US LNG competitiveness in Asia Pacific: cost plus vs. oil indexation in changing oil and gas price environment

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Price formation mechanism in the Asia Pacific market

Gas/LNG pricing systems for the international trade

(1) Europe

- Indexation to price of oil products (Heavy oil/fuel oil/gasoil) with discount *(Groningen formula = netback replacement value at the end user/«on the burner», from 1962 - onwards)*
- Indexation to gas hub *(From 2009 – onwards)*

(2) APR

- Indexation to crude oil prices в APR *(JCC, from 1970 - onwards)*
- Indexation to Henry Hub prices in USA *(From 2016, LNG export from USA*)

Source : Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas (Energy Charter Secretariat, 2007);
The Pricing of Internationally Traded Gas (OIES, 2012)

LNG contract formula for the international trades in APR

- P(LNG/CIF) = A(%) * JCC(FOB) + B *(cost-plus)*
  "B" = freight + insurance
- P(LNG/CIF) = A(%) * JCC(CIF) *(netback replacement value)*

Slope "A" for LNG contracts:

- 17.2% (Oil parity of LNG by calorific value)
- Linkage to oil parity by calorific value with discount => "A" less than 17.2%, so that LNG can be competitive with JCC

Why JCC?

Japan = the first importer of LNG in Asia (from 1969): Middle East crude oil (heavy high sulphur oil) as main fuel for electricity generation in Japan in the 70's => direct competitions between LNG and crude oil in Japan at power sector => linkage to JCC

Cost-plus price mechanism and project development of US LNG

Cost plus pricing mechanism

US LNG operators are risk-free

- P(LNG/FOB) = HH*115% + fixed fee (tolling fee)

- Guaranteed revenue for LNG operators regardless of domestic and international natural gas price
- Low domestic and international natural gas price affect domestic gas producers and LNG off-takers

Debt-financed shale projects + low domestic price + expansion of Panama canal

=> US LNG projects targeted premium Asia Pacific LNG market

Change of international energy market environment since mid-2014

- Decrease of LNG price in the target market (Asia Pacific) caused by plummeting of crude oil price and stronger competitions

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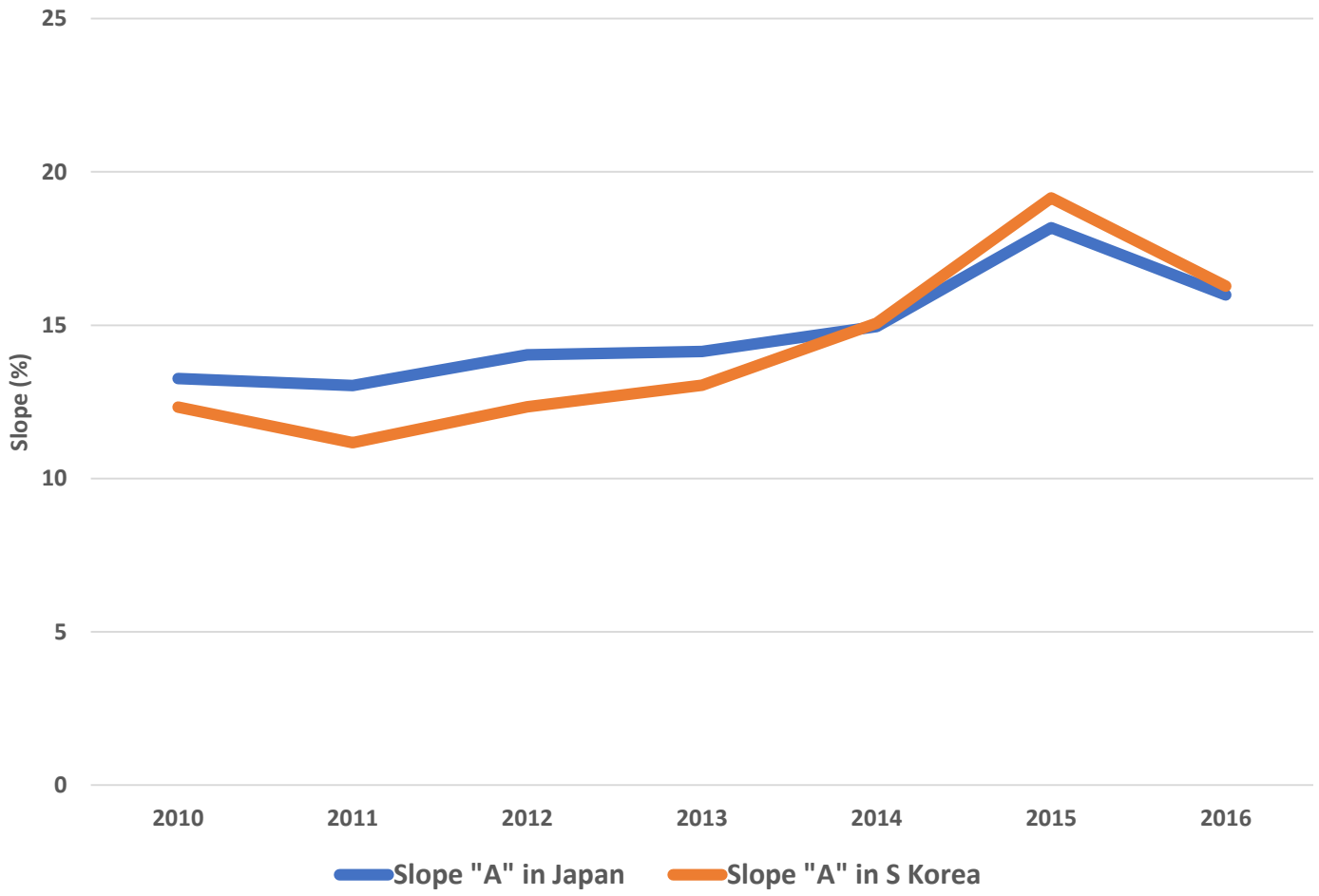
Slope "A" for LNG contracts in Japan and Korea – By annual average import volume as a whole from 2010 – 2016 (CIF prices)



Slope "A" in 2010-2014 fluctuates between:

- Japan - **13%-15%**
- Korea - **11%-15%**

Slope "A" in 2015

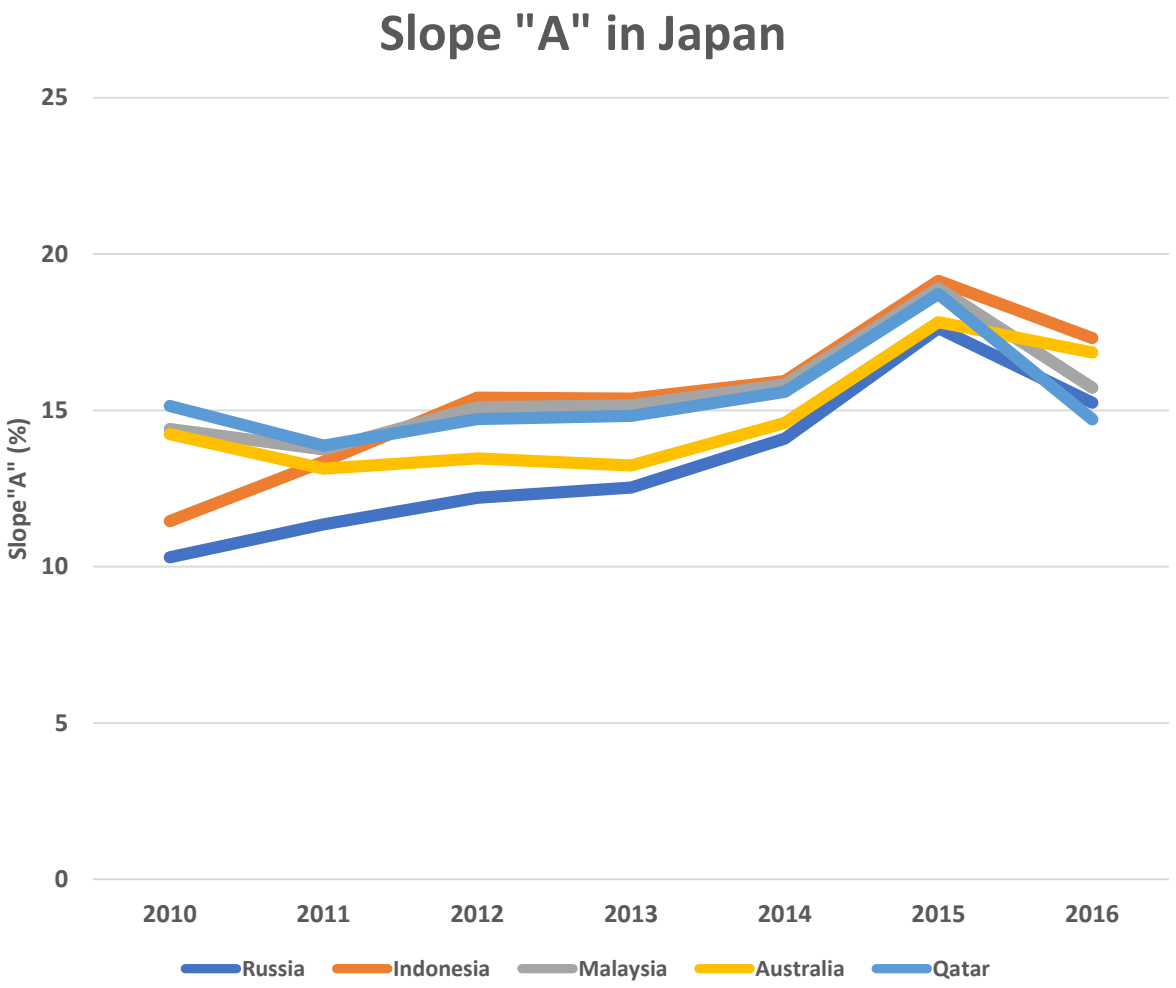
<u>Higher slope period</u>

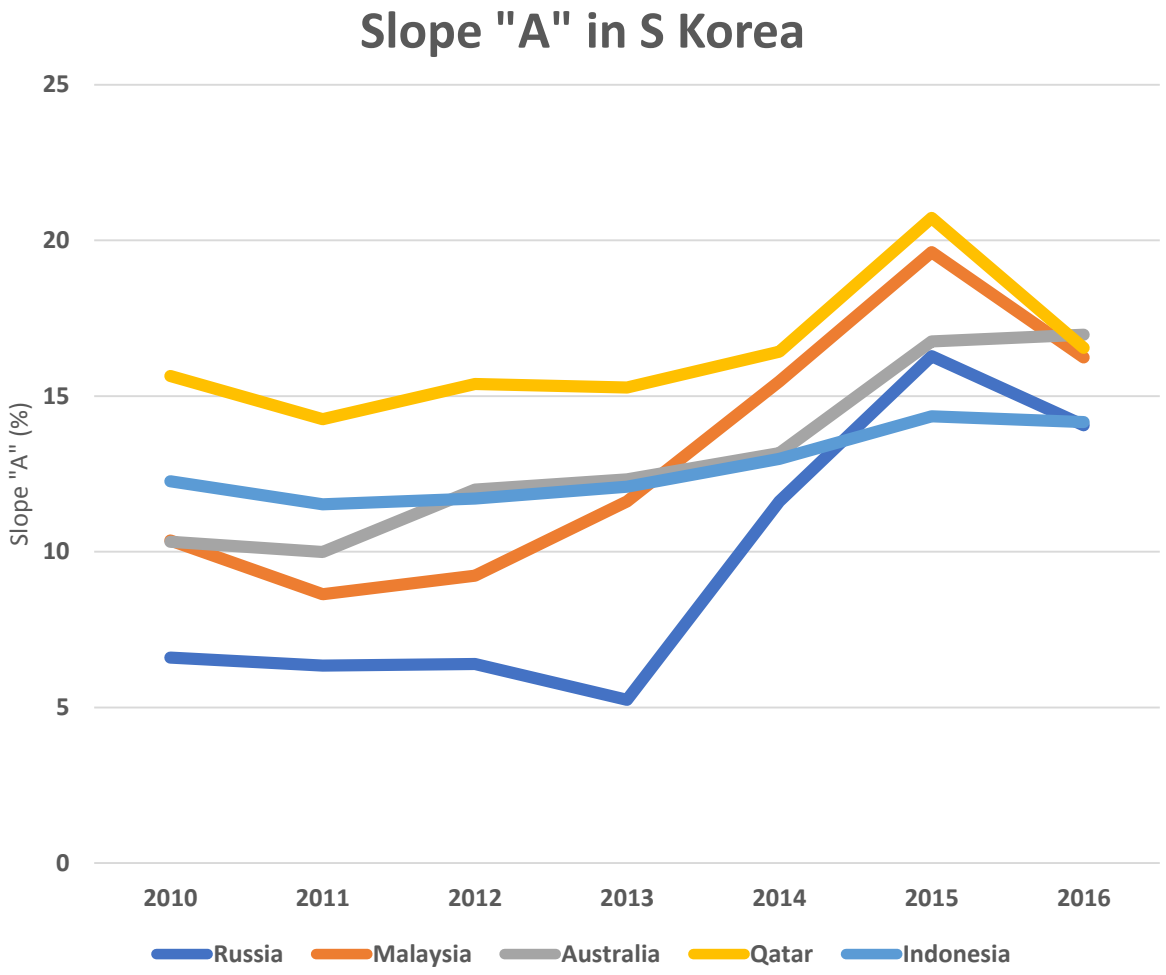
- Pace of oil price fall > LNG price fall

- Japan - **18%**
- Korea – **19%**

Source: Authors, according to customs statistics of Japan and Korea

Slope “A” for LNG contracts in Japan and Korea by suppliers- in 2010 – 2016 (CIF prices)





Source: Authors according to customs statistics of Japan and Korea

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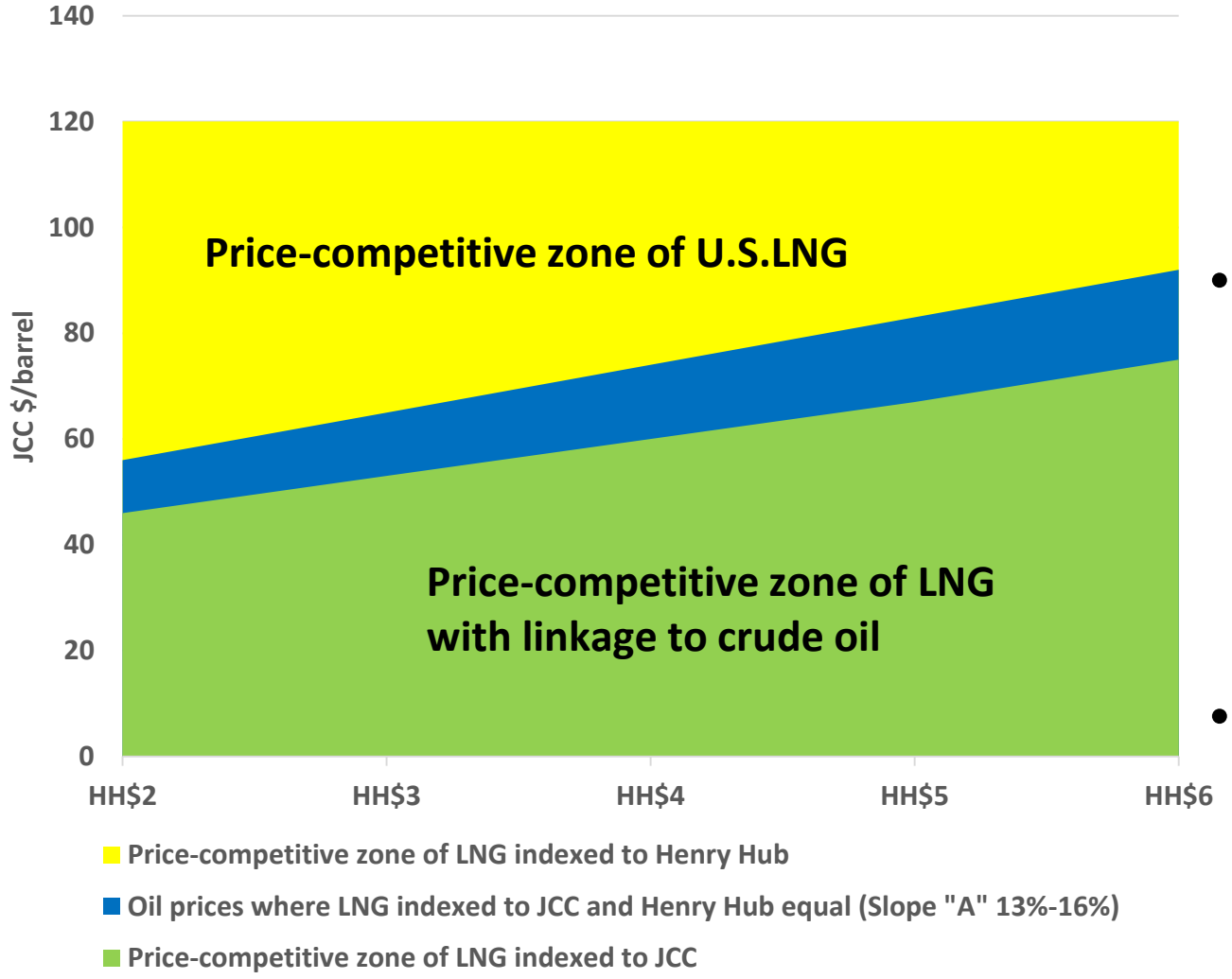
Price-competitive zones of LNG with indexation to JCC and Henry Hub in Asia



- At Henry Hub price $2/MMBTU (*lowest price: April 2012/beginning of 2016*), LNG with linkage to oil is competitive in Asia at price
  JCC < $50/barrel
- At Henry Hub price $6/MMBTU (*maximum price: beginning of 2014*), LNG with linkage to oil is price-competitive in Asia at price
  JCC < $80/barrel *(mid-2010, end of 2014)*
- At JCC price higher than $100/barrel, U.S.LNG starts becoming price-competitive, even if Henry Hub price exceeds $6/MMBTU, however, will oil price of $100/barrel or higher return?

Source: Authors

Price dynamics of JCC and Henry Hub

(1) 2011-2014: multidirectional dynamics of LNG prices with indexation to JCC and gas (Henry Hub) in APR:

- high crude oil prices,
- decrease of Henry Hub prices

due to increased shale gas production in USA and absence of possibility of export

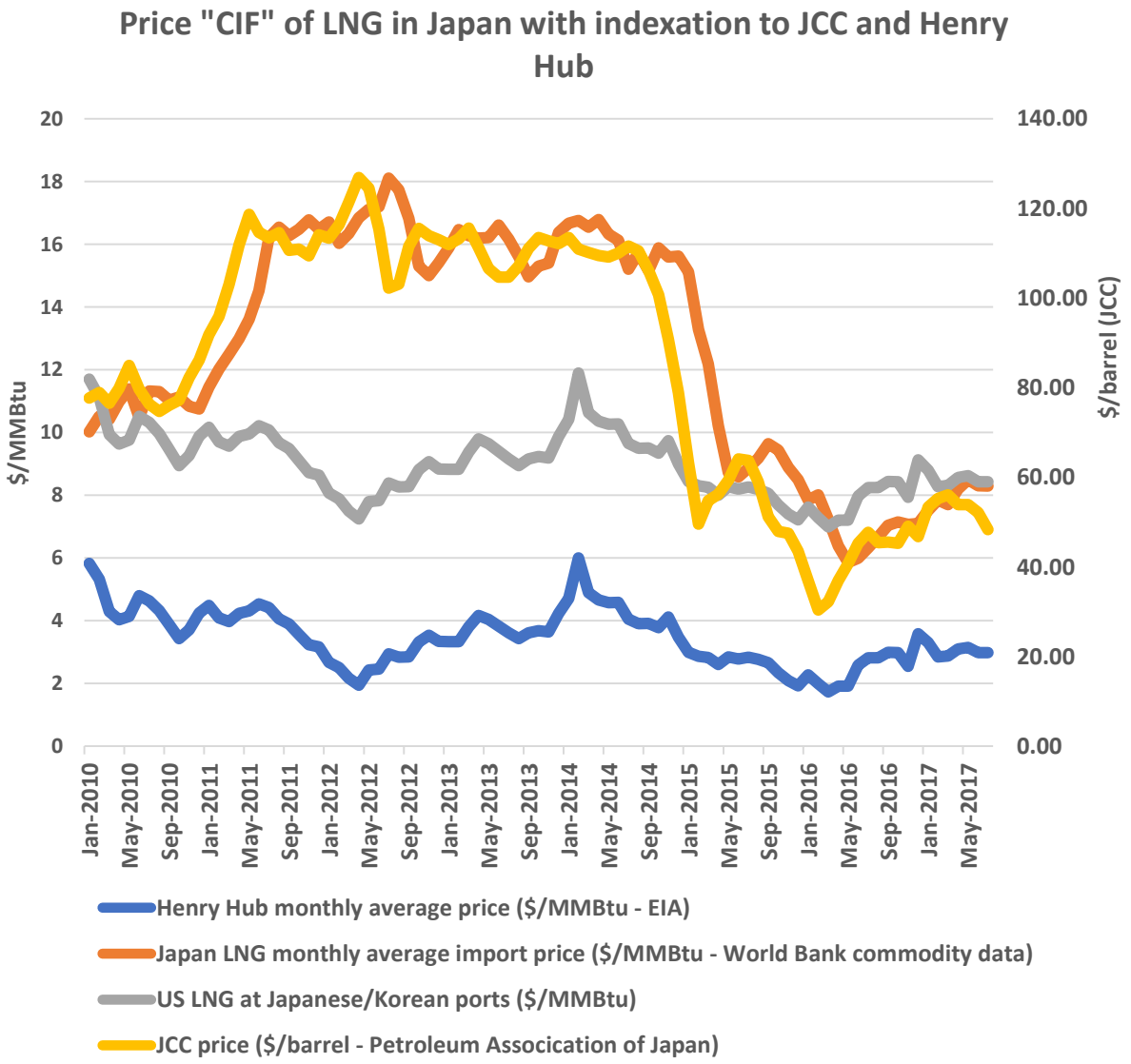
=> (Oversupply in the domestic natural gas market)

(2) From 2014 - onwards: decline in LNG prices with linkage to oil (as a result of global oil prices fall) and Henry Hub prices maintaining low levels ($2-$4/MMBTU в 2015)

Will Henry Hub prices continue to stay at low level after:

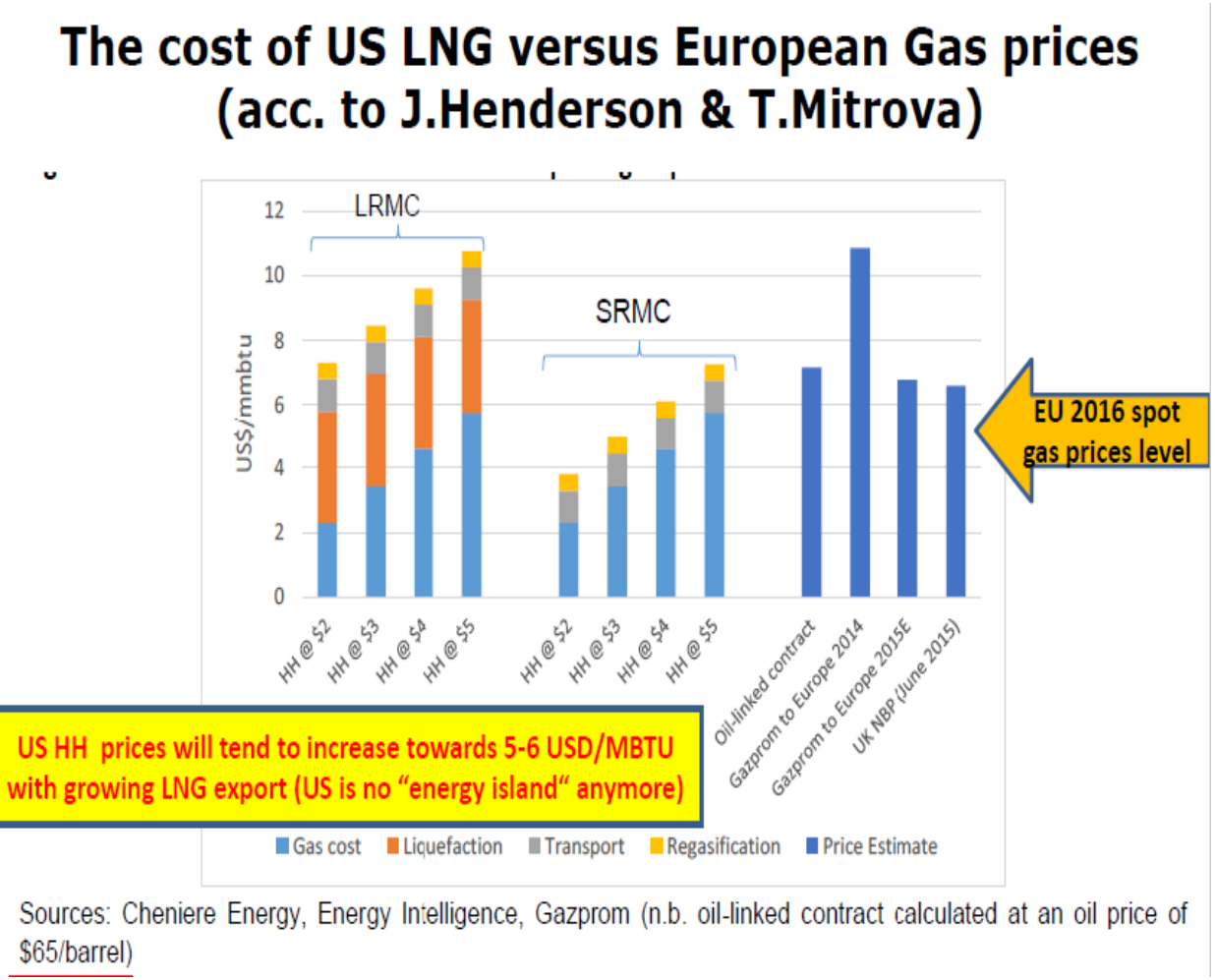
*beginning of LNG export from USA?

*increasing export volume of pipeline gas to Mexico?

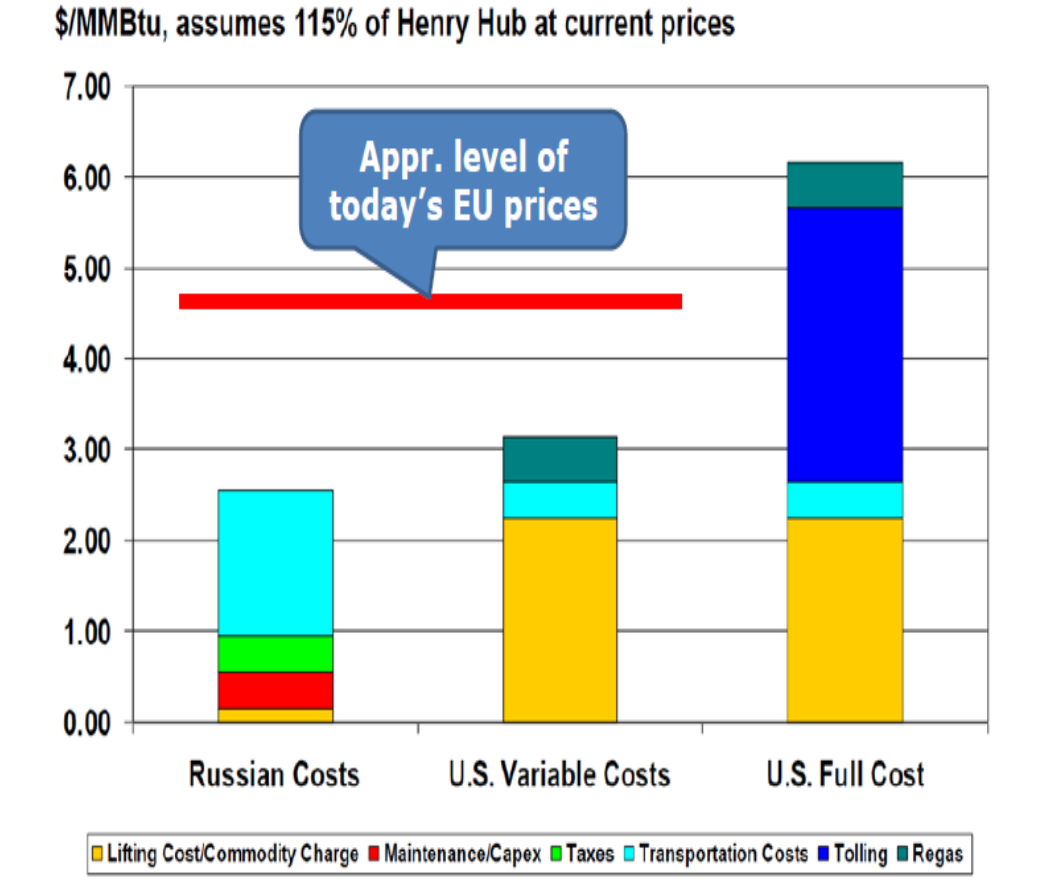


Source: Ministry of Finance Japan, EIA natural gas price

US LNG in Europe: Price in main European market (NBP/TTF) enough to cover SRMC but not full cost



Sources: Cheniere Energy, Energy Intelligence, Gazprom (n.b. oil-linked contract calculated at an oil price of $65/barrel)



Source: PIRA

Source: S.Komlev. Gazprom on the European Market Problems and Solutions . ETCSEE2016, 15-16 June, 2016, Bucharest, Romania

European natural gas market - very competitive market with low price and existence of suppliers with low break-even costs

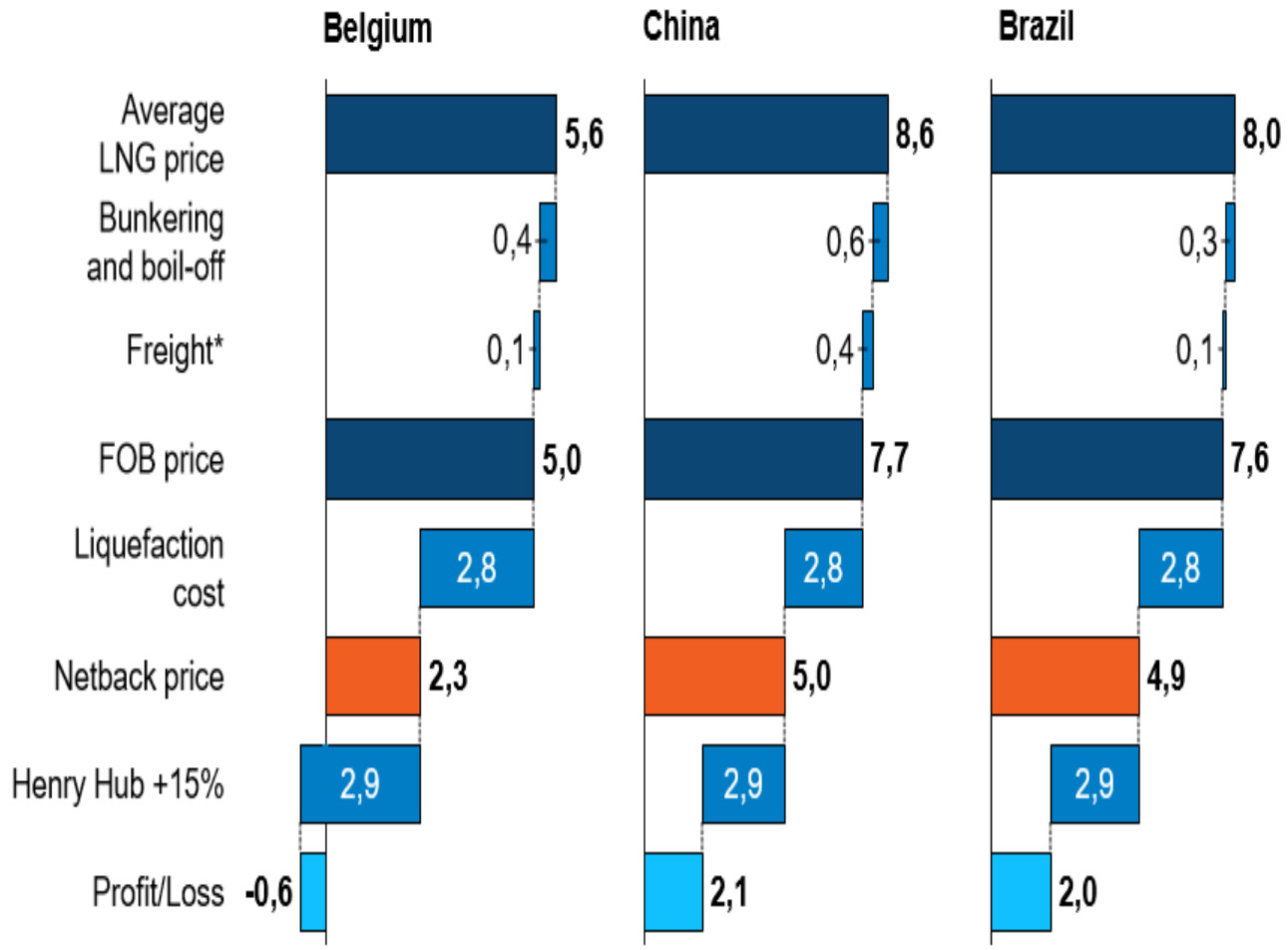
Source: James Henderson & Tatiana Mitrova. The Political and Commercial Dynamics of Russia's Gas Export Strategy. - OIES PAPER: NG 102, September 2015, p. 44

US LNG vs Russian pipeline gas in the EU: to get rid of the rival? Webinar Vostok Capital "US LNG and European gas market", A.A.Konoplyanik, October 2016

S.Komlev. Gazprom on the European Market Problems and Solutions . ETCSEE2016, 15-16 June, Bucharest, Romania,

Comparative analyze: Competitiveness of US LNG in European market

- US LNG cargoes are sent to destinations with the highest profit or lower loss (FOB based contracts)
- No US cargoes were imported to North-Western Europe/Korea and Japan in 2016.
- Korea/Japan began to import US LNG in 2017 while countries in North-Western Europe imported limited number cargoes.
- US LNG predominantly sent to Latin America in 2016-7



* Freight cost includes Panama canal fee for Asia

Source: US LNG Marketing Worldwide: Success or Failure?
Maria Belova, Head of Research, Vygon Consulting

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Low energy price and financial status of US LNG operators

(1) American LNG export plans

- to deflate the accumulated debt of shale gas producers resulted from low domestic natural gas price => speculative ratings of many over-credited shale gas producers.

(2) US LNG development targeted Asian Pacific premium market when oil price was over $100/barrel.

- Oil price began to plummet in 2014 and price-competitiveness of US LNG projects over oil-indexed LNG weakened.

- Unfavorable market environment will affect the profitability of energy companies and US LNG off-takers
- The financial health of US LNG terminal operators is unlikely to be affected thanks to cost-plus pricing mechanism with fixed capacity fee (tolling scheme).
- Large amount of bad loans at energy sector is problematic both for debtors and lenders, it is not anticipated to lead to another financial crisis, like in 2008, as debt of energy sector in total bank credit in US is 2.5-3.5% while debt of mortgage sector amounted to 33% in 2007. Core and valuable assets of bankrupt energy companies can be quickly transferred to other companies in case of bankruptcy.

Source: S.Zhukov, S.Zolina. США: финансовые рынки и развитие сектора неконвенциональной нефти, «IMEMO», 2016, №10

US LNG vs Russian pipeline gas in the EU: to get rid of the rival? Webinar Vostok Capital “US LNG and European gas market”, A.A.Konoplyanik, October 2016

The impact of US LNG exports and the prospects for price-competitiveness in the East Asian market, The Journal of World Energy Law and Business, volume 10, issue 4, Jinsok Sung, 2017

Conclusion

- Wide (5-17%) range of slope “A” for spot and fixed-term LNG contracts in Japan and S. Korea, however, annual average level of slope “A” fluctuates between 11%-15% in 2010 - 2014
- Price-competitive zones of LNG with oil linkage in Asia:

  (1) at JCC < $50/barrel, if Henry Hub price = $2/MMBTU ,

  (2) at JCC < $80/barrel, if Henry Hub = $6/MMBTU,

  (3) at JCC higher $100/barrel, U.S.LNG is price-competitive in APR,

  if Henry Hub price $6/MMBTU, however, will oil price over

  $100/barrel return?
- Today Russian pipeline gas with linkage to oil products price is price-competitive with U.S.LNG in the European market

  (1) Low natural gas price environment in the European market

  (2) oversupply – low spot price

  low oil price - low price of oil products indexed and long-term contracted pipeline natural gas
- Low international and domestic natural gas price are unlikely to affect the financial health of US LNG operators and financial sector.

Thank you for your attention!

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