up to finance "no risk" projects: bankable sellers and buyers, long term contracts based on crude oil, all risk passed through to customers
- No company has ever defaulted on a loan, only the Egyptian contracts have failed

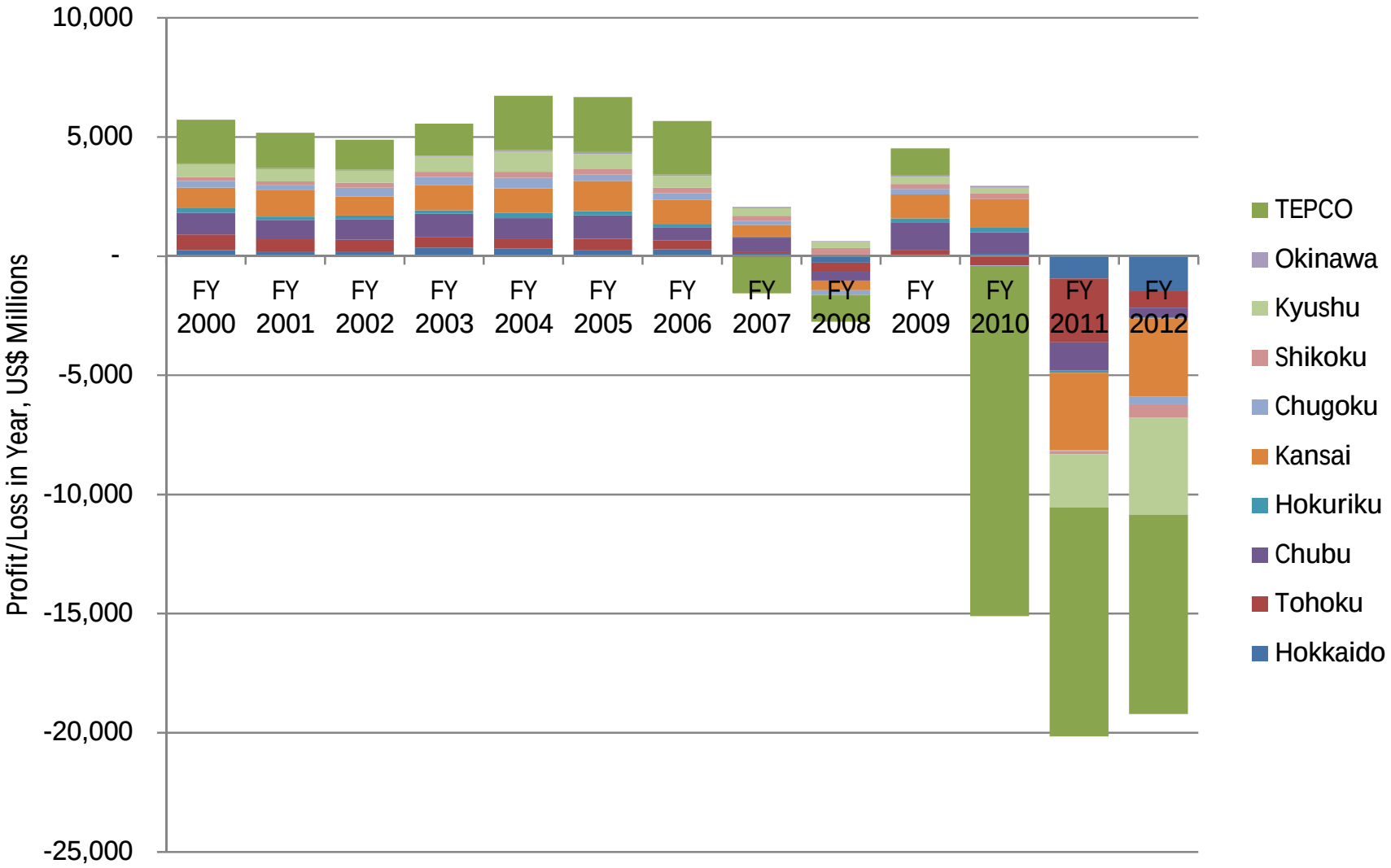
**Bankers want to prolong the dream, but will the future be like the past?**

# JCC: What's the Problem?

- Crude oil price linkage was introduced in the 1970s when crude oil was the main competing fuel to natural gas in Japanese power generation
- The cost pass-through mechanism allows Japanese utilities to adjust their gas and power tariffs to end users by the same percentage as the country's average LNG procurement cost movements, regardless of an individual buyer's actual purchase costs
- Projects "need oil linked prices" to support new LNG supply

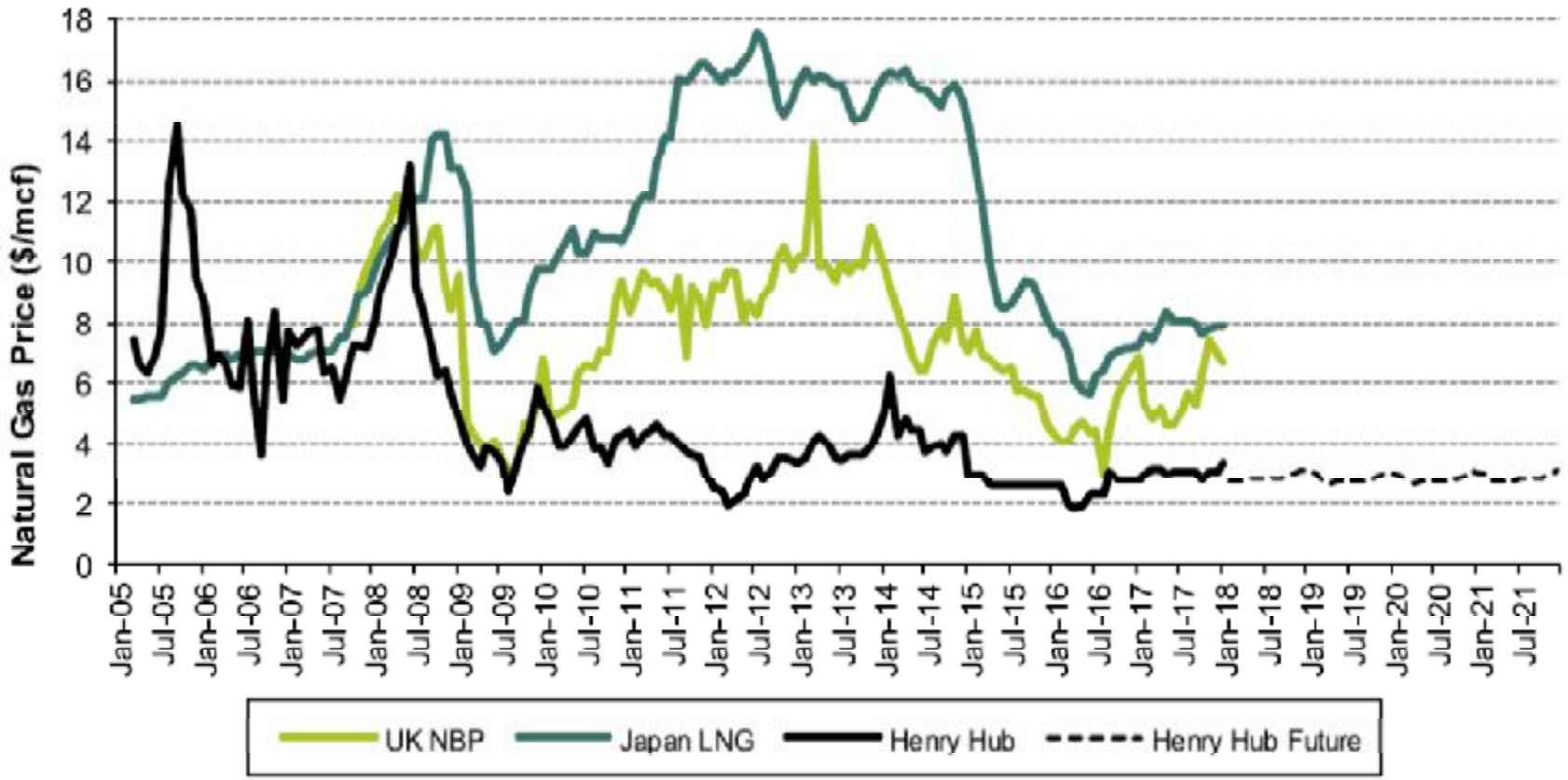
**But, post-Fukushima, a new mood/new fundamentals; Japanese utilities made substantial losses led to a reassessment of JCC**

# Japan: 10 Largest Power Company Financials – very big losses in the early 2010s (partly) due to LNG imports at very high prices




Source: http://www5.fepc.or.jp/tok-bin-eng/kensaku.cgi

# 2009-15: Asia paid much higher prices than other regions - known as `the Asian premium'




Source: Bloomberg, C1 Energy, Bernstein analysis

**SINCE 2015, REGIONAL PRICES CONVERGE ON AN AVERAGE BASIS BUT SEASONAL DIVERGENCE IS STILL POSSIBLE**

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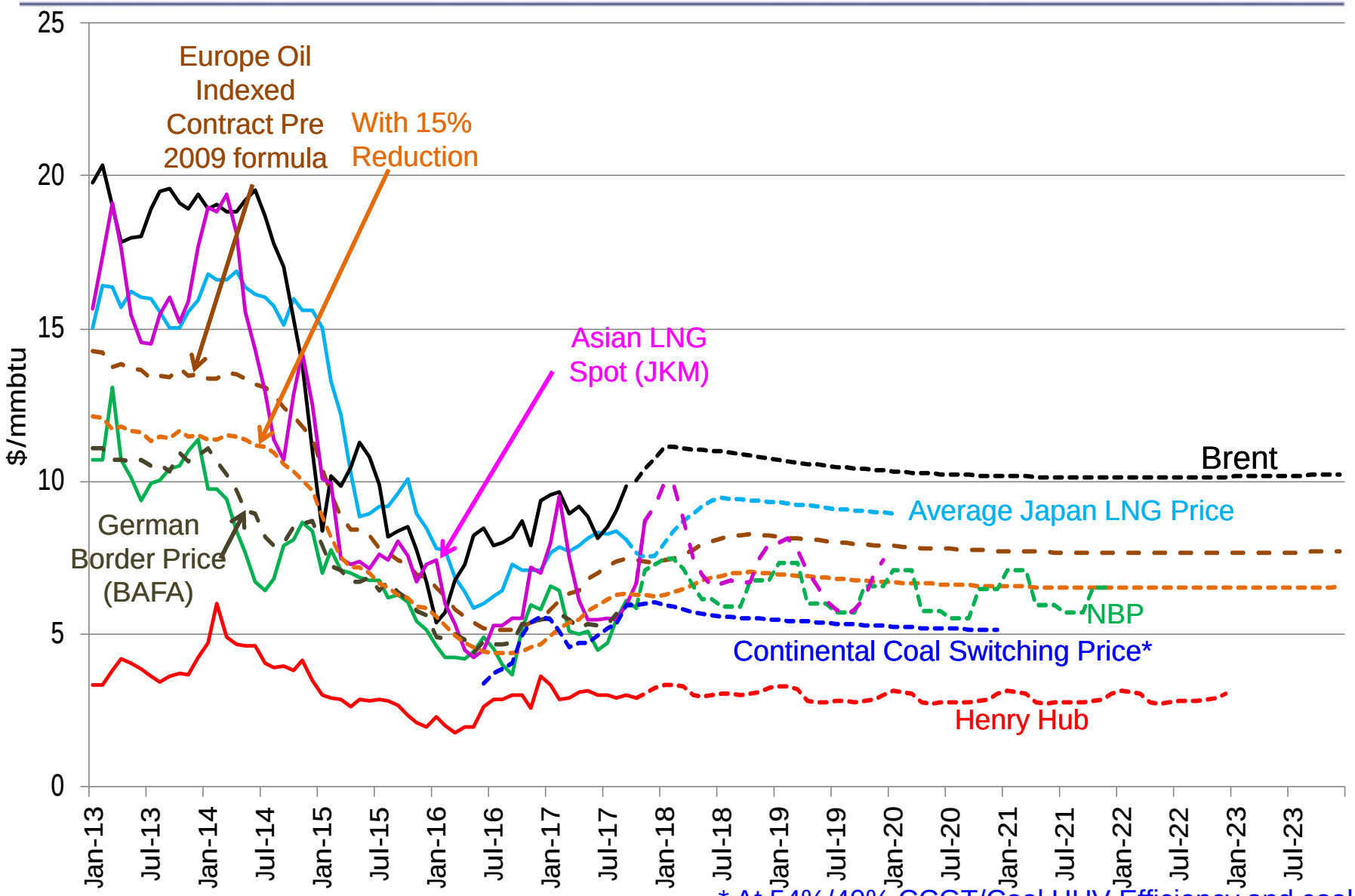
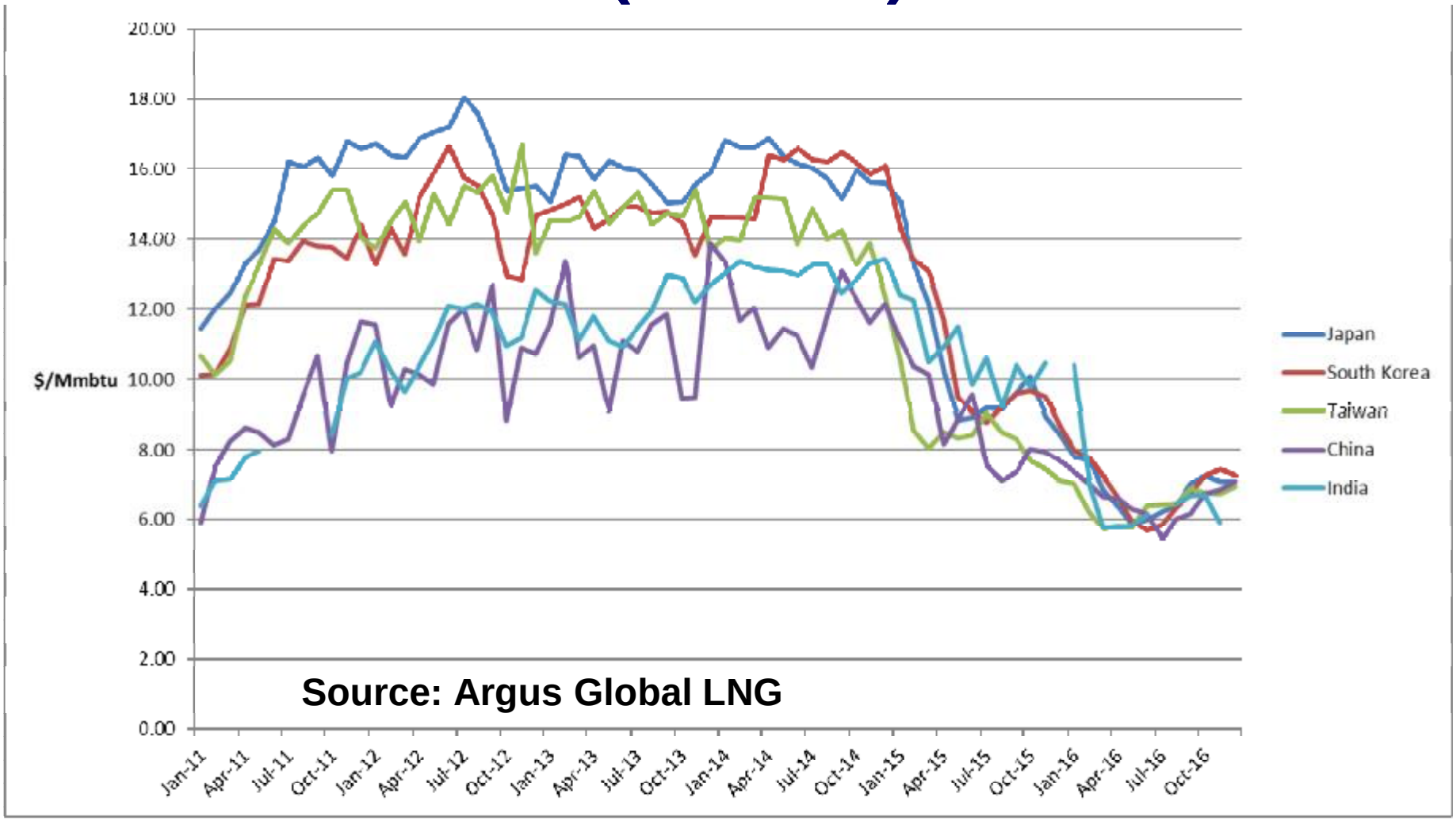
# By 2016 regional prices had substantially converged: the Asian premium shrinks and disappears




* At 54%/40% CCGT/Coal HHV Efficiency and coal ARA actuals & futures price

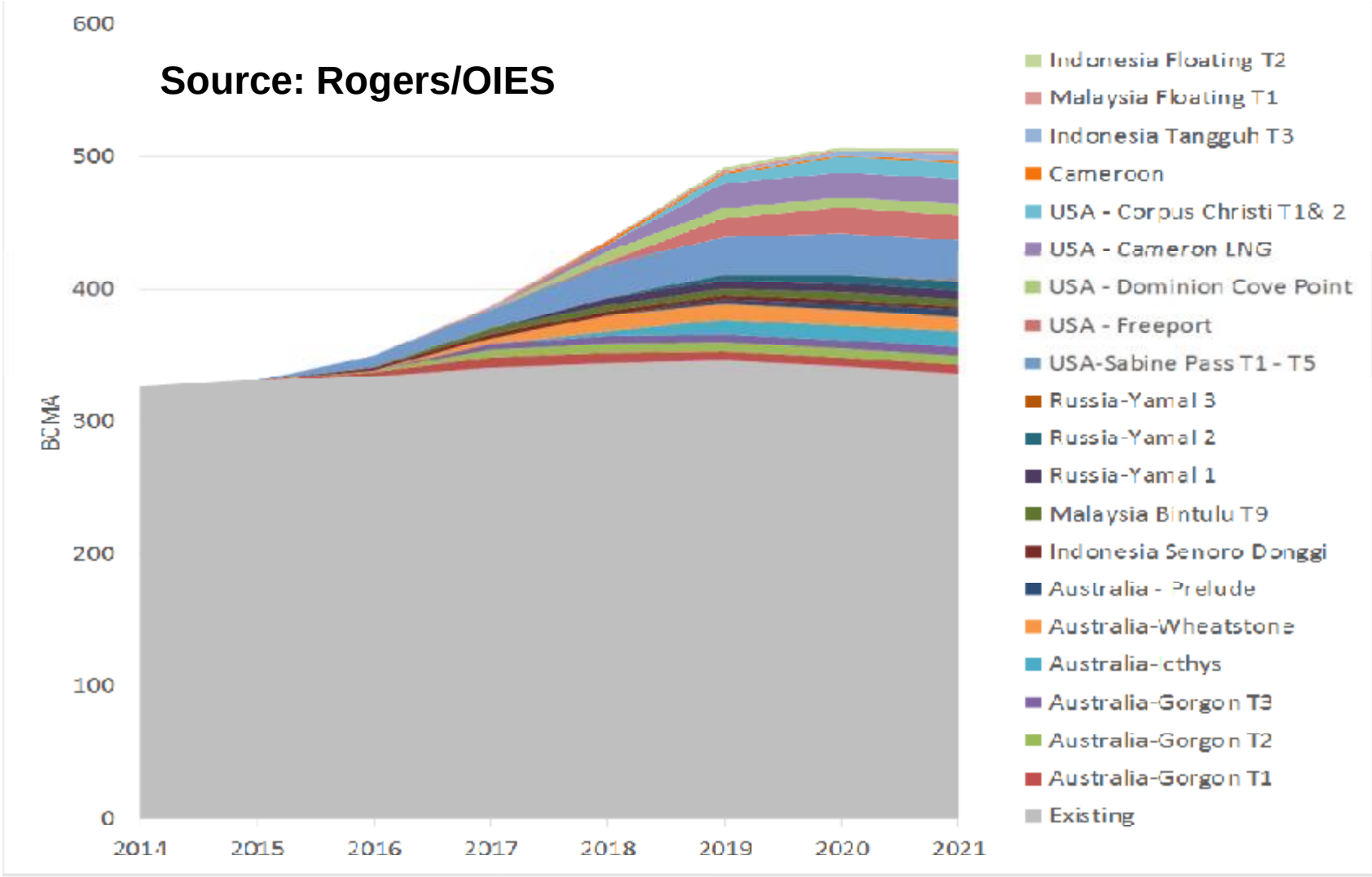
SOURCES: Platts, EIA, Argus, CME

# Average Asian LNG Import Prices 2011-17 ($/MMbtu)




**Also by 2016 Asian prices had converged**

# Unprecedented Expansion of LNG Supply 2016-21




**Abundant supply at low prices likely for some years – perfect market conditions for competition**

# Price formation mechanisms which could replace JCC

- Asian spot price Index (eg JKM, RIM, Argus, JOE): too few cargos (at least currently) on which to base long term contracts
- Average Japanese/Korean LNG import prices – JLC/KLC
- `Hybrid pricing' – a mixture of all of these + JCC/oil+electricity+……
- Henry Hub or European (NBP/TTF) hub prices
- Prices at an Asian hub or hubs

**Which of these mechanisms best reflects gas supply/demand conditions in Asian countries?**

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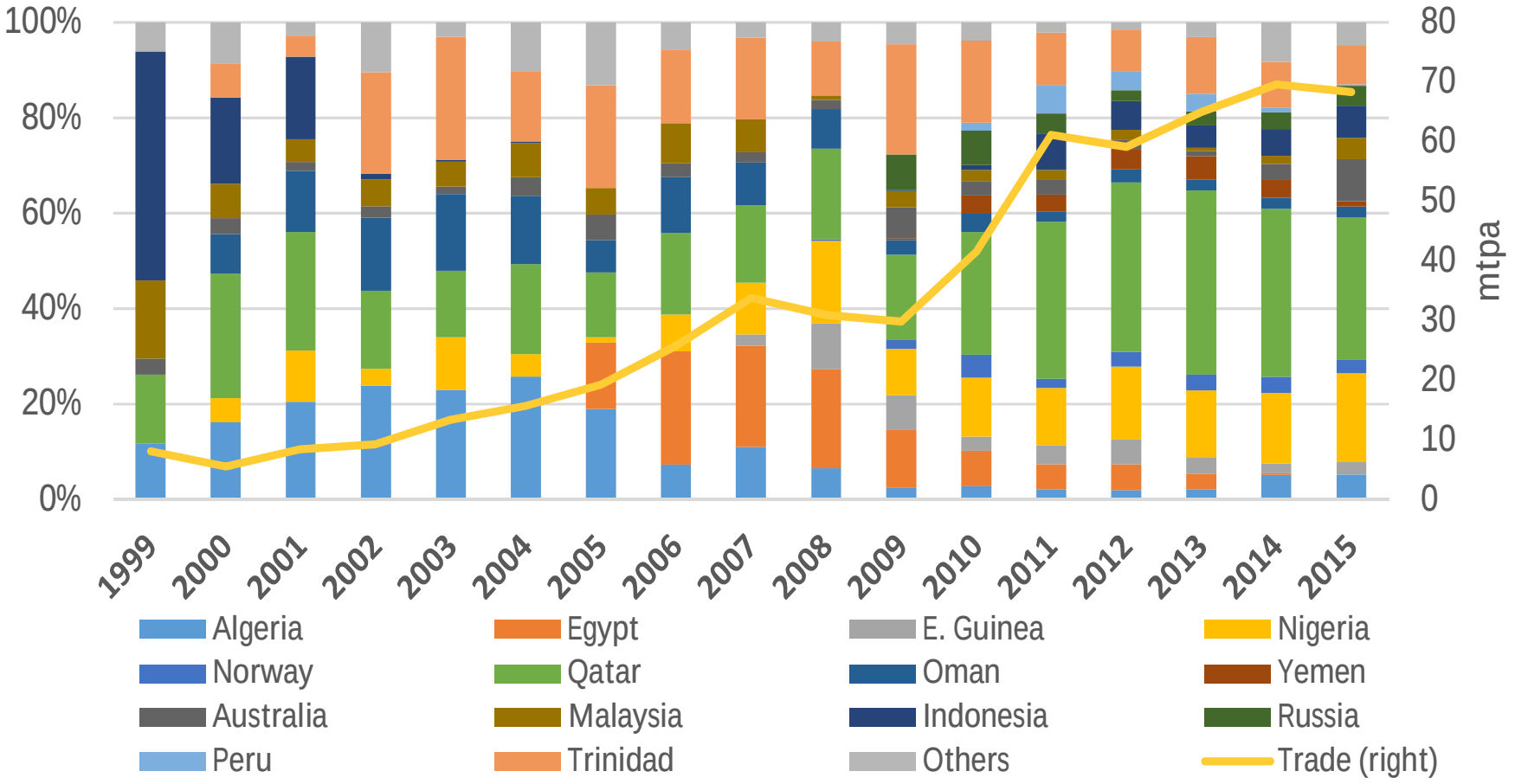
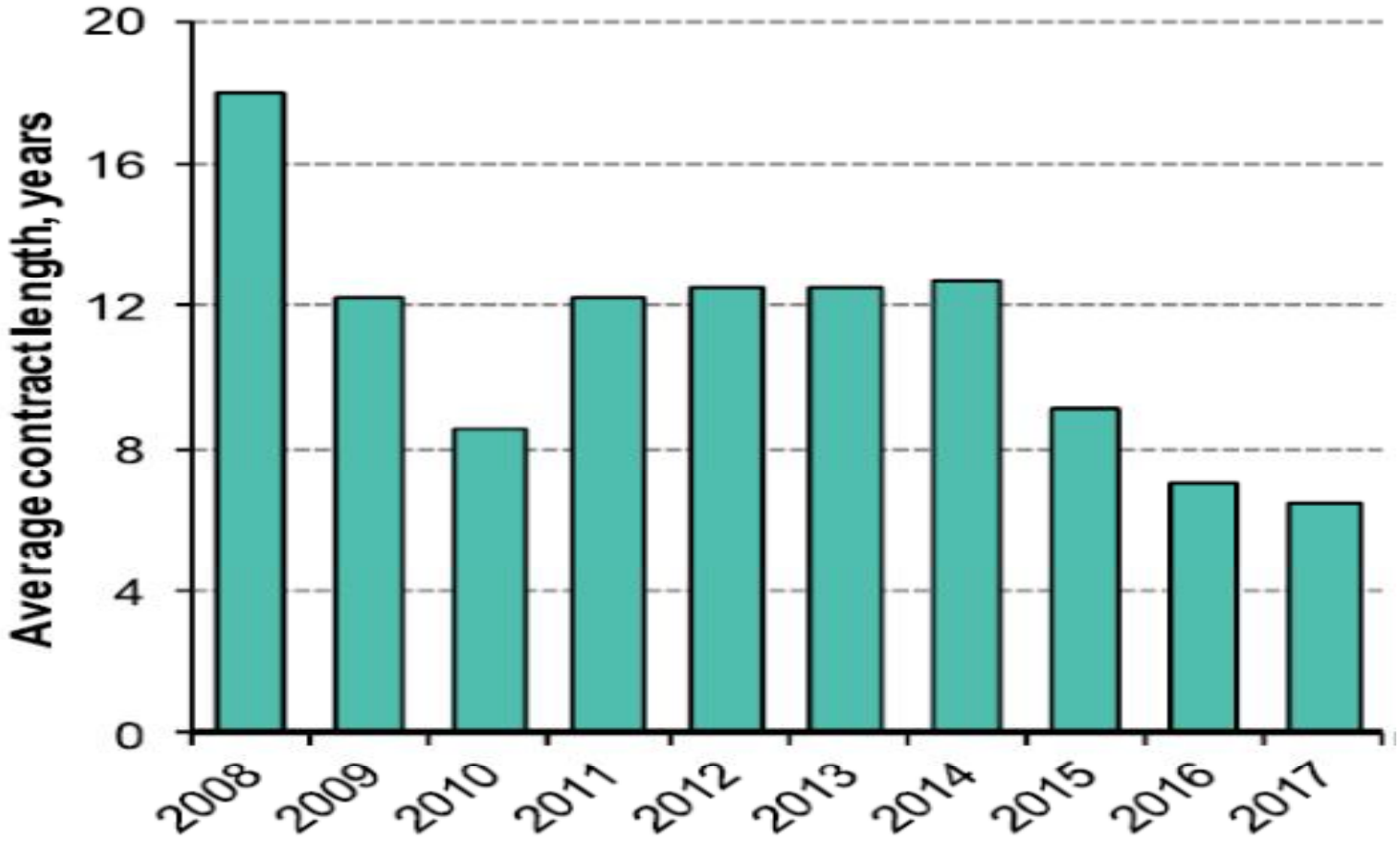
# The evolution of spot and short-term (contracts of <4 years duration) LNG trade 1999-2015




Source: 'LNG markets in transition: the great reconfiguration' (OIES/KAPSARC).

**Spot and short-term LNG trade represented 28% of global LNG trade in 2015, down from 29% in 2014**

# Decline in Average LNG Contract Length




Source: Shell LNG outlook, Bernstein analysis

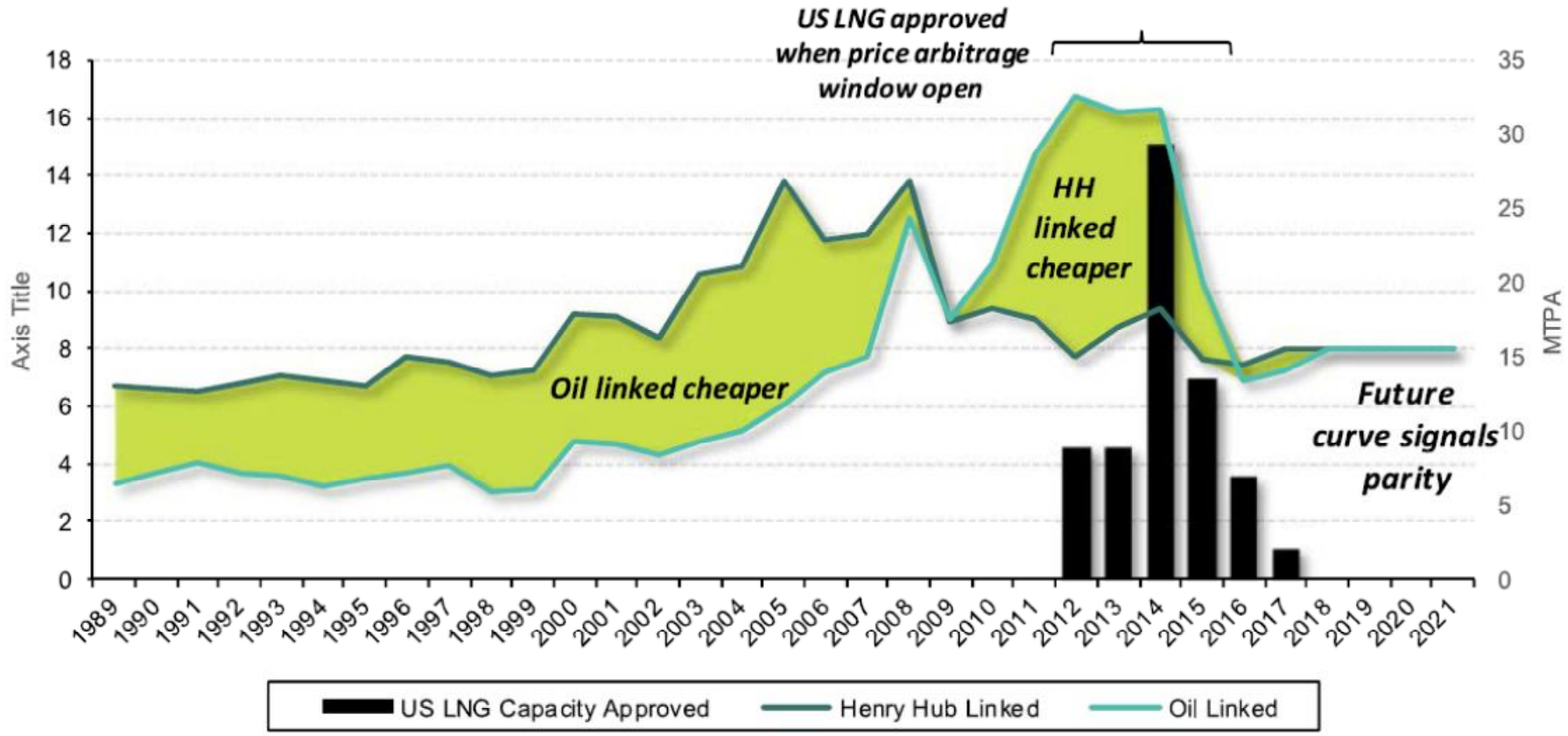
**Is the long term 20-25 year contract a thing of the past?**

# US LNG export contract based on Henry Hub prices plus costs

- Looked `cheap' when oil was at $100/bbl
- But at oil prices below $50/bbl very difficult for offtakers to recover full cost = Henry Hub x 1.15 + liquefaction ($2.5-3.50) +shipping+regas
- Offtakers have 20 year contracts which require them to pay the tolling (liquefaction) fee whether or not they use the service
- Since the start of US LNG, offtakers have recovered variable cost, but rarely full cost

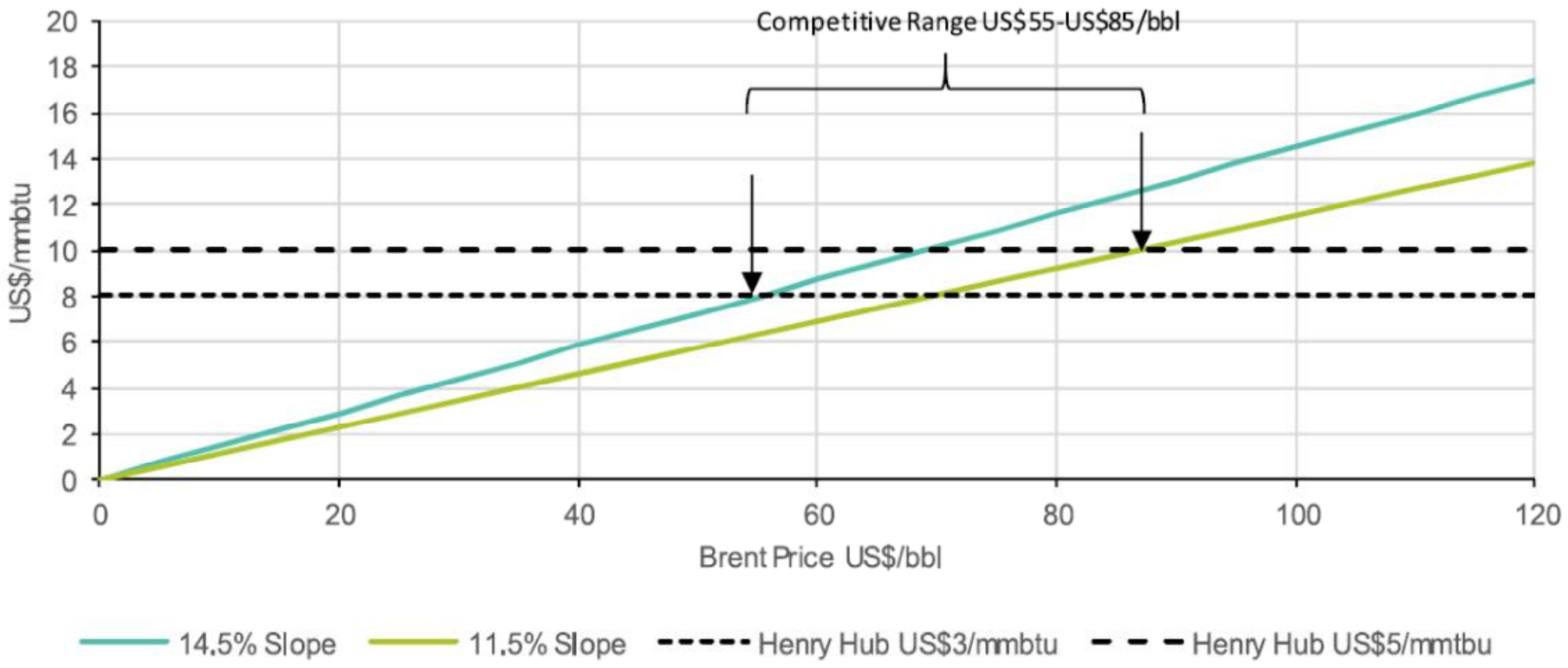
**Basing long term contract prices on Henry Hub was never logical; it was a consequence of focussing on price level (in Asia) not price formation (in US)**

# Which Index do LNG Buyers Prefer: Henry Hub or JCC?




ource: Bloomberg, Bernstein analysis

# Henry Hub at different levels compared with JCC at different slopes (indexation)




ource: Bernstein analysis