UNIVERSITY OF CAMBRIDGE | Energy Policy Research Group

UK & European gas markets: taking stock and looking forward

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25 October 2018
BIEE Natural Gas Seminar, London

Key messages

I. NWE (incl. UK) has competitive wholesale gas markets
   I. Structural changes in global gas & LNG
   II. European regulatory measures to liberalise & integrate gas markets

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   I. Structural changes in global gas & LNG
   II. European regulatory measures to liberalise & integrate gas markets

II. However, these regulatory measures (some) pose challenges to complete the IEM and may actually disintegrate the single gas market

III. This disintegration could costs consumers up to Euro 6 bn/yr (for UK – Euro 0.75/yr)

Agenda

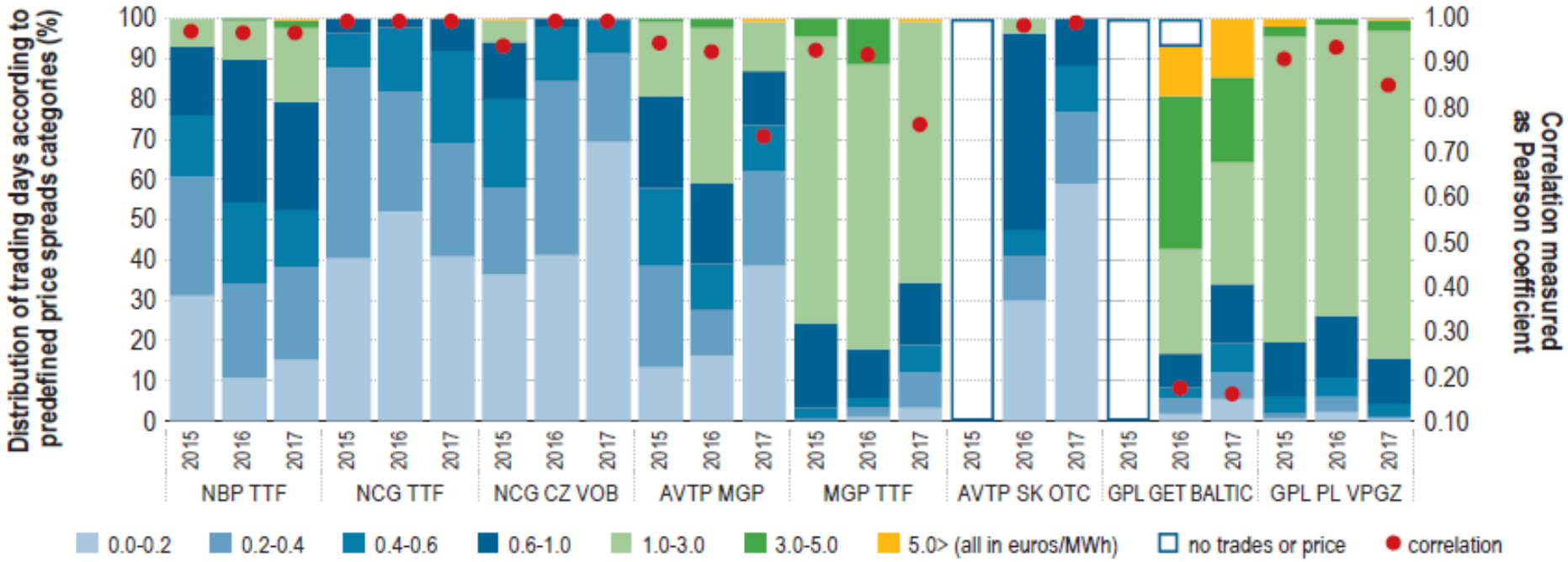
I. How did we get to where we are now?

II. Looking forward

III. Implications for the UK gas market

IV. Conclusions

But where are we?



Source: ACER (2018): Figure 28: "Levels of DA price convergence between selected NWE, CEE and Baltic region hubs year on year – 2015 vs 2017"

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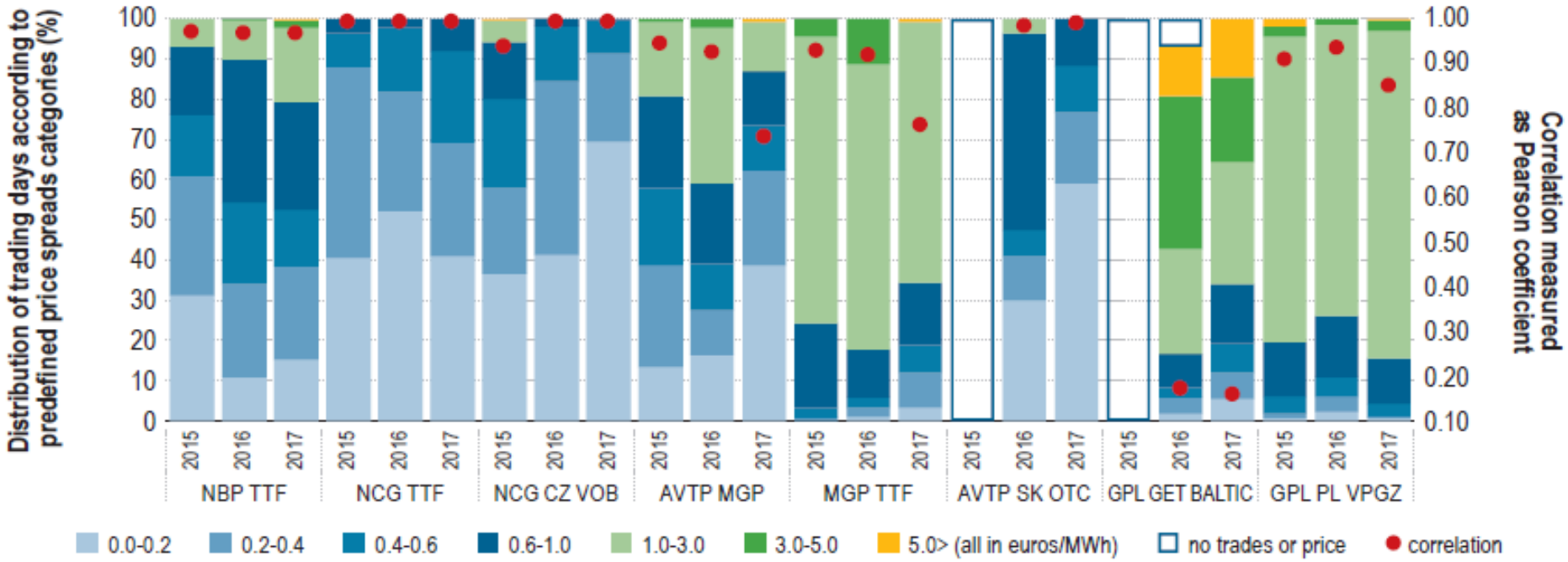

Source: ACER (2018): Figure 28: "Levels of DA price convergence between selected NWE, CEE and Baltic region hubs year on year – 2015 vs 2017"

By 2016, gas prices in Europe (predominantly in NWE) converged to the extent that locational price differentials approached marginal cost of transporting gas and hence arbitrage was saturated – it is a sign of a well-functioning wholesale gas commodity market in Europe

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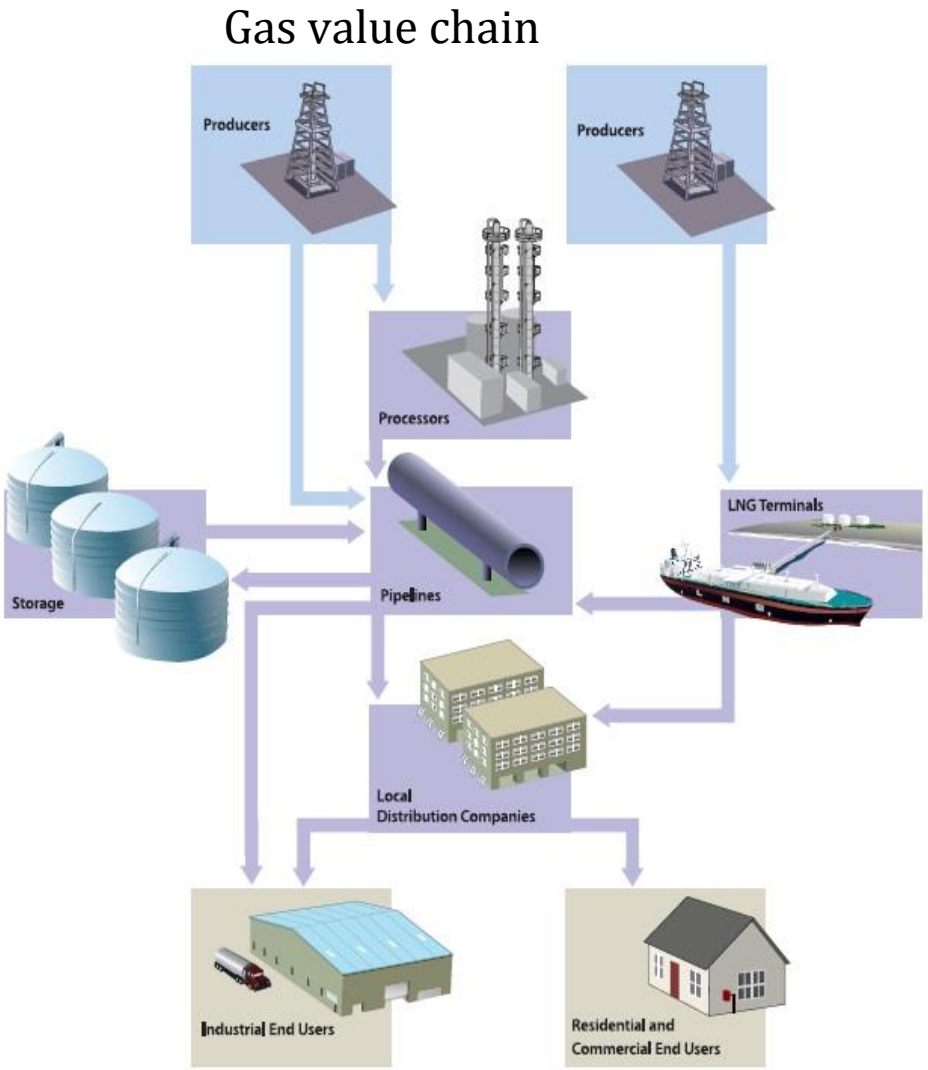
European gas markets – *how it all started?*

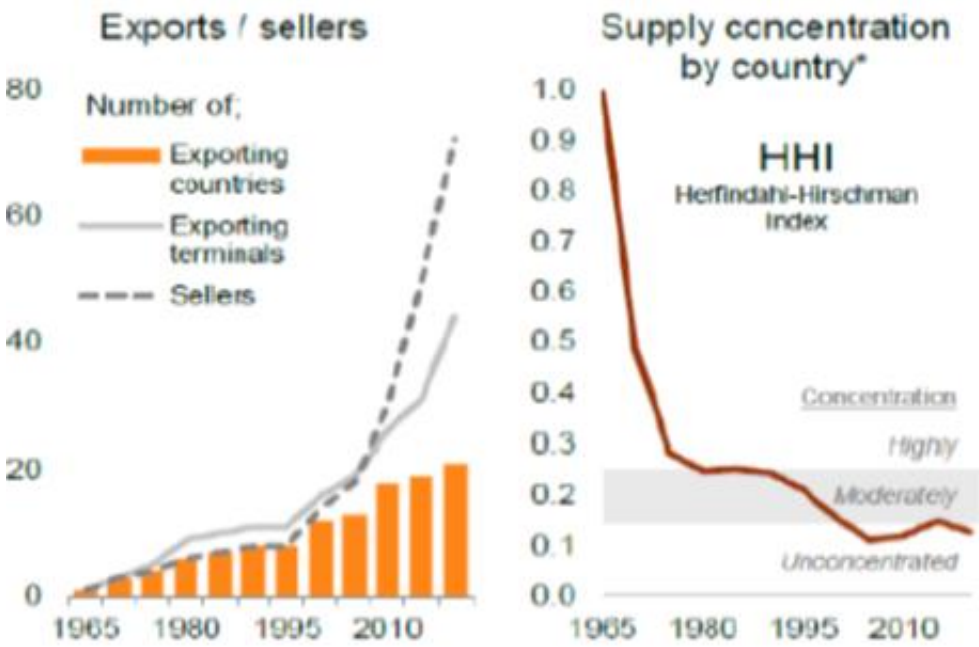


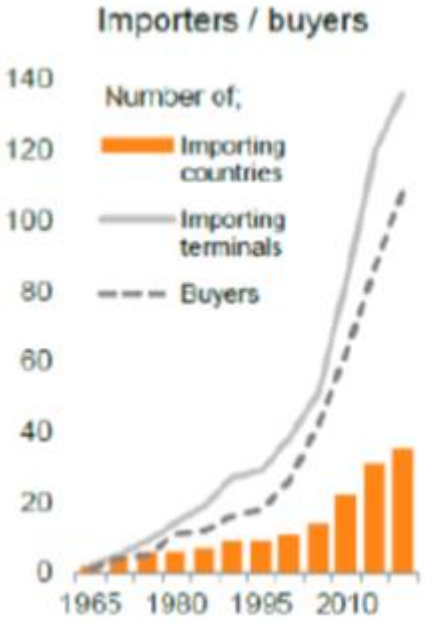
- The European gas industry was developed based on a system of complex long-term contracts (LTCs) between buyers and sellers.
- to protect them from *ex post* opportunism arising from the highly asset-specific, durable and capital-intense investments involved in the whole gas value chain
- Buyers: take volume risk
- Sellers: take price risk
- The pricing in such agreements is used as a mechanism to divide the rent

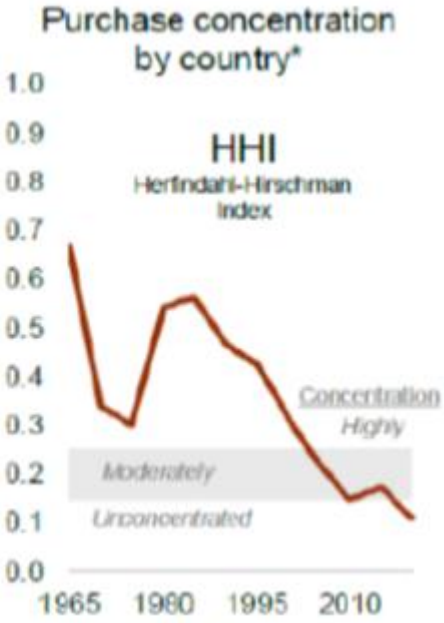
European gas markets – *changing industry structure 'upstream'*

- However, over the past 40 years the industry structure (number of buyers and sellers) has changed:
  - early **1970s** – a balanced period with 16 exporters and 18 importers;
  - by **2000** – 34 gas exporters and 56 gas importers;
  - by **2016** the number of exporters had reached 51 while the number of buyers had increased to 81

European gas markets – *changing industry structure 'upstream'*







Source: BG Group (2015 Presentation @ Gastech)

European gas markets – *changing industry structure 'midstream/downstream'*

- While the number of exporters and importers increased worldwide, market liberalisation and the ability to tap into global LNG markets meant that the number of buyers and sellers also increased in European gas markets
- Structural changes in the 'downstream' part:
  - 1991 transit directive,
  - legal battle between European antitrust authorities and major exporters to remove destination clauses from long-term pipeline and LNG import contracts,
  - then followed by the first two energy packages (1998 and 2003) and then by the third energy package (2009),
  - and in between – 2005 DG COMP Energy Sector Inquiry
  - Environmental & climate policies in electricity sector

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  - Environmental & climate policies in electricity sector
- Results of these changes:
  - Many small suppliers (powergen & LDC) became part of the gas value chain
  - Pricing mechanisms in LTCs
  - volume of spot gas trade in Europe stood at 43% in 2013, rising to 66% in 2016
  - Regulation of natural monopolies – local transmission and distribution networks in Europe

European gas markets – *Breaking up the pipeline oligopoly: The role of LNG*

	1999	2006	2016
LNG import capacity: Total (bcm)	**64.3**	**90.9**	**225.6**
Belgium	5.5	5.5	9.5
France	17.9	17.9	36.2
Greece	0	1.4	5.2
Italy	3.5	3.5	15.9
Portugal	0	5.5	8
Spain	37.4	52.2	72.8
UK	0	4.9	55.2
Lithuania	0	0	4.2
Netherlands	0	0	12.7
Poland	0	0	5.3
Sweden	0	0	0.6
Pipeline import capacity: Total (bcm)	**321.2**	**332.2**	**421.2**
Russia	175	175	230
Norway	104	104	130
North Africa	42.2	53.2	61.2
EU Consumption (bcm)	**460**	**512**	**449**
Share of LNG capacity in EU consumption	14%	18%	50%
Share of pipeline capacity in EU consumption	70%	65%	94%
LNG import capacity (relative to 1999)	100%	141%	351%
Pipeline import capacity (relative to 1999)	100%	103%	131%
Number of LNG exporters: countries *(export capacity, bcm)*	11 *(145)*	13 *(254)*	20 *(465)*

Source: BP (2018), IEA (2000, 2007, 2017); pipeline import capacity—author's own assessment based on various websites of export pipelines

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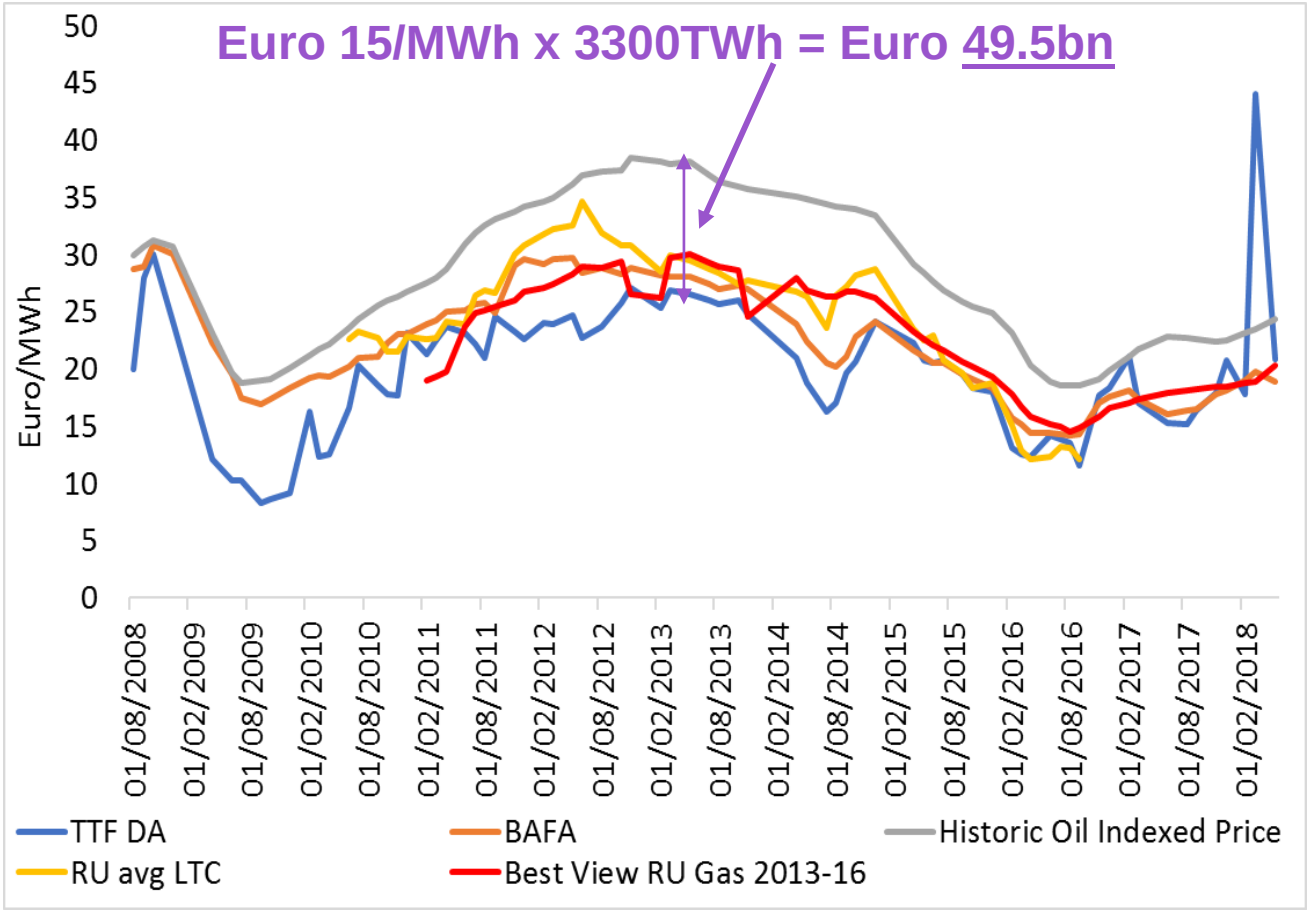

ACER (2018):

"More competition between producers has led to a situation where supply price differences between adjacent markets are regularly below IP tariffs.

Increased gas sourcing diversification and more widespread use of gas hubs foster supply competition"

Welfare benefits

- ACER (2012): 11 bn euros
- by ACER (2014) 7 bn euros
- A more important benefit (and perhaps less amenable to quantification) that a single gas market may bring to Europe is **minimization of political consequences of price differences observed between different EU member states (see e.g., Noel 2009).**

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Looking forward

- In a perfectly competitive and integrated market the *'relative law of one price'* should be observed

- Most recent gas trade data reported by ACER suggest that price differentials between most traded hubs in Europe was even below transport tariffs.

- Barriers to single gas market:
  - the divergence of prices between different locations could be dictated largely either by transport tariffs,
  - and/or non-trade barriers (lack of implementation and/or derogation from certain rules of the Third Energy package, for example).

- Transport tariffs:
  - entry/exit zones managed by TSO;
  - Geographical scope – national/MS borders or smaller
  - designed for full (sunk) cost recovery: the tariffs depend on utilization of the entire gas network of each transport zone.

Looking forward

Transmission pricing and gas market integration

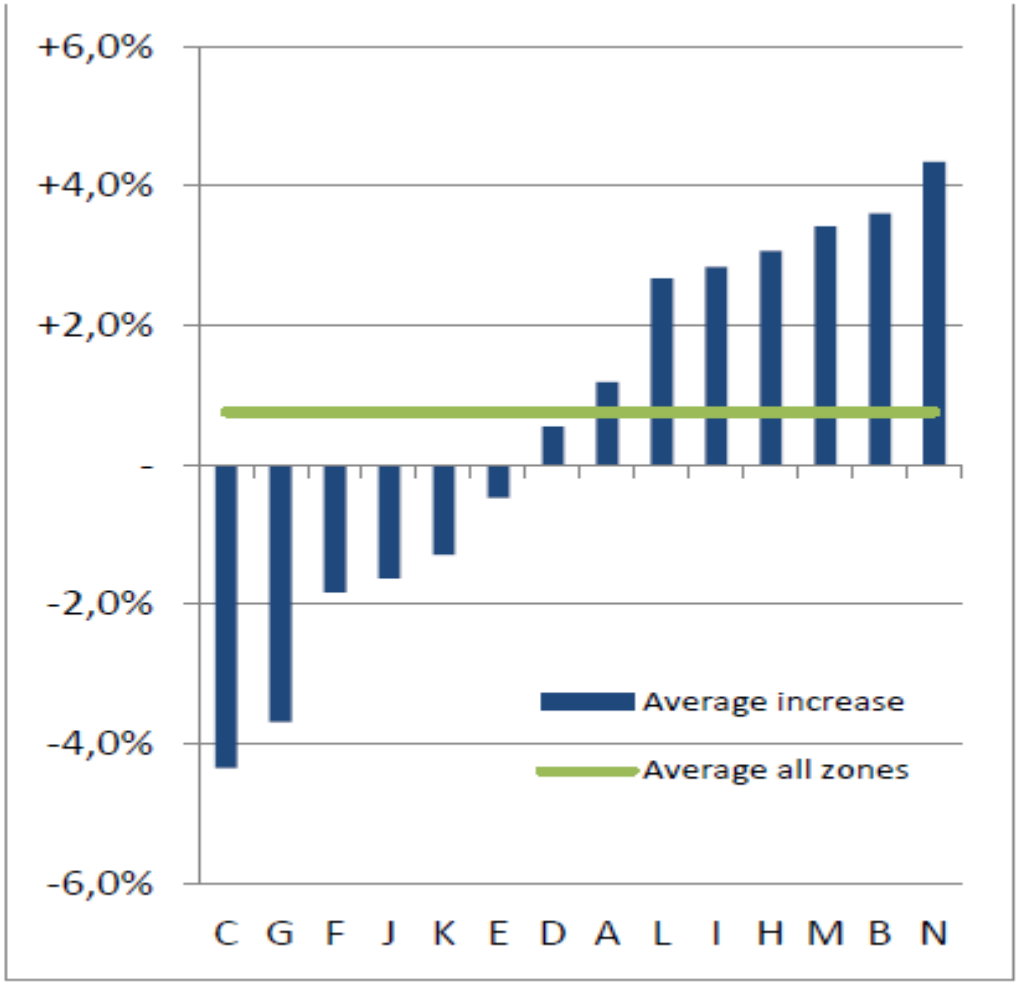

Fig. 4: Yearly-average increase in gas transmission tariffs

Source: BearingPoint & Microeconomix (2015) "Study on comparative review of investment conditions for electricity and gas Transmission System Operators (TSOs) in the EU" for DG ENER

- Given that (A) the current E/E transmission tariffs are designed for full cost recovery,
- and (B) the demand outlook being flat for the next ten years,
- This will lead to increase in gas tariffs. This trend is reinforced if gas TSOs implement TYNDP (2015-2025):
- On average, the annual tariff increase should be +0.8% in the gas sector
- In the 10 gas tariff zones where the RAB will increase, corresponding gas transmission tariffs will increase by 1.6% on average
- Looking at cumulative figures for the period 2015-2025, the increases stand out even more: **+38% in MS B, +27% in MS N, +39% in MS M**
- **Majority of expected investment is driven by security of supply concerns in CEE/SEE**

Looking forward

Transmission pricing and gas market integration

- Possible high locational price differences may motivate **'tailored'** national policy responses when the European authorities try to **'harmonise'** national policies (see e.g., the discussion around '*Liquidity Corridor*' proposed by Italy)

- The issue of transport tariff and the way infrastructure cost should be recovered is going to play a very important role not least because of price divergence but also because this will dictate pricing strategy of dominant suppliers in those markets:
  - 'tariff pancaking' distorts competition and cross-border trade by increasing wholesale price differentials allowing a costlier marginal source to meet demand

- Tariff setting may be influenced by political economy considerations of each members states and their TSOs

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Transmission pricing and the UK gas market

ACER (2018):

- *"…the decline of Groningen field production along with the outage of Rough UGS has removed two key sources of supply flexibility for the UK, making NBP and Continental spreads sharper and prompting rising volatility at NBP.*

- *In this scenario, price formation at NBP further reacts to UK fundamentals, and prompts a rising disconnection between UK and Continental prices.*

- *The abrupt elimination of some of the traditional tools that provided supply flexibility for the UK market increased the market value of the remaining ones:*

  1. *the offshore **interconnectors** with the Continent,*
  2. *as well as the uncontracted **Norwegian** production*
  3. *or spot **LNG** cargoes."*

Looking forward

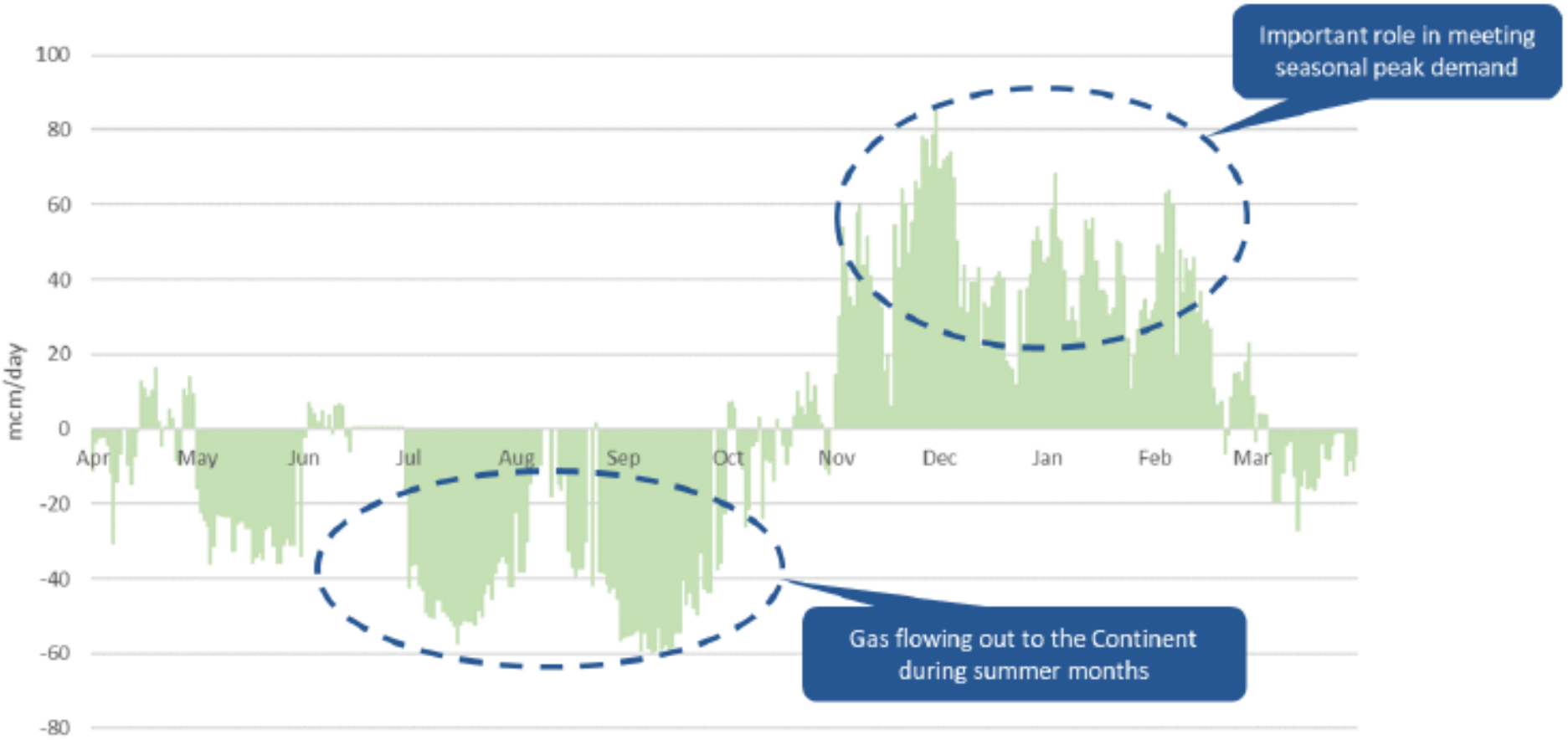
Transmission pricing and the UK gas market

Detailed daily gas flow analysis at all E/E points suggests that:

1. Interconnectors are indeed increasingly being used as seasonal flex
2. Flows from the UK enter Belgium via Zeebrugge, and are the transported towards Germany and the Netherlands.
3. This is mainly “excess” gas from UKCS production during the summer months, which is transmitted to Belgium, Netherlands and Germany to fill available storage capacity.
4. And then transported back to the UK during winter months

Looking forward

Transmission pricing and the UK gas market



Source: CEPA (2018) available at: http://www.cepa.co.uk/userfiles//CEPA_Equal%20NTS%20Charging%20Treatment_Final%20Report.pdf

Modelling potential impacts of transport tariffs on locational price spreads & welfare

- several tariff scenarios were modelled:
  1. Commodity tariffs only;
  2. Full annual tariffs (comm + capacity tariffs);
  3. Full short-term tariffs (daily comm + capacity) structure for all E/E points.
     1. Multiple of (x2) or (x3) of annual tariffs

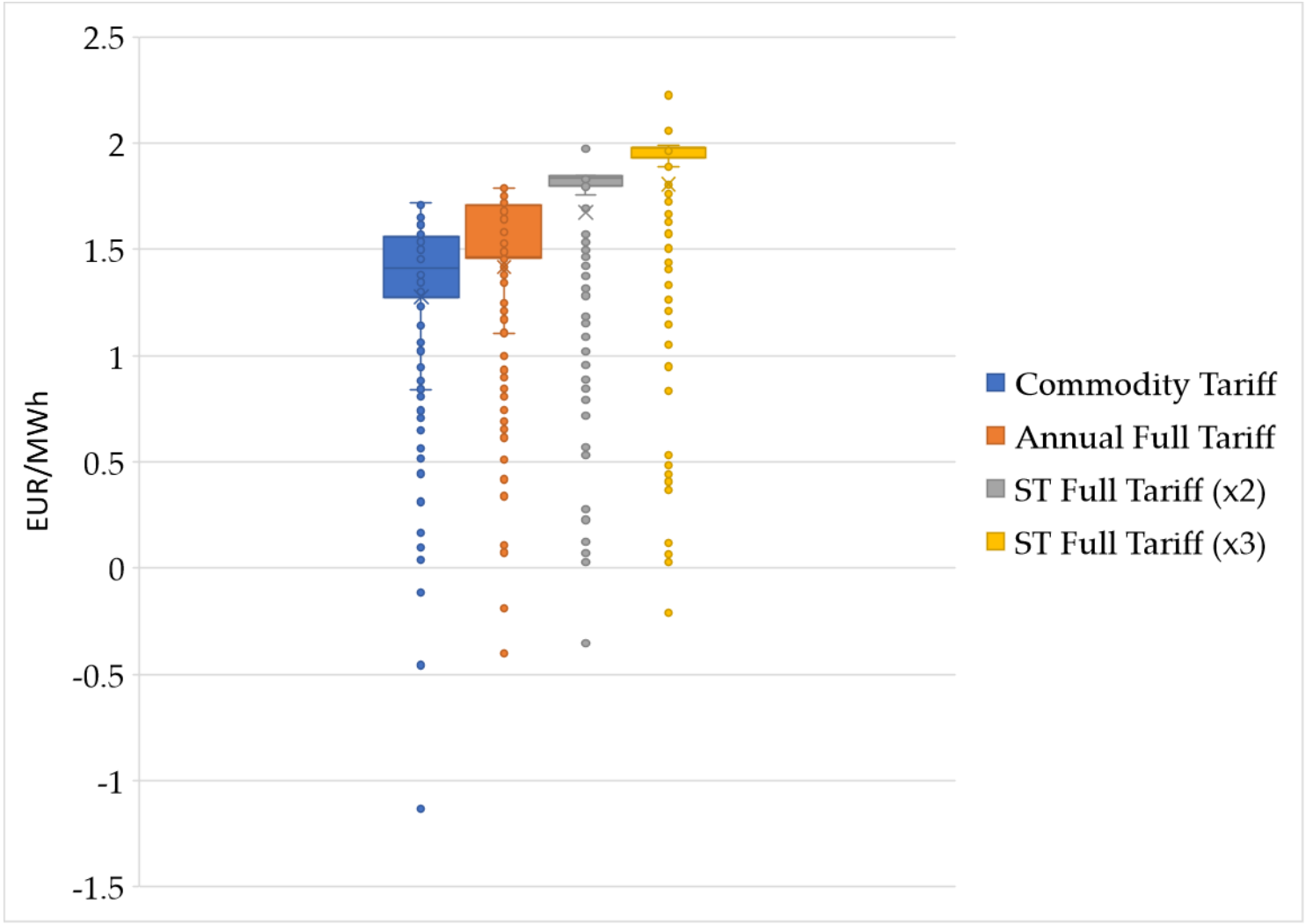
- The first scenario is a proxy for the current situation whereby majority of cross-border flows are subject only to variable costs as capacities were bought under LT shipping contracts and hence sunk costs

- Once these contracts expire, CB trade will be subject to full cost – that is, scenario (2) and (3)

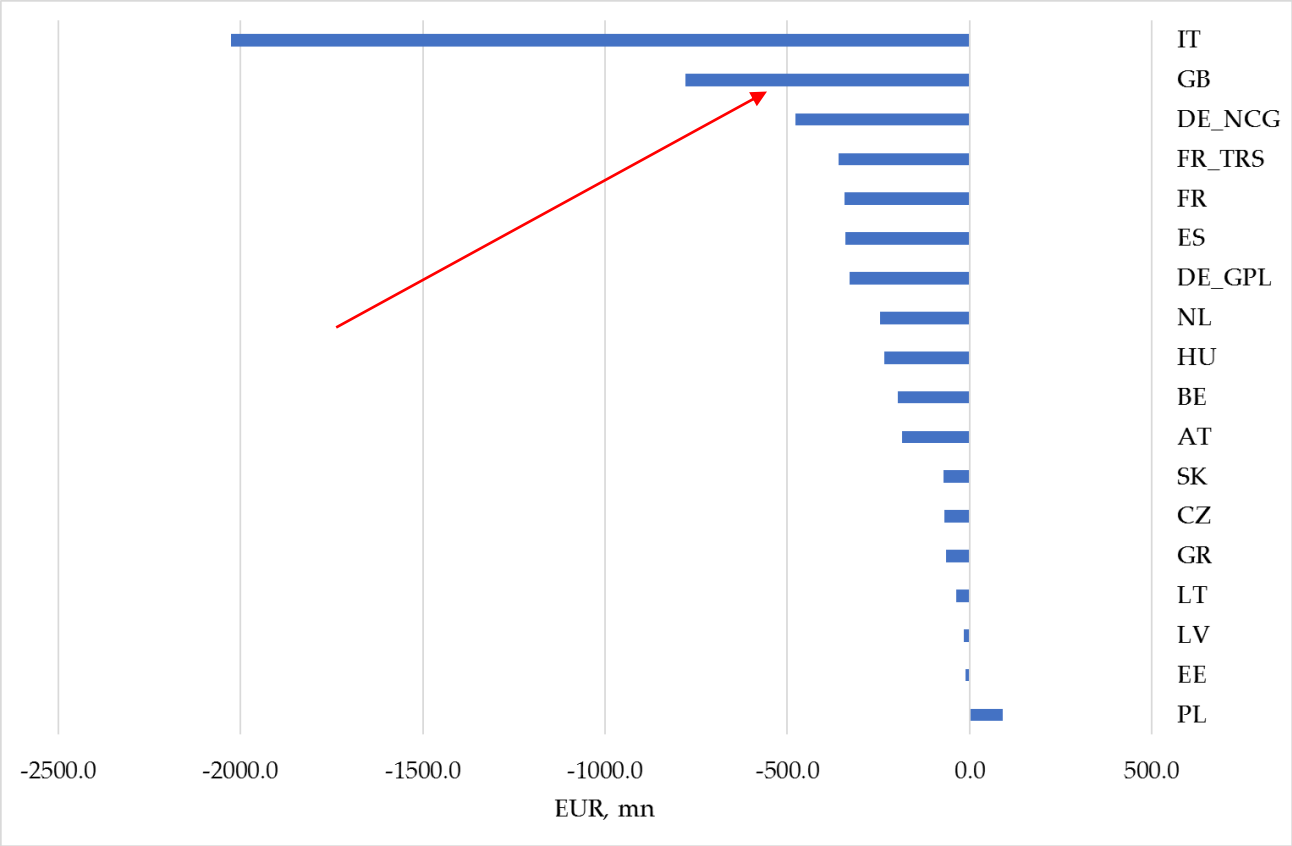
- This analysis is to understand the effects of tariff pancacking on cross-border trade, locational price differentials and welfare

Potential impacts of transport tariffs on locational price spreads & welfare

NBP – TTF price spreads



Tariff pancaking and Gas Consumers



- Negative impact on EU consumers if cross-border trade will rely on short-term capacity bookings
- Total negative impact: EUR -5.7 bn
- ACER estimated total welfare benefit from completing gas IEM:
  - 2012: EUR +11 bn
  - 2014: EUR +7 bn

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Conclusions

- Structural changes coupled with regulatory changes allowed a smooth transition from a gas system relying on rigid bilateral LTCs to a competitive wholesale gas markets.

- IEM has created net benefits to Europe/UK in the form of price convergence, transparency and minimization of political consequences of possible market segmentation and disintegration.

- In the past high locational price differences between NWE and CEE was predominantly due to discrepancies between hub-based (NWE) and high oil-linked (CEE) prices as well as supply structure

- Going forward, locational price spread could to a large extent be dictated by regulatory measures, policies around security of supply, cost recovery and reflectivity of tariff structures

- An important question that European authorities may wish to consider is whether the existing market institutions can ensure competitive entry of new sources of gas supplies deep into land-locked markets of Central, Eastern and Southern Europe.