Gas prices today and going forward

Wholesale prices and the impact on retail prices for LNG as bunkering fuel ($ / tonne version)

MarTech LNG value chain development seminars

Rostock / Szczecin / Klaipeda

13-16 October 2014

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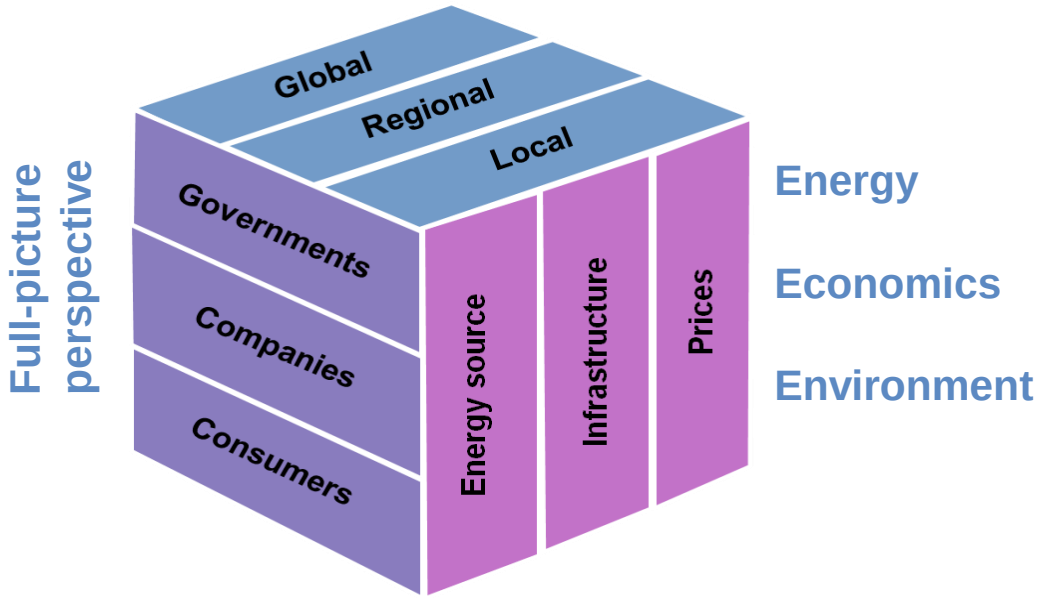


Learning between countries, industries, energies, technologies and more…

In the small-scale LNG area, clients include:

- Sellers
- Buyers
- Ports

Typical assistance:

- Strategy and business model
- Market analysis
- LNG contract negotiations
- Partner search
- …and more

…by understanding the full picture of stakeholders

Fewer than expected are building for LNG propulsion

Several reasons for this

- Difficult to get and understand gas pricing
  - Industry practices/culture very different in bunker oil and LNG
  - Terminology, timing, uncertainty

This presentation will attempt to simplify and demonstrate

- Pricing trends globally wholesale – key drivers
- Possible options in retail LNG for bunkering
- Risk management key for buyers
- Mainly for potential buyers

Sellers should also take note

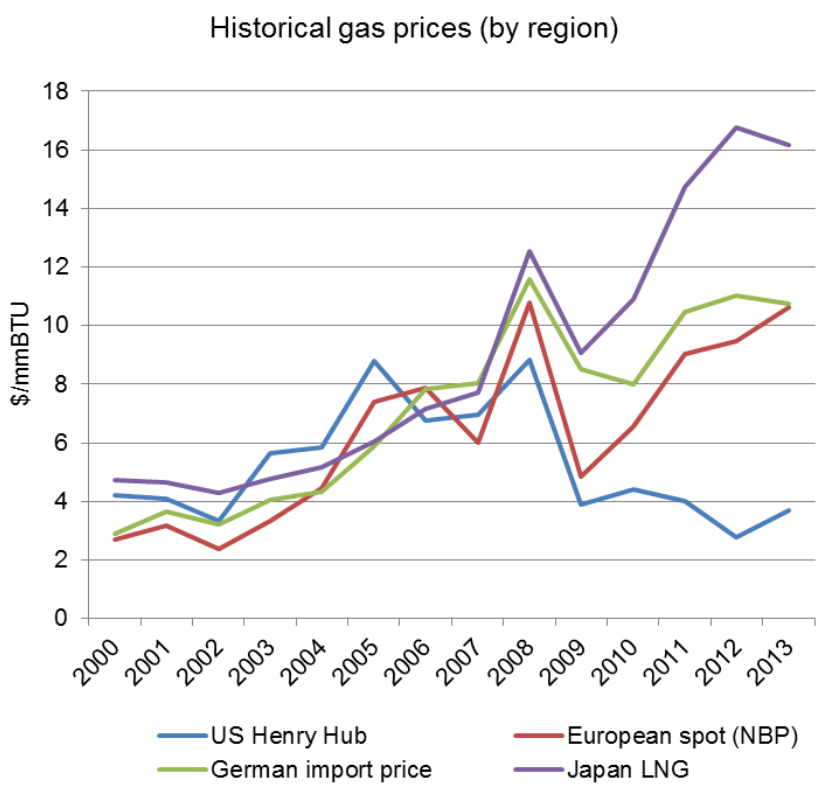
- Complicating matters (as today) makes decisions more difficult
- A simpler approach would give more volume faster!

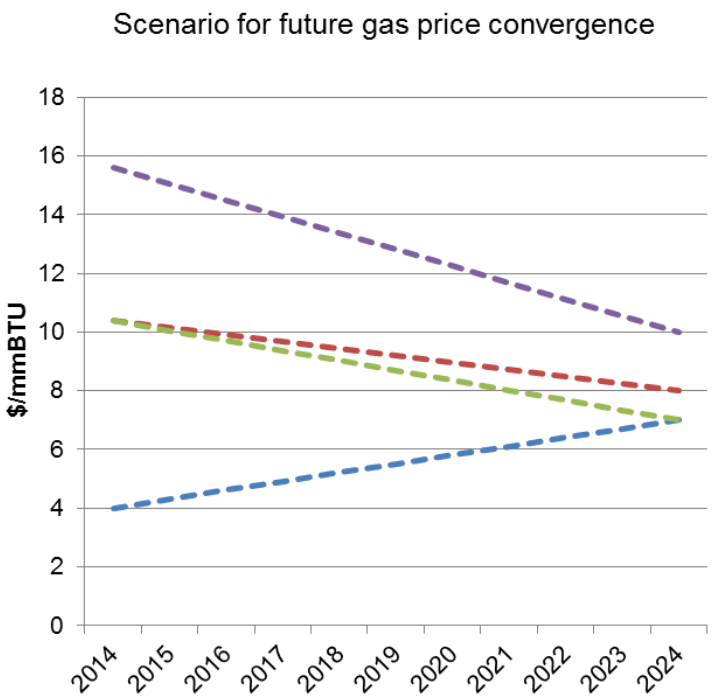
Global gas prices diverged considerably since 2008

US shale boom brought down prices there

Fukushima and high oil prices kept Japan high

Going forward, wholesale LNG could act as "equalizer" for new supplies





$10 / MMBtu = $520 / tonne

Data: BP Statistical Review of World Energy June 2014

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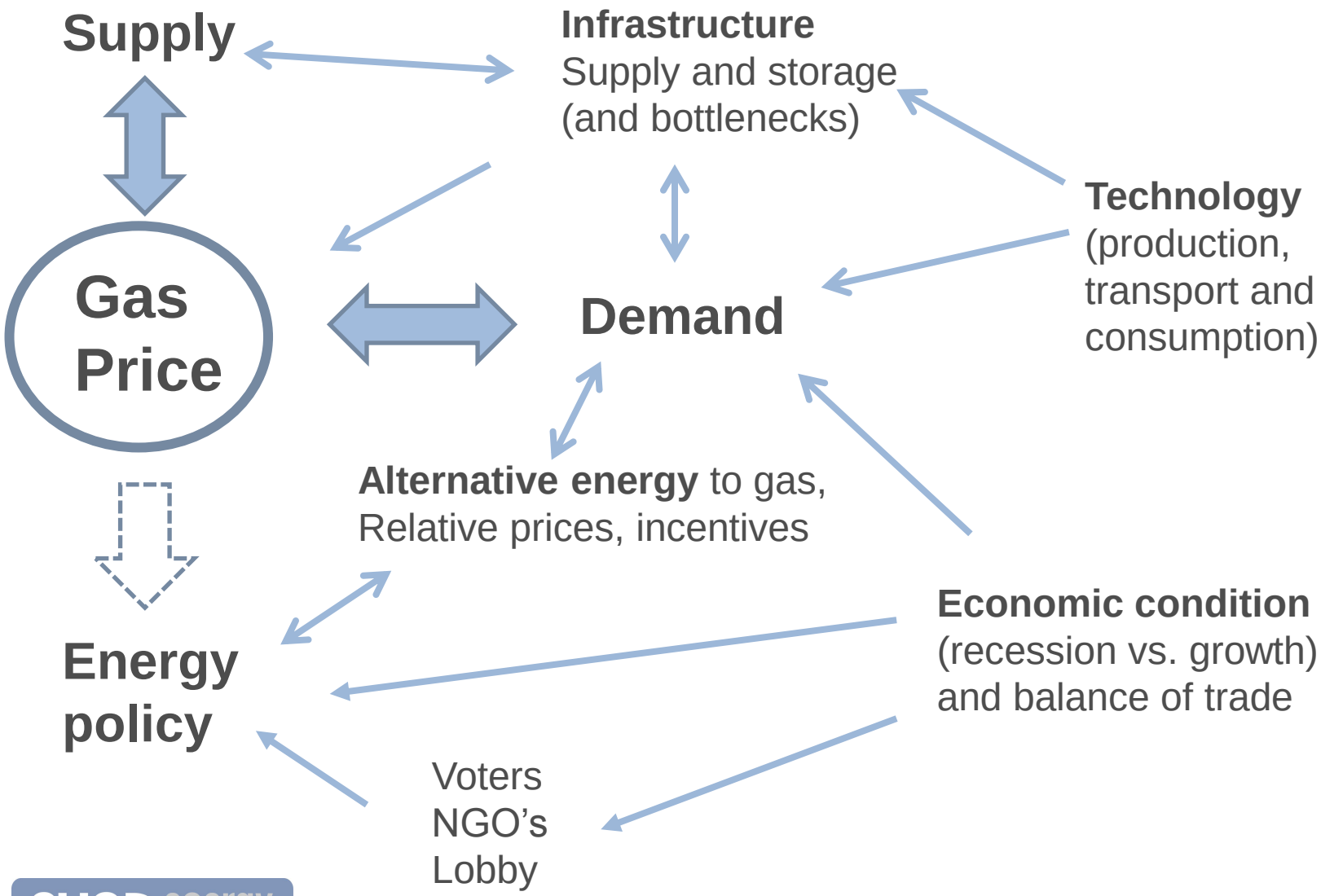
The picture is complex, and drivers change over time



Global LNG production set to increase dramatically

More planned capacity than expected demand for LNG

- New projects in Australia, North America, Russia and East Africa will compete for demand – the world likely over-supplied before the end of this decade

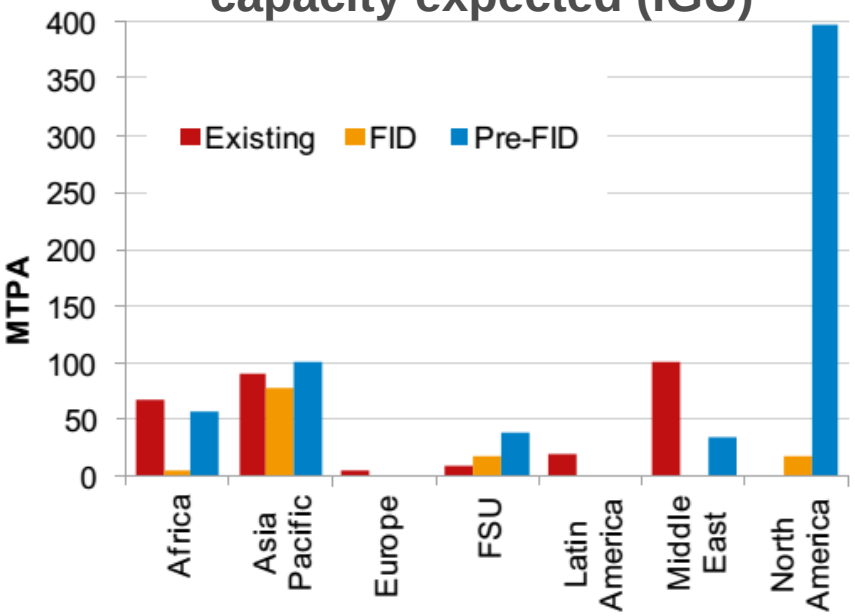
Much could be sent to Europe

- Delivered at hub prices
- Plenty of import capacity
  - 2013 utilisation 19%

Hub price in Europe set by demand and supply balances

- Now demand falling
  - LNG to marine could help
- Russian crisis could reduce some supply
  - And long term demand

Much new liquefaction capacity expected (IGU)



Nominal Liquefaction Capacity as of Q1 2014

LNG import capacity – much spare, but still growing

134 MTPA

EXISTING

22 LNG Terminals
(196 bcm/y)

22 MTPA

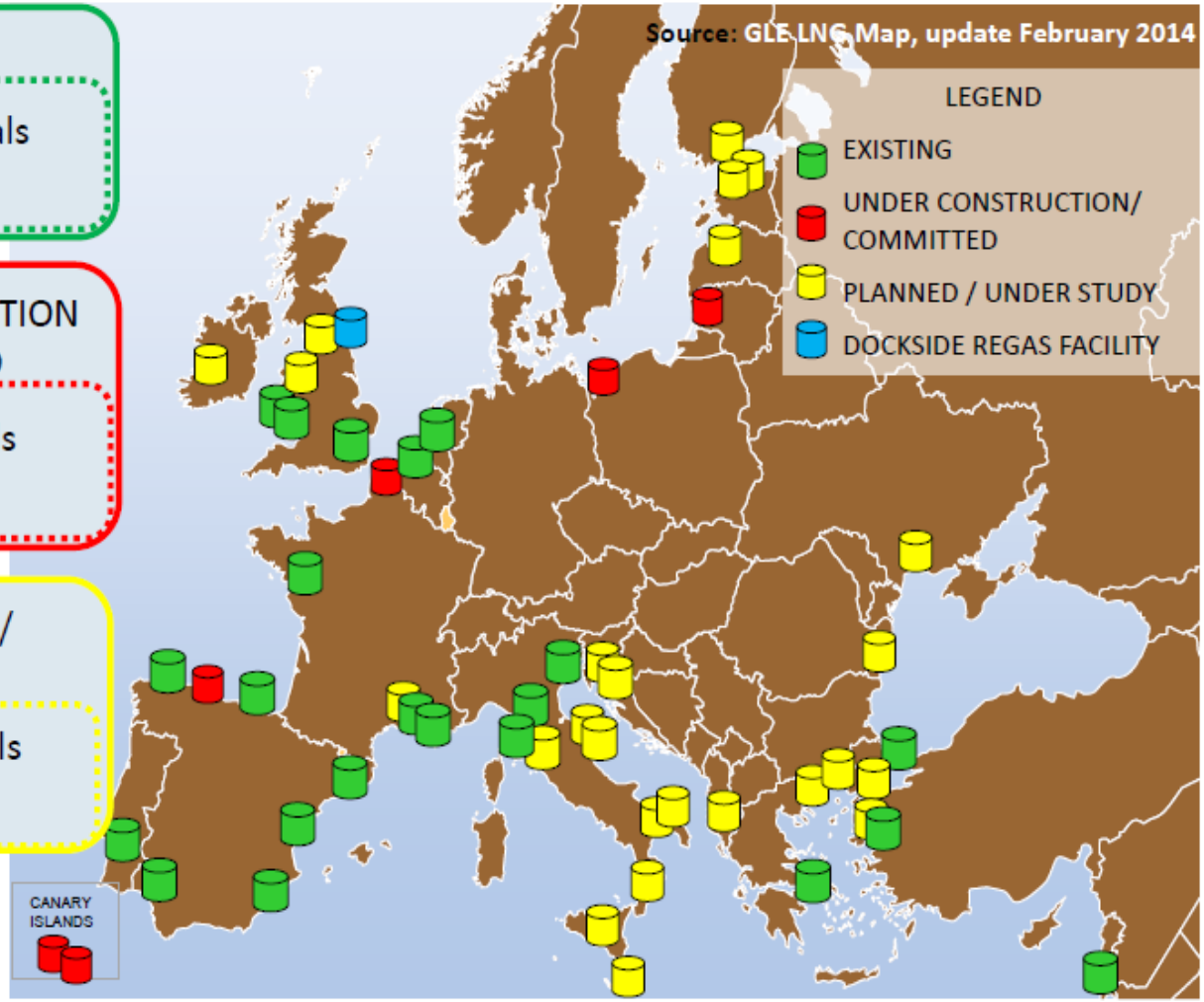
UNDER CONSTRUCTION / COMMITTED

6 LNG Terminals
(32 bcm/y)

109 MTPA

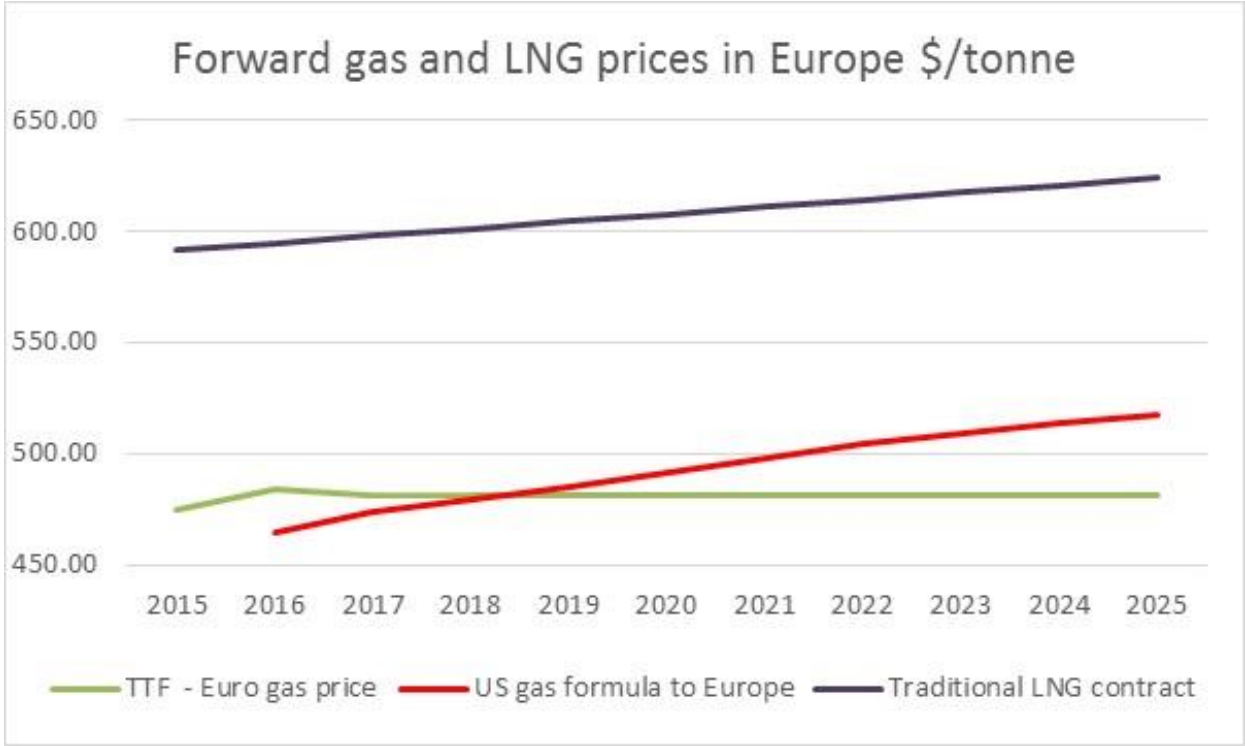
UNDER STUDY / PLANNED

32 LNG Terminals
(>160 bcm/y)



Detailed information on LNG terminals available at http://www.gie.eu/index.php/maps-data/lng-map

Outlook for wholesale prices – hub or oil linked



- Traditional LNG contract oil formula into Europe = Brent * 12% + C
  - Delivered cost of LNG (e.g. from Qatar) to Europe – wholesale LNG
- Henry Hub (US gas price) LNG formula = HH * 115% + toll fee (+ shipping)
  - Delivered cost of LNG (from US) to Europe – wholesale LNG
- TTF European gas price – the hub market for gas
  - Cost of gas in NW Europe (not liquefied) – wholesale gas

The wholesale price is only part of the retail price

A small market with few players today

- Some room for high margins, especially at high oil prices
  - Competition and lower oil prices may change this
- Two main models for retail LNG to bunkering
  - Linked to MGO (with a built in discount)
  - Hub price + cost/profit elements
- Which is best depends on your view of future and preferred risk management

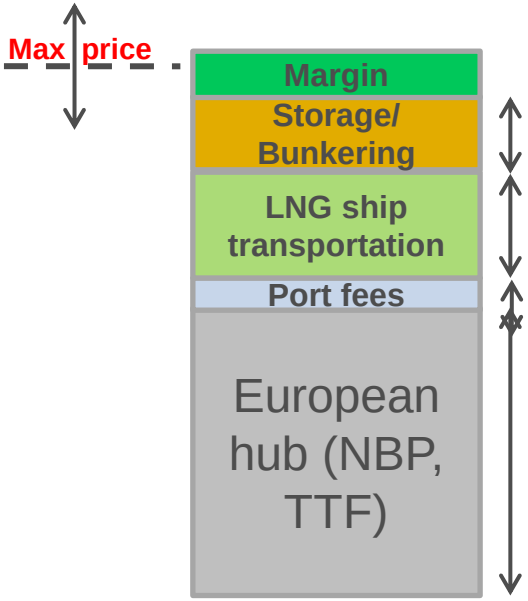


Illustration of LNG price to storage tank in port/ bunkering

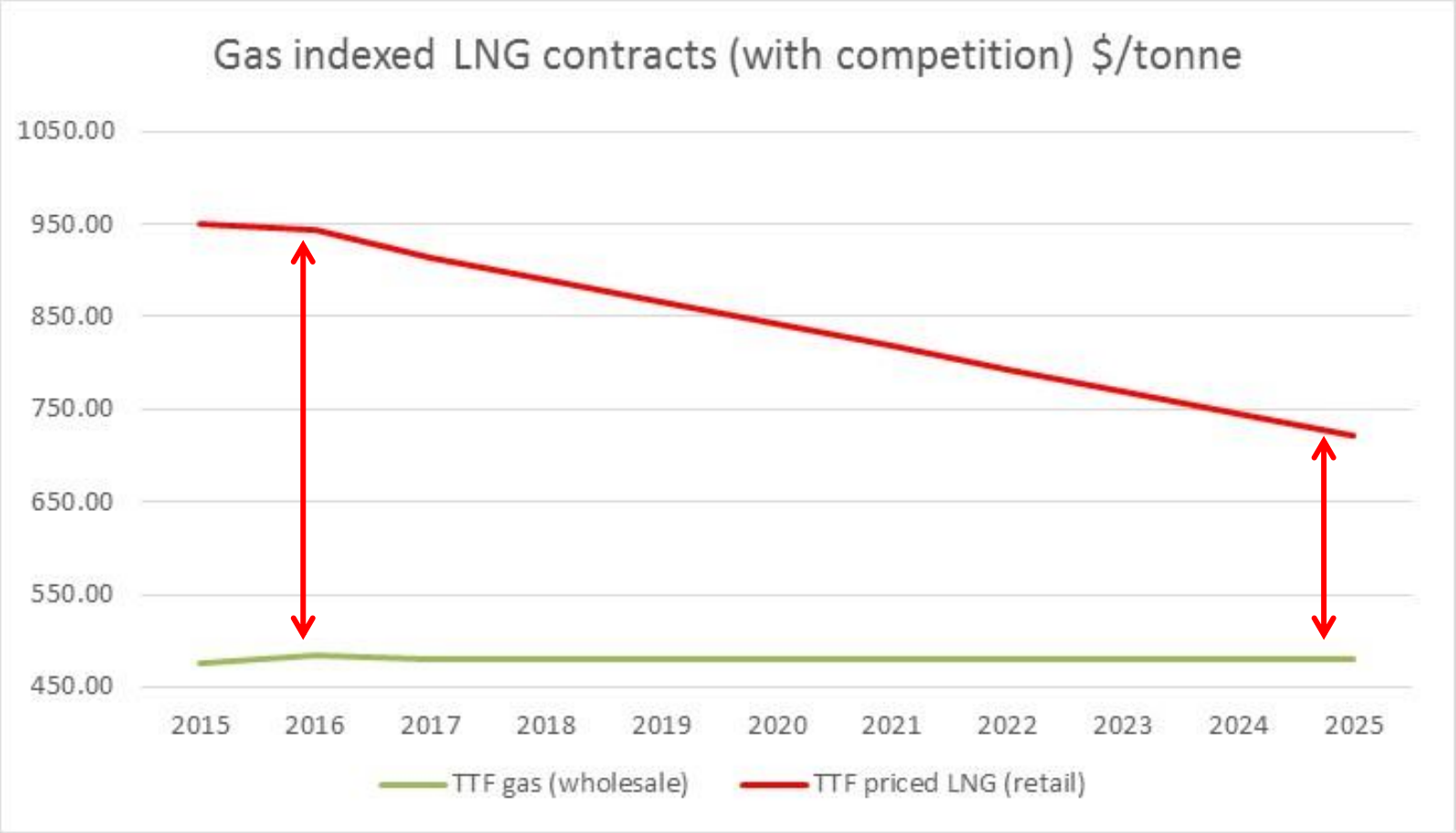
40 - 100 $ / tonne, depending on solution, size, degree of utilisation. Lower with smaller shipments, which increases transport cost and risk

50 - 200 $ / tonne, depending on ship size, location of «origin» LNG terminal, degree of utilisation, etc. Lowest with more competition/ own ship if used enough

Port fee at LNG pick-up point: 20 - 60 $ / tonne , depending on port, ship size, etc

350 - 500 $ / tonne depending on demand/supply – forward curve

Illustration – a view on prices – TTF priced LNG

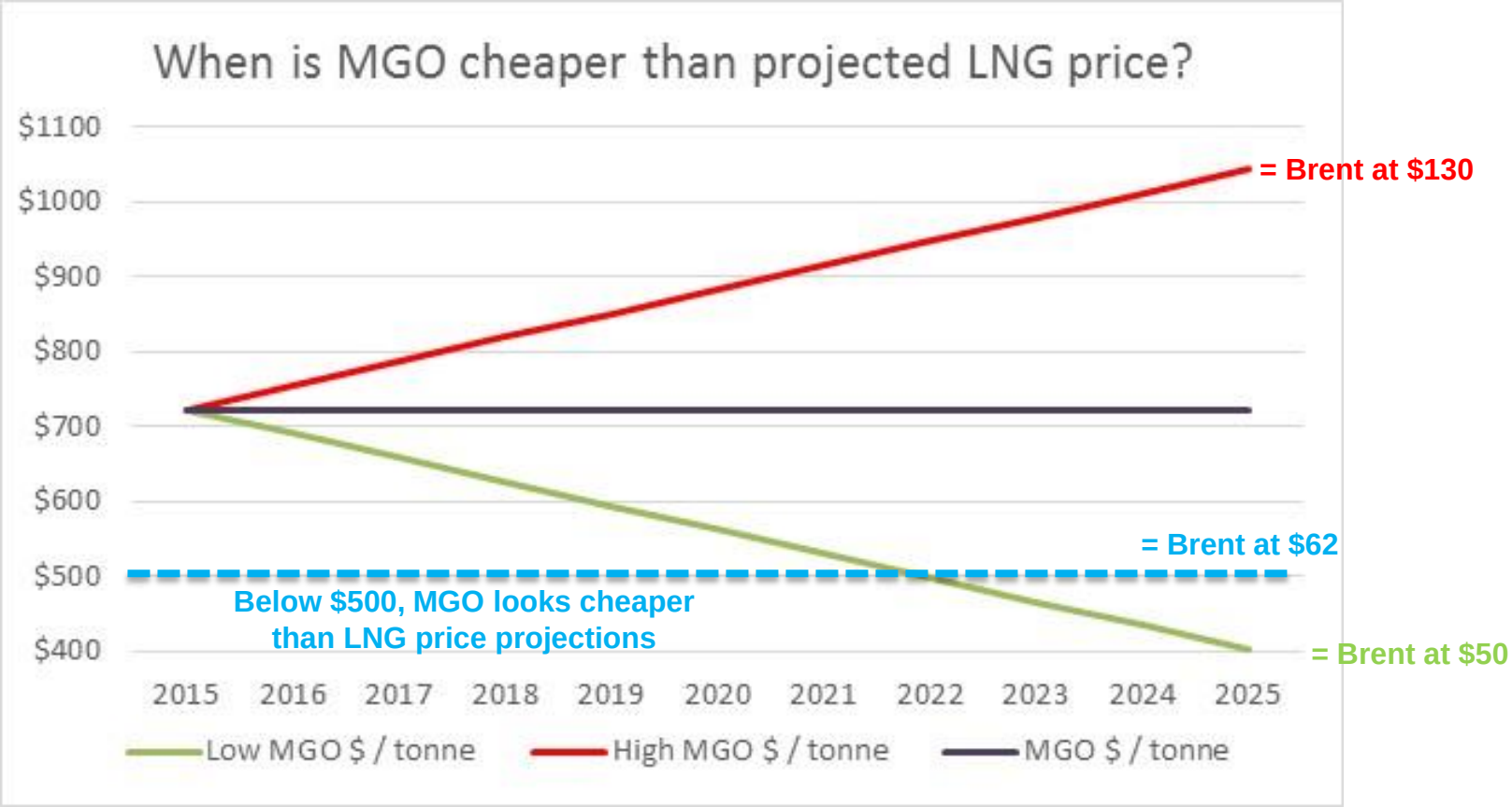


NB: Difference between wholesale and retail prices is still significant for LNG, very small for oil-based fuels

We expect this difference to significantly reduce with competition, bringing gas priced LNG down by $200 – 250 / tonne, which would be competitive with MGO at current levels

Source: Montel/ Metanopoly, June 2013

Illustration – a view on prices – MGO vs LNG



Difference between Low and High scenarios in this example is movements in crude oil prices, $90 falling to $50, or $90 rising to $130 / bbl.
In a weak crude market, MGO will fall but by what ratio? And what will this mean for LNG bunkers priced on a MGO-priced formula? Will the pricing formula be adjusted with weaker prices?

Source: Montel/ Metanopoly, June 2013

Small-scale liquefaction – an alternative to ready-made?

Where does it happen?

- Where there is pipeline gas and LNG demand but no available supply
  - Often where gas is 'stranded' with no means of redistribution by pipeline, large-scale LNG production, or flaring
- Opportunistic gas, from landfill or wastewater – Biogas to LNG
- Peak-shaving for utilities or back-up for industrials
  - Best current example for bunkering - Buenos Aires' *Buquebus*
- Where will it happen going forward?

Volumes available through small-scale liquefaction

- From 3,000 tons per year up to 500,000 tons per year
  - Cryostar, Chart, Wärtsilä Hamworthy, and GE are just a sample

Costs example

- A unit producing around 4,000 tons per year could cost around $5 m
- Could cost $250 – 500 / tonne to produce LNG
- Plus cost of gas, TTF at $500 / tonne
- Plus storage, transport, return for investors…

What is best, then? Exposure and risk management

If you want the same costs as others – oil link could be best

- Most ship owners stick with oil products (MGO)
- Having LNG linked to MGO prices feels safe
  - Especially if you expect a long term shortage of gas

If you believe oil prices will go up and gas is plentiful

- Significant cost reductions possible in choosing gas linked price
  - Hub + cost could well be the lowest price in the future

Uncertainties on both sides

- Different tools available for hedging – both oil and gas
- Some also choose dual fuel, as a natural hedge
- Important to work on contracts to suit preferences
  - Term, pricing, delivery terms and more
- Both absolute cost level and relative prices important to consider

We are happy to discuss further!

We offer strategic and commercial advice + partner selection

- Small and large buyers, governments, TSOs, producers
- Gas, electricity, environment and more

Selected recent work

- Sourcing strategy and gas contract (re)negotiations in Nordics/ Baltics
- Small-scale LNG value chain and market potential analysis
- Gas price scenarios for 2020

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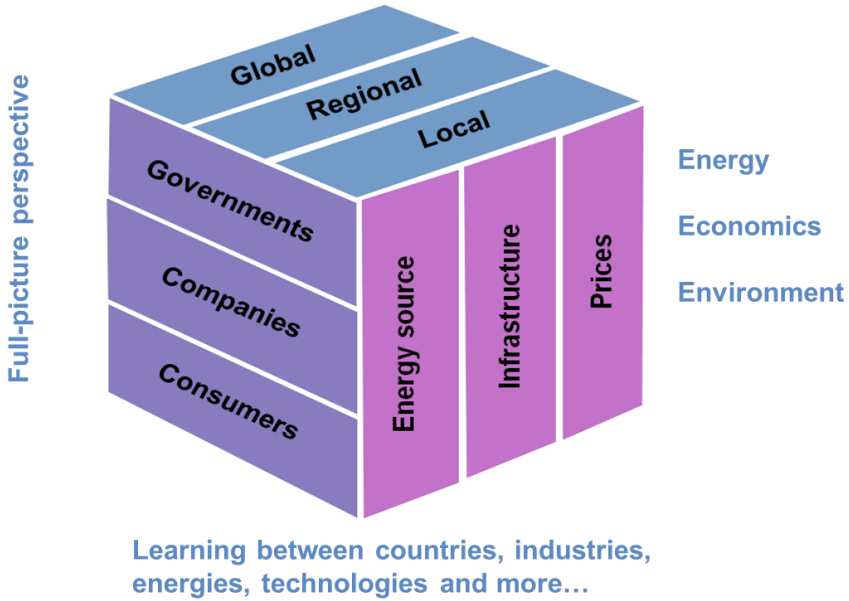


Blank

Break bulk and ‘mid-stream’ prices

Large vessels reload to small-scale LNG in break bulk

- Conventional sized vessels 120,000 - 160,000 cbm, small scale 50 – 20,000 cbm
- Projects include Rotterdam, Zeebrugge and Gothenburg
- Where will it happen in the coming years?

Mid-stream players bulk break and sell to retail sector

- Margin required to cover wholesale price, transit to break bulk terminal, accepting cargo, transfer cost
- This is where the delivered price on conventional sized ships gets converted into small-scale price (but not yet the retail price…)
- Costs, like reload slots, are in the region of $1.50 / MMBtu, but will be higher for smaller loads, lower for larger loads (economies of scale)
- There needs to be the incentives for suppliers to sell small !

Volume

- How much LNG for bunkering could come in and where….?

Retail prices – the bunkering market

LNG as marine is taking off

- Three environmental drivers
- But economic potential is key!

Over 50 LNG-fuelled ships in traffic

- Around 60 new-builds / conversions confirmed during 2014-2018
- Potential for 1000 ships in traffic globally by 2020

Viking Line is already no longer alone!

- Fjord Line: LNG passenger ferry (ropax) with LNG-only engines
- Brittany Ferries
- Viking, Norled, others…
- >10 operators in Europe investing in LNG

Deep Sea vessels are next…

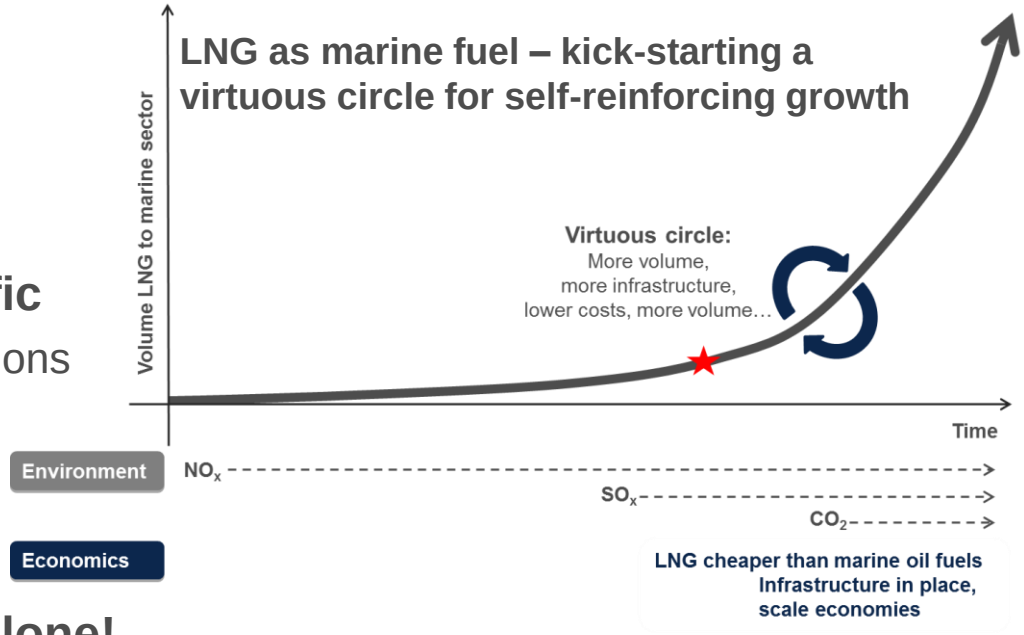


Illustration: Sund Energy

Source: Fjord Line, 2013

Retail pricing - the bunkering market

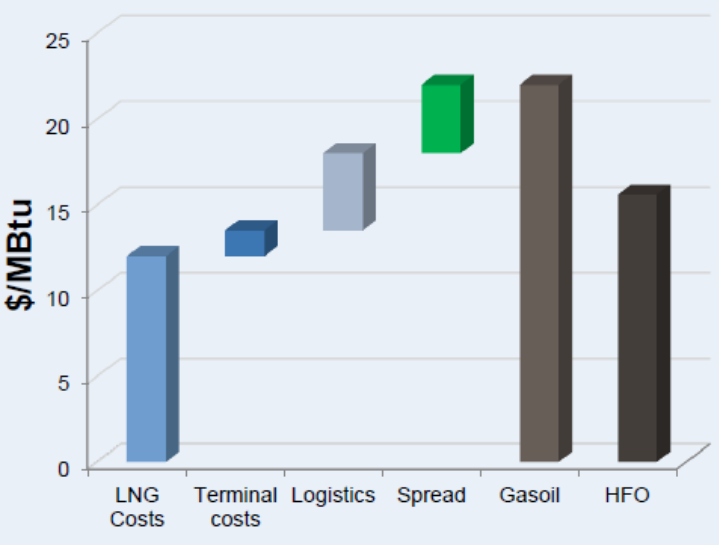
LNG could be the cheapest available marine fuel on the spot markets

- Value chain costs are significantly higher for LNG than for oil-based products
- Nevertheless, LNG could maintain a comfortable edge against IMO-compliant HFO and MGO

Several cost elements add up to the hub/ liquefaction plant FOB price

- Port fees to pick up LNG from the receiving terminal (or liquefaction plant)
- LNG tank-ship fees for transportation to small-scale receiving terminal
- LNG storage in the port/ cost of bunkering
- Possibly cost for further transportation by truck, and perhaps onwards by local pipeline to final user

Competitiveness of LNG as marine fuel



Source: Elengy, 2013

Prices will change as the supply chain changes

Small scale, almost as trendy as shale gas!

- They are also helping each other at many levels
  - Sustained discount to oil grows market – the larger the margin, the quicker the growth
- New areas of use develop
- Volume estimates vary for bunkers in Europe (in line with global LNG volume uncertainty)
  - 2015 in the range 0.1 to 0.3 mtpa
  - 2020 in the range 2.0 to 4.0 mtpa
  - 2030 in the range 5.0 to 10.00 mtpa

Conventional technology adapted to smaller solutions

- Better solutions for remote production, making more gas available
  - Breaking some old rules about what can be economic gas
- New entrants will provide better solutions and more use
- With more competition, value chain prices will be lower
  - More similar retail and wholesale prices

So much has happened in the last year!

- What will the market look like in 20 years?

How will pricing change moving forward?

Small scale: We seem to be beyond the worst chicken & egg discussions

- First motivation: Lack of pipelines – this gave small ships and trucks
  - Now economic to transport by truck, in several places more than 500 km!
- Second motivation: LNG as bunker fuel – reduce emissions of SOx and NOx
  - Local ferries, international ferries, merchant ships with base, deep sea ships next?
- **Third motivation: LNG can be cheaper than oil over time – globally!**
  - **Initially only new-builds – conversions next?**

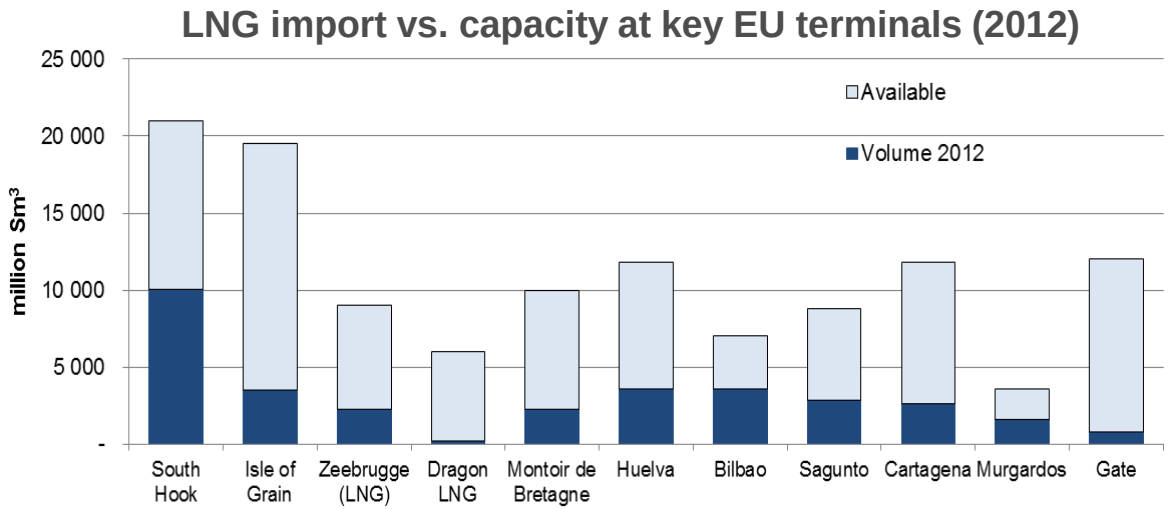
Infrastructure is changing, too

- Taking proven technology from larger scale operations to small scale
  - Truck market and blending in biogas new trend in several countries
- From dedicated/ integrated to third party access – port services

Products and contracts

- Long term, binding volume & price → shorter, more standard, quick negotiations?

There is much spare capacity in Europe's terminals…



Possible future hubs

Data: IEA, GLE LNG, 2013

…and increasingly many ports with available bunkering infrastructure

Current	Future (some examples)				
Stockholm	Risavika	Hamburg	Bodø	Pori	Rostock
Rotterdam	Lysekil	Antwerp	Mongstad	Sillamae	Helsinborg
Kollsnes (CCB)	Turku	Zeebrugge	Øra	Paldiski	Copenhagen
Halhjem	Porvoo	Ghent	Helsinki	Riga	Aberdeen
Florø	Tallinn	Aarhus	Hirtshals	Swinoujscie	Dunkerque
	Klaipeda	Gøteborg	Brunsbüttel	Lubeck	

Europe in the middle of global prices, for now

World LNG estimated landed prices ($/mmbtu) – September 2013

Source: FERC, 15 August 2013

Agenda – the price you pay for fuel

Factors contributing to end user price are far and many

- LNG pricing has changed over time
- We are in the middle of a revolution which will impact the small-scale market

International wholesale prices and other liquefaction sources

- Large scale LNG
  - Traditional LNG pricing (oil-linked prices)
  - New LNG pricing (gas hub-linked prices)
- Small scale LNG
  - Break bulk from large scale
  - Small scale liquefaction

Retail prices for bunkering

- What pricing models have we seen in the bunkering market?
- The impact on prices of the small-scale LNG supply chain

How will pricing change as more players join the market?

- Competition

Traditional LNG pricing

Traditional view: Last resort for stranded gas to stranded market

- Only way to monetise gas from large reserves without markets nearby
- Willingness to pay only where all alternatives were more expensive
- Long distance and long term business – integrated chain

Oil indexation for LNG

- Traditional contracts were typically calculated by multiplying a mechanism known as the slope, which reflects the degree of correlation to crude oil
- Sellers tend to want a slope of ~17.3 to optimize oil indexation (oil parity)
- Buyers have recently tried to bargain it down (recently 14 – 15% Brent) to Asia
- Now, with US LNG exports on the horizon, the ‘value’ that buyers are seeking on renegotiated oil indexation is more like < 12% Brent

New LNG pricing environment

Several small revolutions and a dash of uncertainty – lately

- Oil prices are higher than expected – coal prices much lower
- More gas reserves than expected – demand much lower
- Different trade-offs and new realities – new solutions
- Optionality more appreciated in uncertain times

Easier to build infrastructure in bits

- LNG more flexible and scalable
- Recession gave cost focus!

PRICE?
VOLUME??

New LNG pricing environment – large scale LNG

US is a game changer, no doubt

- Certain projects WILL be online 2016/17 (Sabine Pass and later Cameron)
- The number of likely projects for 2020 is increasing
  - Approvals easier to achieve now – US government changing stance
- Many more *possible* projects for 2025, but many observers are sceptical

Volume from North America

- Sabine Pass 8 mpta in 2016, 16 mtpa by 2018, possibly 24 mtpa by 2020
- Who will have that early volume? BG then Korea, India, Japan…
- But where will it be sold: much in Europe…?
- *Interesting points and current….. A ramp up in LNG trading in Atlantic basin now looks certain, with NW Europe as the 'sink' for surplus volume*

Volume from elsewhere

- New supply from Australian and Papua New Guinea supply may be oil linked
- This should free up even more Henry Hub priced supply to come to Europe… provided there is trading and efficient optimisation

New LNG pricing environment

Henry Hub priced LNG

- Cheniere have sold floating price LNG supply contracts at Sabine Pass
- 115% of Henry Hub monthly price PLUS $2.25 to $3.00 = e.g. $7.00 / MMBtu
- Plus shipping to Europe at around $1.25 currently = e.g. $8.25 / MMBtu
  - But this is only the price delivered to a European LNG terminal, conventional size
- Forward curve projections 2017 – Europe delivered price $8.50 to $9.50
- By 2025, forecasts have the LNG price in the range $7 to $10 in Europe
- *To translate the delivered LNG price in Europe into a price available at an LNG bunkering facility is not clear nor simple to forecast…*

Volume

- Volume too is uncertain
- How much will go to Japan, Korea, China, India?
- What spare will be there for the small-scale market?
- Where will it be sold, facilities in Gate, Zeebrugge, Spain?

Retail prices – evolution of small scale pricing

First generation of small scale LNG was mainly sold on cost plus deals

- Gas at cost + liquefaction + transportation + margin
- Generally quite long contracts – 10 years
- Often exclusivity in return for terminal

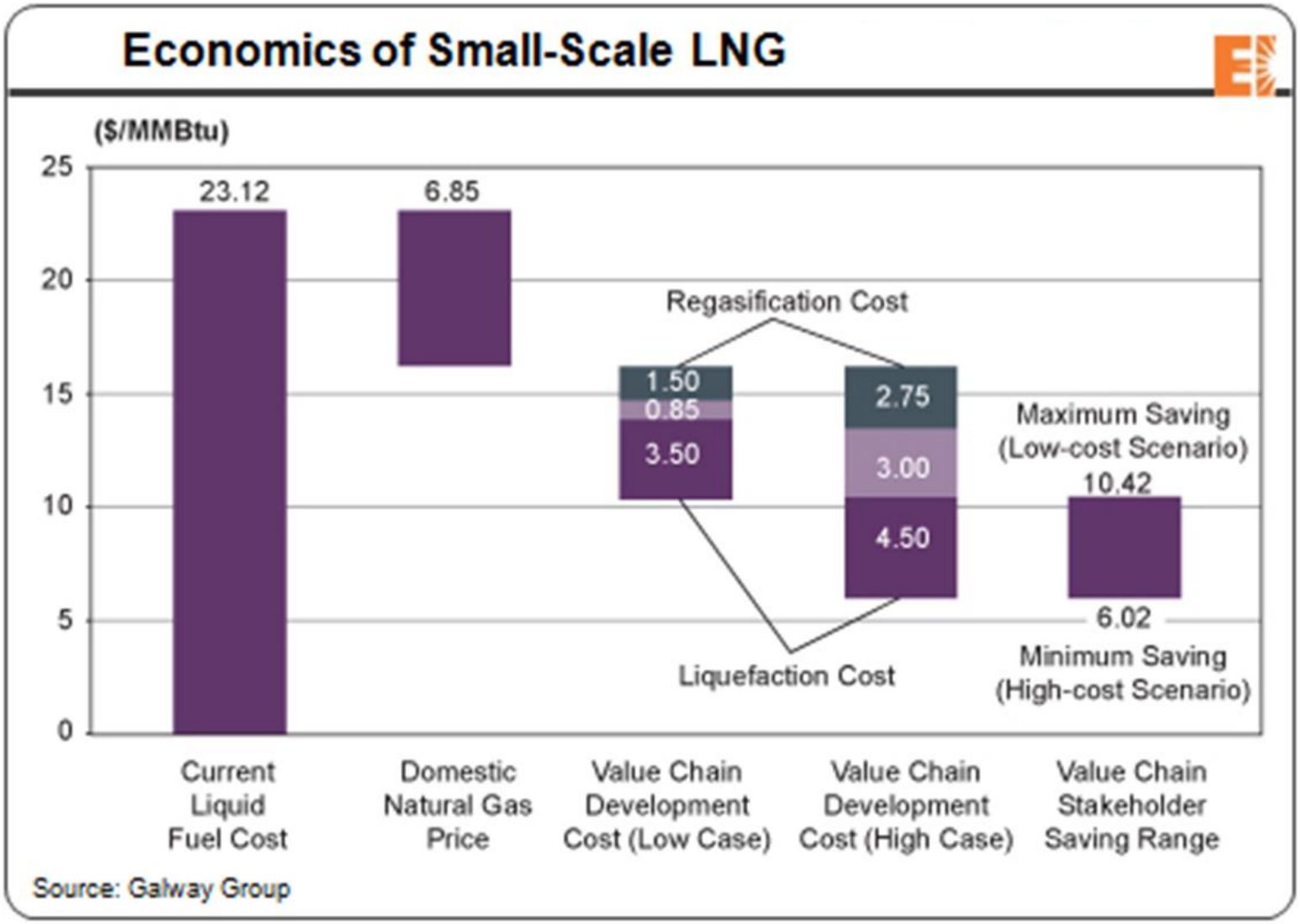
Gas cost to liquefaction was initially indexed to oil

- Resulting in customers getting oil link + cost element
- Increasingly, the main sellers are able to offer spot links

What do the buyers want from new sales?

- Level of price, most important
- Indexing to suit business or in that area expected most competitive
  - More want spot link now than earlier – also better liquidity in spot markets
- Quicker negotiations and shorter terms
  - Especially ship owners find it unreasonable to negotiate for several years
  - Most buyers are finding it less attractive to commit to 10 years now

Retail prices – evolution of small scale pricing



Retail pricing - the bunkering market

Current forward curves do not price in MARPOL rules…

Overall, HFO is currently the marine fuel of choice, at least until January!

- But to become IMO-compliant, SOx scrubbers need to be installed
- Scrubbers are currently difficult to get in large enough volumes, and expensive
  - Cost reductions and better logistics expected in the near future
  - More than 100 scrubber units sold so far (less than 1% of vessels)
  - DFDS opted for scrubbers, with €100m spend…

MGO could be an easy fix to SOx emissions, but is expensive and scarce

- Expect even higher prices with sudden demand spike when ship owners need to find a quick fix to their SOx emissions
- Over 90% of shipowners in ECA zone expected to take MGO
  - Significant local demand increase
- Low value chain costs could make it competitive on the long-run, if refineries see attractive margins in producing more

LNG contracts currently offered for bunkers are varied, and kept quiet!

- MGO – X
- TTF (Dutch gas hub) + Y

Source: Montel/ Metanopoly, June 2013

Recent price quotes with current wholesale prices

We are seeing a number of different pricing formulas for LNG bunkers

- LNG price linked to MGO
- LNG price linked to a gas hub price (i.e. TTF, in Holland)
- LNG price linked to HFO (although we believe this is rare)

Samples of LNG bunker prices

- LNG price linked to MGO comes in around $16 - 18 / MMBtu in recent deals
- LNG price linked to TTF gas comes in around $17 - 19 / MMBtu in recent deals

One thing is certain… these prices will change!

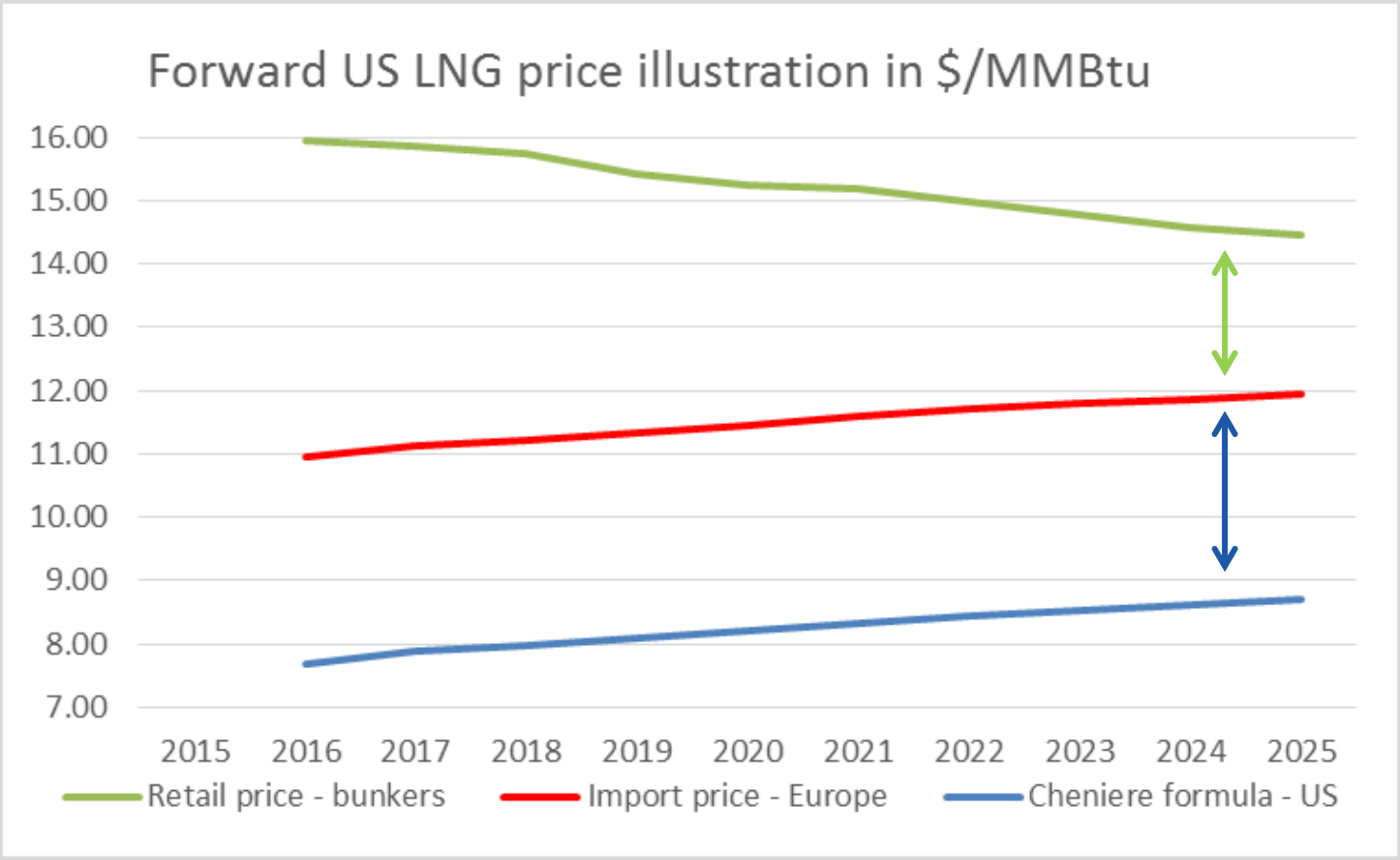
- The prices are floating so will change with the MGO or gas price
- The buyer is therefore taking a bet on gas or MGO being cheaper in the future
- With competition in bunkering, these prices will also change as margins should be reduced

Negotiations on bunker prices will be interesting going forward

- With US gas priced LNG entering the market, wholesale prices should reduce
- With increased use of MGO from January, higher demand should lead to higher prices for MGO
- With more volume and deals done, we will see increased transparency
  - A published LNG bunker index / benchmark price?

Source: Montel/ Metanopoly, June 2013

Illustration – a view on prices –US gas priced LNG

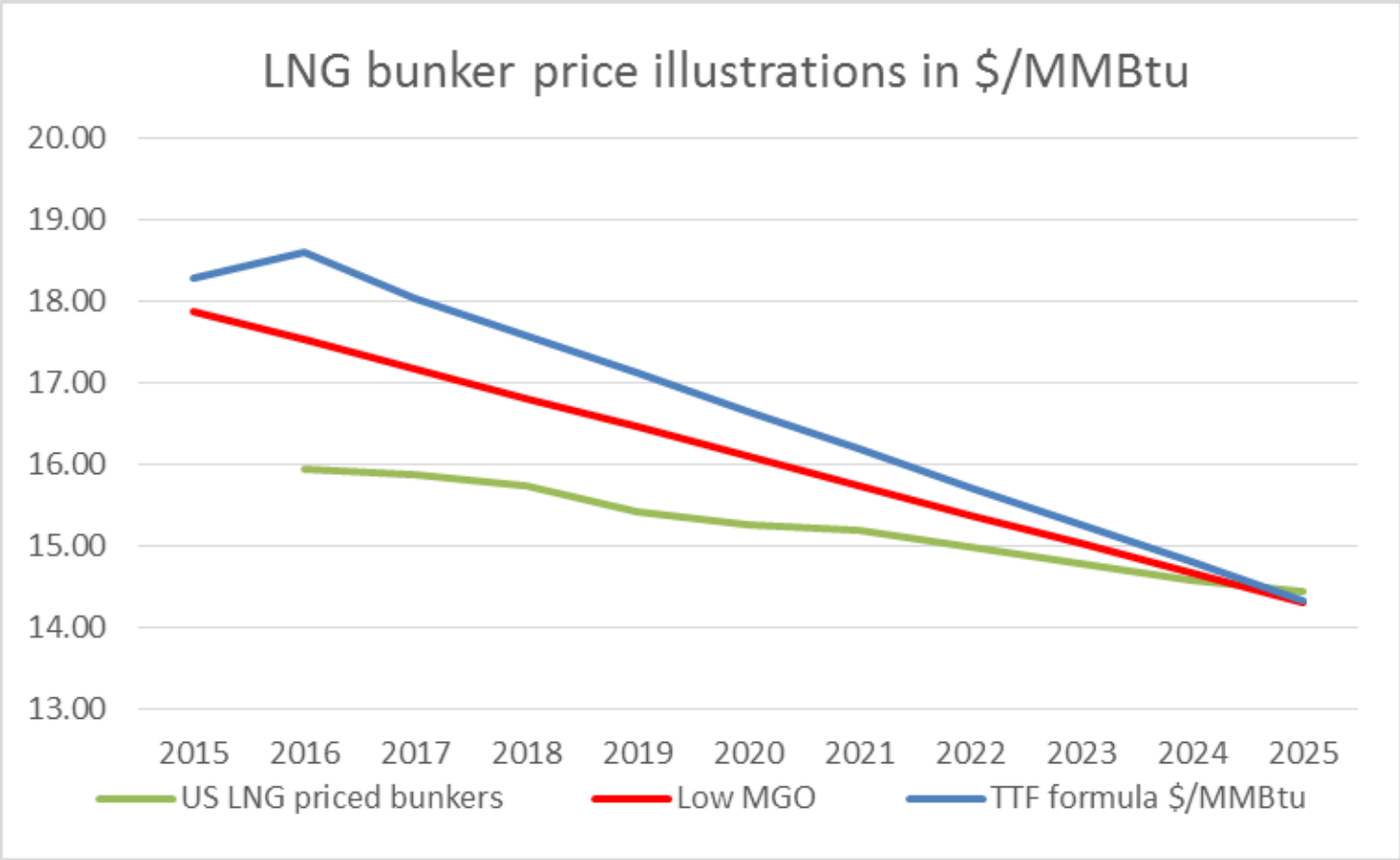


US sourced LNG, priced using an LNG wholesale price plus costs model

The margin above LNG and transport costs will reduce over time with competition

Source: Montel/ Metanopoly, June 2013

Could LNG bunker prices converge?

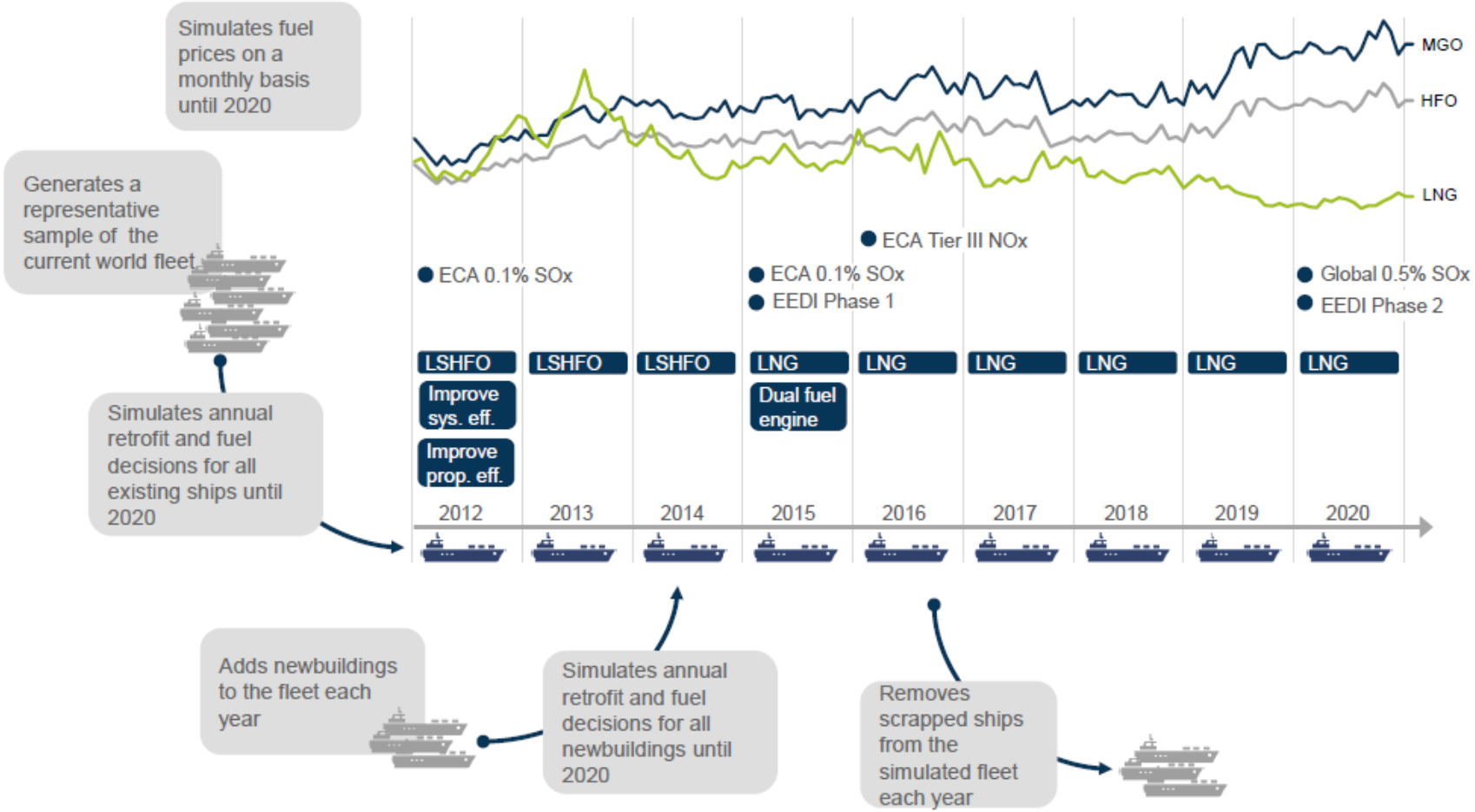


This is an illustration of possible 'retail' LNG bunker price movement given increased competition in the mid-stream and retail sector of small-scale LNG over time.

The Low MGO scenario assumes crude and MGO will continue to fall through 2025

Source: Montel/ Metanopoly, June 2013

DNV also sees LNG as attractive



Source: DNV, Shipping 2020

Ship owner considerations: LNG vs. dual fuel ships

	LNG-only	Dual fuel
+	Higher engine efficiency Takes more space than oil-based fuels, but less than dual-fuel tanks Cheaper maintenance	Fuel price hedging Easier fuelling/ logistics
—	Incipient infrastructure, route-bound for now Fuel price risk	Lower engine efficiency Need for scrubbers/ MGO Tanks take up space

Bunkering LNG to ships opens for sales to trucks, too

CNG/ LNG sales to road traffic could give good margins

- Alternative is oil products, particularly (polluting) diesel
- Buses, trailers/ fleet traffic and private cars, often in synergy with larger volumes delivered to other clients
- Technology is well known and currently being standardised
- Blending with biogas can create portfolio synergies
  - Sales of «green certificates» and mutual flexibility (enhancing security of supply)

LNG filling station

Source: BiMe Trucks project, 2013

Example: Skangass and Fordonsgas Sverige

- Filling station from LNG tank, for Volvo trucks in Gøteborg
- Fully compatible with biogas (LBG) and up to 1000 km range on full tank
- Network could be expanded along main transit routes across Sweden, spurring take-up

LNG tank on Volvo trailer

Source: Volvo, 2013

Conclusions – LNG as marine fuel is a rather safe bet

The business case for switching to LNG will keep becoming stronger

- More competition in all stages of the value chain will provide better terms, shorter lead times and increased optionality for ship owners
- Value chain costs will fall, increasing competitiveness against established fuels
  - Lower spread between wholesale gas prices and retail price
- Easier to commit to dual fuel and even LNG-only engines

Unlikely to see higher real LNG prices than today on a long-term basis

- LNG on spot could remain expensive until 2015 and see occasional spikes later on, but expect a long-run price ceiling at current levels

MGO prices could also decline, long-term, but unlikely below LNG parity

- In case of cheaper oil, with new/ adjusted refining capacity becoming available

Don't count on regulations changing "back to normal"!

- The environment/ curtailing ship emissions will remain high on global agendas
- Even if MARPOL rules are postponed, this would only be temporary

Small scale SE Asia