Request:

DPU-CLF 1-1 Refer to prefiled testimony of Gregory M. Lander, exh. CLF-1, at 21, lines 6-7. Please provide supporting documentation for the $11.00 per Dth price of LNG landed in New England. Further, state what the city gate price of that same LNG would be once storage and pipeline transportation are taken into consideration.

Response: DPU-CLF-1-1-a

With respect to the first part of the Department's Information Request, "[p]lease provide supporting documentation for the $11.00 per Dth price of LNG landed in New England":

Looking at May 2015, forward prices, LNG over the next 9 or so years is priced in the winter time at an average below $11.00/Dth landed in Europe.

See Attachments 1 - 4.

Attachment 1 is the May 2015 issue of LNG Forward prices published by Capra Energy Group.

Attachment 2 is an enlargement of the forward price chart presented in Attachment 1 with lines to show that the average price for European prices across the winters of 2015/2016 through 2024/2025 are on average below $11.00.

Attachment 3 is a recent history of LNG Ship charter rates from Timera Energy.

Attachment 4 is a BG Group (soon to be Shell) slide with recent spot charter rates in the note.

Getting that price landed in Boston could be accomplished in a number of ways. First, a seller with supplies that could be delivered to Europe could simply agree to sell into Boston at the same prices and save shipping cost to Europe. LNG ships travel at an average of 18 knots (nautical miles) per hour. For example Trinidad/Tobago sourced supplies travelling to Boston instead of to the Teeside LNG receiving terminal in the UK would have to travel 2,000 fewer nautical miles or nearly 5 days less sailing time (~10 days less for the round trip). At between $60,000 and $100,000 per day LNG ship chartering cost, that is between a

$600,000 and $1,000,000 cost savings. On a 3 BCF cargo that is a savings of between $0.20 and $0.33 cents per Dth off of landing the LNG in Europe.

A second way to accomplish the same landed price in Boston would be for a seller, holding U.S. Gulf of Mexico ("GOM")-sourced LNG and making a sale to a Boston customer, to arrange with another LNG seller to send a ship to Boston while seller #1 sends its physical LNG to seller #2's destination. For example, a U.S. GOM-sourced LNG seller wanting to move LNG to Boston could make a deal with Shell for its Nigerian-sourced LNG, originally bound for Teeside, UK (which uses the UK National Balancing Point ("NBP") pricing point). The U.S. sourced ship would deliver its gas cargo to Teeside at the NBP price and the Shell ship from Nigeria would deliver its gas cargo to Boston at the U.S. GOM price.

This transaction can occur when seller #2's ship is closer to Boston (saving on shipping costs) or even a bit further away. The distance from Sabine, LA (the GOM source) to Teeside is 4,908 nautical miles and the distance from Nigeria to Boston is 4,977 miles. While the difference in distance from Nigeria to Boston, versus Nigeria to Teeside is 448 nautical miles or ~ 1 day (~25 hours) longer one way (~2 days longer round trip) to Boston than Teeside, that added charter cost even at the higher $100,000 a day (~$200,000 in total) only adds 6.6 cents to the "landed cost" of the typical 3 Bcf ship of LNG. Against an $11.00 landed price, 6.6 cents is 6/10ths of a percent.

The more likely manner in which the second arrangement would be effectuated by an LNG merchant with a diverse portfolio of sources of supply would be just to effectuate the above "exchange" internally within and around their own portfolio. Here, they would deliver the gas from source "X" to destination "Y" and deliver the gas from source "A" to destination "B". Meanwhile the "price" associated with source "X" is delivered to destination "B" and the price of source "A" is delivered to destination "Y". For this portfolio player, as long as they cover their variable cost and profit between these transactions, it doesn't matter whether the physical gas priced at a particular source price is delivered to the market to which a sale based upon that price was made or not. As long as the gas is delivered to both destinations and the money collected, they have achieved their desired result.

The good news in all of this is that the neither the buyer in Boston nor the buyer in Teeside need be involved in any of these logistics; it is all handled by the seller.

Sources:
Attachment 1 & 2 source:
http://capraenergy.com/uploads/3/2/3/5/3235882/lng_forward_market_wire_-_may_2015_edition.pdf

Nigeria LNG marketer data source:
http://www.shell.com.ng/aboutshell/our-business/bus-nigeria/lng.html

Distances Source:
http://www.sea-distances.org/

Distances:
Bonny Island to Teeside UK 4,529 nautical miles
Bonny Island to Boston, MA 4,977 nautical Miles

Trinidad and Tobago to Teeside UK 4,175 nautical Miles
Trinidad and Tobago to Boston MA 2,001 nautical Miles

Sabine, LA to Teeside UK 4,908 nautical miles

Response: DPU-CLF-1-1-b

With respect to the second part of the Department's Information Request, "[f]urther, state what the city gate price of that same LNG would be once storage and pipeline transportation are taken into consideration":

For deliveries of gasified LNG to National Grid, there are several avenues with several different possible costs (or no costs) associated with National Grid's receiving that gasified LNG into its system(s). Relative to the Precedent Agreement amounts; National Grid could receive the gasified LNG as follows:

1) In an amount up to 135,000 Mcf/d (~138,375 Dth/d at 1,025 btu/cf) directly into its distribution system from Distrigas (Everett) and then under its TGP Agreements re-direct its Boston-bound TGP deliveries to other TGP-served city gate stations of National Grid.
    a. Cost to achieve this would be $0.00 as there is no charge for receiving supplies from the Everett terminal directly into its system; nor is there any charge by TGP for re-directing Boston bound supplies to other of National Grid's TGP city gate stations.
2) To the extent #1 above is not chosen for the full amount of National Grid's receipts of gasified LNG available to serve Boston and re-direct

TGP Boston-bound supplies to other TGP served locations, National Grid can receive gas from Distrigas into TGP (also in Everett) and pay TGP as little as $0.1599 per Dth (inclusive of EPCR, & ACA) under the TGP FT-BH (back-haul) rate schedule (plus a retainage factor to TGP for Lost and unaccounted for gas of 0.26% of gas received which at $11.00/Dth gas cost would bring the total to $0.1886 for transportation to National Grid city gate station(s). The cost of storage at the LNG terminal is usually embedded in the gas prices of the LNG merchant(s) in the forward prices presented in part 1 of the response.

3) Other means of receiving gasified LNG to serve National Grid's TGP city gate stations abound. Among them are:
    a. Receive the gasified LNG into AGT, deliver the AGT supplies to the districts connected to AGT and re-direct the TGP supplies to those same districts to other TGP districts, here to the extent the total deliveries in AGT from all sources exceed the sum total of all AGT contracts, the AGT over-run rate of $0.2272 would apply, then, for deliveries to TGP gate stations, which would be within total TGP Contract Quantities, there would be no charge, and then only to the extent that total deliveries of domestic supplies plus gasified LNG supplies into all TGP and AGT contracts exceeded both the AGT overrun quantities plus base contract quantities, then there could be the same $0.1886 per Dth TGP charge on only those limited quantities that were in such excess.
    b. Receive an amount of the gasified LNG into AGT at any one of the on-shore or off-shore LNG receipt locations (which by virtue of segmentation will incur only pure usage and fuel charges), then deliver these AGT supplies to TGP at Mendon and then deliver these TGP supplies to National Grid's Central Mass (Worcester County) city gates (up to 77,925 Dth/d for its Worcester County citygate stations while staying within point and contract quantities) and redirect the TGP deliveries bound for those locations to other National Grid city gates off of TGP. By virtue of segmentation National Grid could receive on TGP these Worcester county delivered TGP supplies and re-directed TGP supplies would not incur any incremental service charges other than pure usage and fuel charges or $0.2361 in total per DTH for the AGT to TGP at Mendon and TGP Mendon to Worcester County deliveries (assuming $11.00 gas cost).
        i. It is also worth noting that there are 5 shippers on TGP with contracts totaling 230,283 Dth/d with supplies sourced west of the NY/MA border and with firm

deliveries from TGP to AGT at Mendon. In this regard, National Grid could arrange with any one or more of those parties to deliver them National Grid's AGT supplies (bound for Worcester County) at AGT Mendon (where those 5 shippers need to deliver their TGP supplies) and in exchange have the shipper(s) deliver the like amount of TGP supplies to National Grid to the Worcester County points (i.e., the 77,925 Dth/s that are west of Mendon) instead. Under this arrangement National Grid would incur no additional transportation TGP transportation costs associated with that portion (if any) of their gasified LNG that they chose to receive into AGT that was bound for Mendon for further deliver to Central Mass.

c. Receive the gasified LNG into AGT at any one of the on-shore or off-shore LNG receipt locations (which by virtue of segmentaion will incur only pure usage and fuel charges, deliver the AGT supplies to Maritimes and Northeast (MN&E) and then deliver these MN&E supplies to TGP at Dracut.
    i. Delivery of these Dracut-received supplies, by virtue of segmentation on TGP, would not incur any incremental service charges other than pure usage and fuel charges. The sum total of the AGT, MN&E and TGP charges (assuming $11.00 gas cost and including fuel) would be $0.9378 and only for those quantities that could not be scheduled over the less expensive routes identified in 1), 2), 3 a) or 3 b) above.

Capra Energy Group Ltd.

LNG FORWARD MARKET WIRE *May 2015*

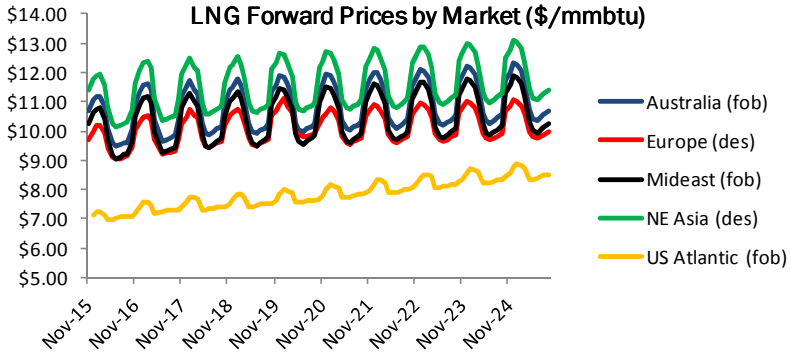
Highlights for May 2015

- Long-term LNG markets settled down somewhat in May 2015, after the sizeable swings seen in prior months.
- Northeast Asia's long-term premiums versus the US-Atlantic persisted overall and strengthened in the back years, implying supportive economics for structural arbitrage plays between US projects and East Asian markets.

MONTH-END FORWARD PRICE CURVES

After the large swings seen in prior months, long-term LNG forward markets settled down in the month of May 2015. 10-year strips for Northeast Asia, Australia, the Mideast and Europe firmed modestly, with increases of between +0.3% and +0.9%, while the US-Atlantic 10-year softened slightly (-0.7%).

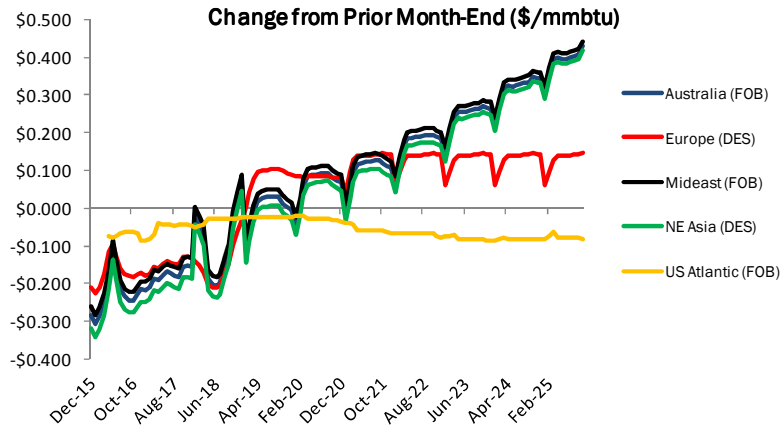
The premium between longer term forward prices and shorter term levels (i.e., long-term secular contango) did widen, however. For example, Northeast Asia CAL 2024 vs. CAL 2016 rose from $0.95/mmbtu to $1.50/mmbtu.



PRICE CHANGES FROM PRIOR MONTH-END

The European and Asia-Pacific markets all exhibited moderate 'twist action' again, driven by a combination of modest contributions from European gas hub prices, crude oil markets and US dollar FX rates. The US-Atlantic softened in line with Henry Hub weakness across the 10-year horizon, however.

Australian and Mideast netbacks vs. Northeast Asia improved very modestly, however, as LNG tanker dayrates and bunkers softened over the course of May.



INTER-MARKET SPREADS

The robust Northeast Asia vs. US-Atlantic premium that reappeared in April softened slightly in CAL 2016, but strengthened in the later years. For example, at the back end of the curve (CAL 2024), the forward spread rose from $3.50/mmbtu to almost $3.90/mmbtu. These levels are very supportive of long-term arbitrage plays between US projects and Northeast Asian markets.

Similarly, Northeast Asian premiums vs. Europe remained sufficiently wide to support cargo reload and diversion economics within 2016 and beyond.

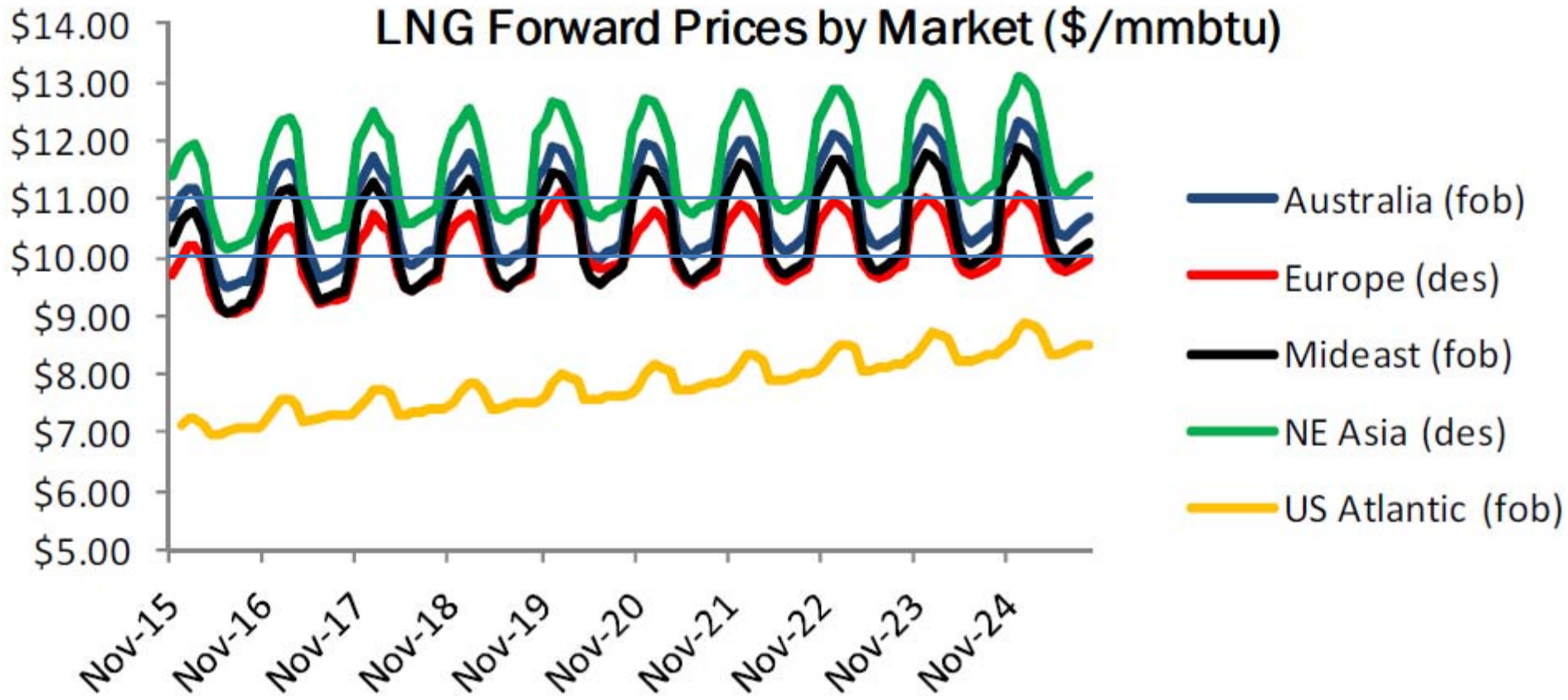
CAL 2016 Price Spreads ($/mmbtu)	Europe (DES)		NE Asia (DES)	
	Settle Date	Mth Change	Settle Date	Mth Change
Australia (FOB)	-$0.639	$0.057	$0.677	-$0.032
Mideast (FOB)	-$0.250	$0.034	$1.067	-$0.055
US Atlantic (FOB)	$2.370	-$0.082	$3.687	-$0.171
Europe (DES)	-	-	$1.317	-$0.089

ABOUT LNG FORWARD MARKET WIRE

Capra Energy's *LNG Forward Market Wire* service provides end-of-week assessments of long-term forward prices for major LNG markets around the world. Price curves are delivered weekly via e-mail and FTP server to subscribers. Please contact our editors for more information:

Tamir Druz, Editor/tamir.druz@capraenergy.com
Carlos Blanco, Editor/carlos.blanco@capraenergy.com

Source: Capra Energy Group



http://capraenergy.com/uploads/3/2/3/5/3235882/lng_forward_market_wire_-_may_2015_edition.pdf

LNG vessel charter rates heading south

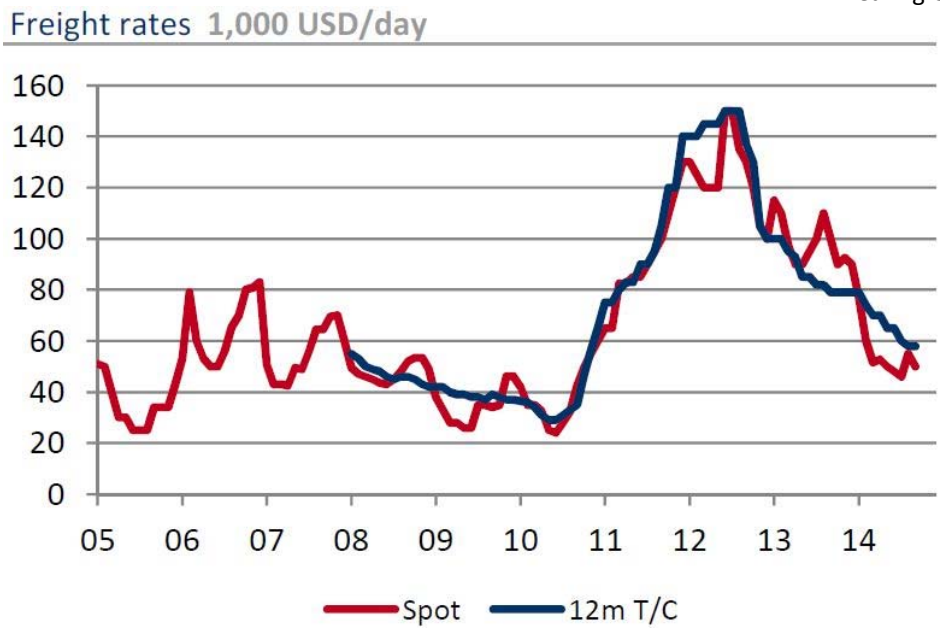
06 Oct, 2014

The upheaval in the global gas market this year is also being felt in the LNG shipping market. LNG charter rates have sunk in 2014 alongside gas prices. Healthy LNG vessel order books in anticipation of new liquefaction capacity are resulting in a wave of new deliveries from shipyards. At the same time the fall in demand for gas in Asia is reducing vessel journey times. The fall in LNG charter rates is having an important knock on impact on LNG shipping costs which are becoming an increasingly important driver of global gas price differentials.

The weight of supply

We published an article at the start of January on 'Steam coming out of the LNG shipping market'. Our conclusion was that given the weight of a substantial order book for LNG vessels "*2014 may mark the start of the next glut in LNG shipping capacity*". Spot charter rates have fallen from levels around 90,000 – 100,000 $/day in 2013 to around 50,000 $/day last month. 12 month term charter rates have also fallen to around 58,000 $/day in sympathy as shown in Chart 1.

Chart 1: LNG spot and 12 month term charter rates



Source: RS Platou Monthly (Sept '14)

These rates are now back below those required to support new build of LNG vessels. It also appears that the post-Fukushima boom in shipping charter rates is giving way to a period of oversupply, similar to that seen from 2008 to 2010.

New orders for LNG vessels are drying up. But there is a lot of inertia in the existing order book given the time lag between order and delivery. Existing orders have been driven by higher LNG prices and charter rates post-Fukushima and a wave of enthusiasm around new liquefaction capacity coming to market in the second half of this decade. Chart 2 gives an indication of the number of vessels to delivered over the next 3 years. While many of these vessels are under long term contract in relation to new liquefaction capacity, there are also a number that are not under contract. These may further weigh on shorter term charter rates.

Chart 2: Global LNG vessels order book

Order book in no. / mill cbm

1,000 cbm	Total		Rest 2014		2015		2016+	
10-50	10	0.27	1	0.03	7	0.18	2	0.06
50-100	0	0.00	0	0.00	0	0.00	0	0.00
100-200	120	20.15	22	3.56	30	4.97	68	11.63
200+	0	0.00	0	0.00	0	0.00	0	0.00
Total	**130**	**20.42**	**23**	**3.59**	**37**	**5.15**	**70**	**11.68**

Source: RS Platou Monthly (Sept '14)

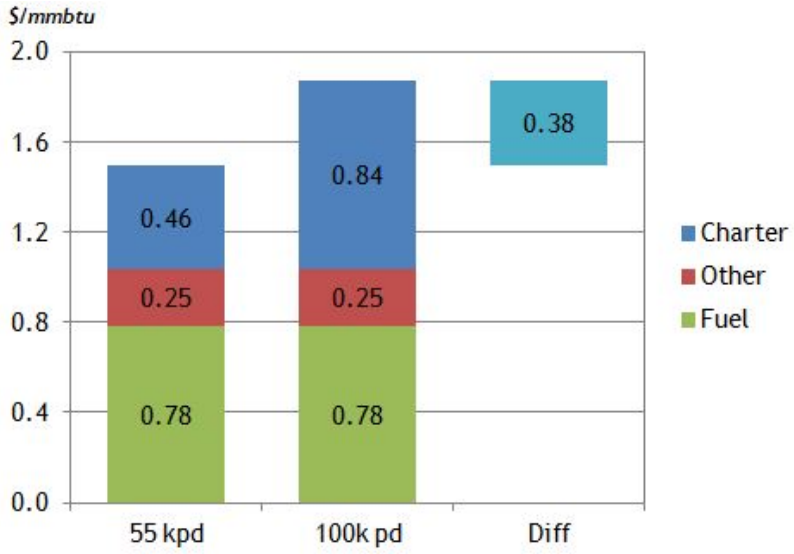
Changing LNG shipping costs and flow dynamics

As well as a healthy order pipeline, the other factor weighing on LNG charter rates in 2014 is changing patterns of vessel utilisation. The sharp fall in Asian spot LNG prices over the summer has seen a reduction in the diversion and reloading of European LNG supply to Asia. This in turn reduces average journey time and unballasted voyages, factors which have supported shipping demand and charter rates over the post-Fukushima period.

Weak spot gas prices and falling charter costs have also reportedly led to a number of vessels being used for storage plays for up to 6 months, i.e. gas can be stored in the summer and re-sold as prices recover into winter.

Vessel charter rates are the largest component of LNG shipping costs. So the fact that charter rates have more than halved since 2012 has significantly reduced the cost of moving LNG. Chart 3 shows the impact of the recent fall in charter rates in reducing shipping costs for cargo diversions from Spain (Huelva) to Japan (Sakai).

Chart 3: Illustration of reduced LNG cargo diversion costs from Europe to Asia



Main assumptions:

- *Laden leg only, 147k MT vessel, 600 MT fuel oil price*
- *10,014 NM journey via Suez canal, 19 knots average speed,(~22 day voyage)*
- *USD 400k canal transit charge (one way), other costs including port fees, brokerage and insurance.*

Source: Timera Energy

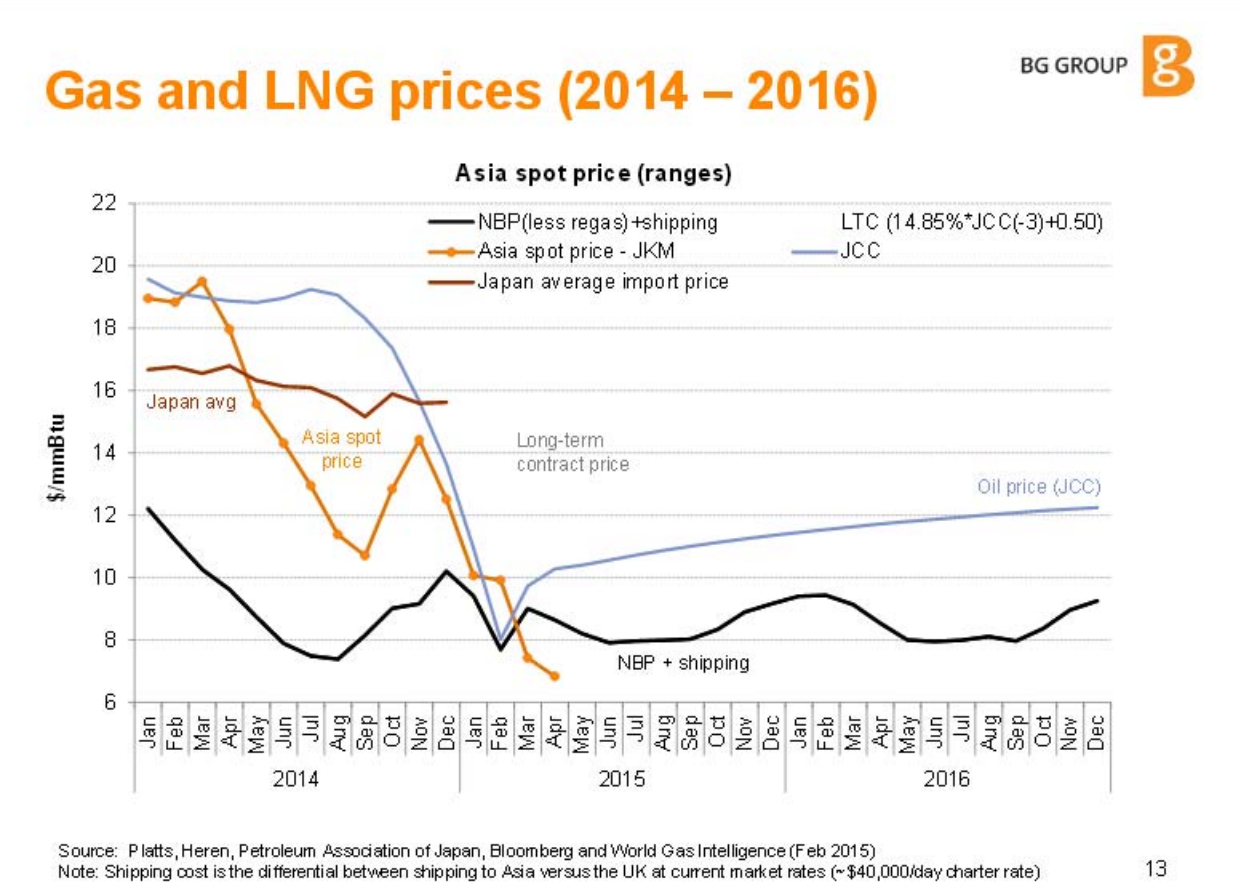
The primary driver of LNG flows is locational price differentials. It appears that we are entering a new phase of global gas pricing where these price differentials may be narrowing (as we set out here). A reduction in LNG charter rates will likely act to reinforce global price divergence by reducing the cost of moving LNG between locations. As global LNG market tightness subsides, shipping costs are likely to become increasingly important in driving global pricing. We look at some of the implications of shipping costs on LNG pricing dynamics in an article to follow shortly.

Source:

http://www.timera-energy.com/lng-vessel-charter-rates-heading-south/

LNG Ship Charter rates

See Note under Chart.



Source:

http://files.the-group.net/library/bggroup/files/doc_592.pdf