



European Gas Hub Liquidity

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What we do

We provide **market intelligence** to the global petrochemical, energy and fertilizer industries

Companies in these markets trust us to provide accurate, relevant and timely **NEWS, PRICING DATA, ANALYTICS and CONSULTING** to guide their decision making.

Our information and analysis covers:



Chemicals: aromatics, olefins, intermediates, solvents and plastics



Energy: crude oil, natural gas, refined products, coal, carbon and biofuels



Fertilizers: ammonia, sulphur, nitrogen, urea and phosphates

- ◆ ICIS in **Energy**: the most widely referenced for spot gas prices in Europe
- ◆ Over 10 publications covering gas hubs, global LNG, power, carbon and coal
- ◆ The biggest specialised gas and power price reporting team
- ◆ The longest price history database for European gas markets and global LNG trade
- ◆ Analytic tools – LNG Edge ship tracking and predictor technology combining LNG market intelligence



Where ICIS operates

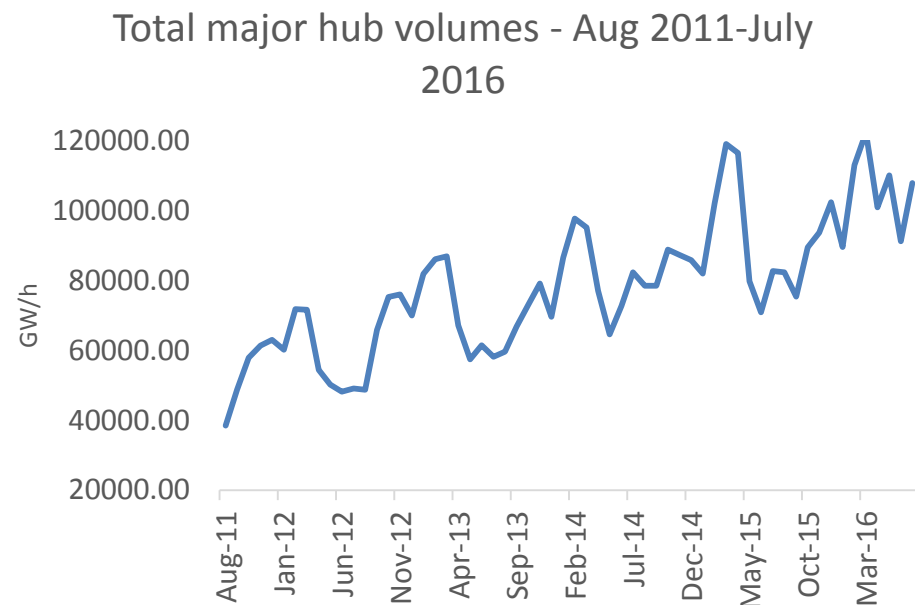


A team of over 800 people who cover 180 commodity markets across Europe, Middle East, Asia-Pacific and the Americas

European gas trade – central themes



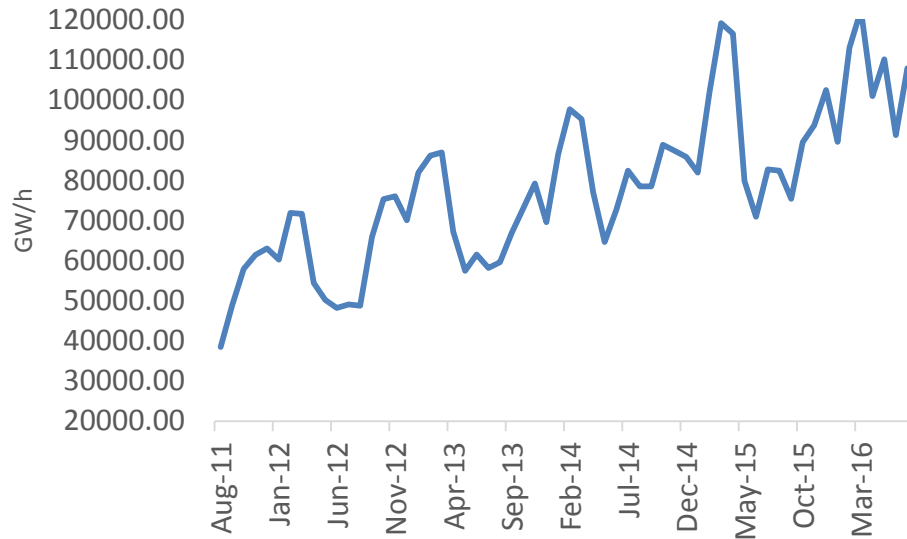
European gas trade – trading volumes continue to rise



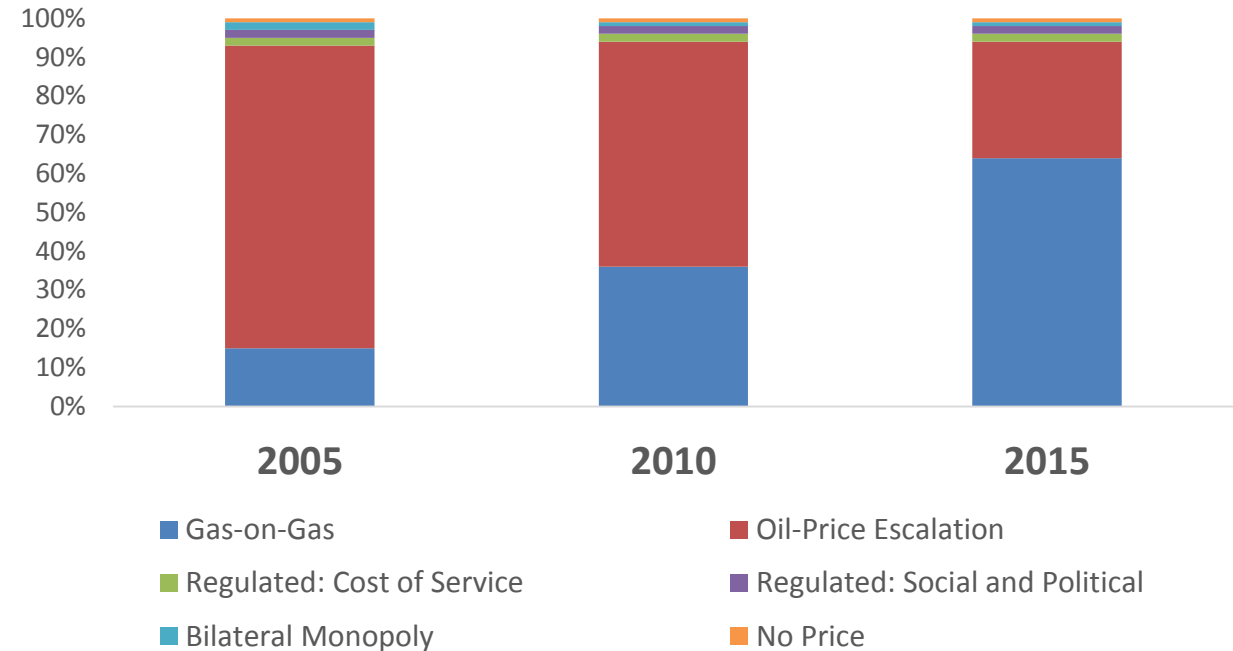
- Traded gas volumes have continued to grow across Europe on the back of market liberalisation and changing contract structures.
- Traded volumes (OTC and exchange) rose by approx 400% between 2008-2016 (ICIS data)
- Total traded volumes reached 4 trillion cubic metres in GY 2015

European gas trade – gas-to-gas competition

Traded volumes continue to grow



European Price Formation - 2005-2015 (IGU)



- Nearly two-thirds of gas sold across Europe includes some hub price indexation component, according to latest International Gas Union survey (2015).
- Over 90% of gas sold in NW Europe was priced at the hub; nearly 60% in Central Europe

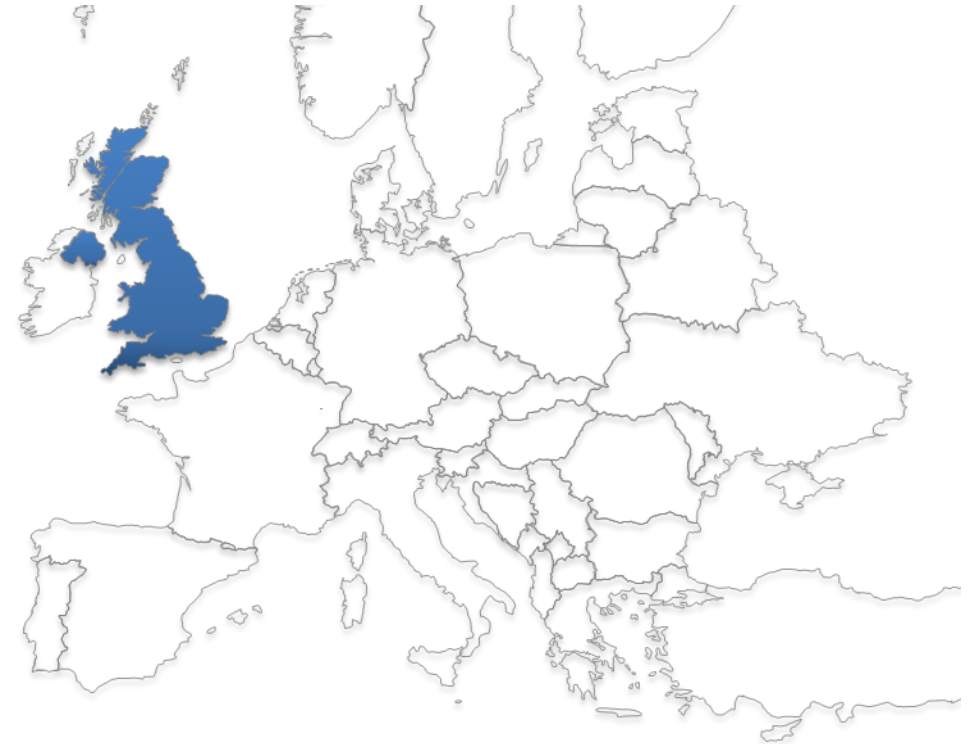
European gas trade – market expansion

National markets continue to open
and trade spreading south and east

European gas markets assessed by
ICIS daily – 1995

Number – 1

Britain



European gas trade – market expansion

National markets continue to open
and trade spreading south and east

European gas markets assessed by ICIS daily – 2005

Number – 5

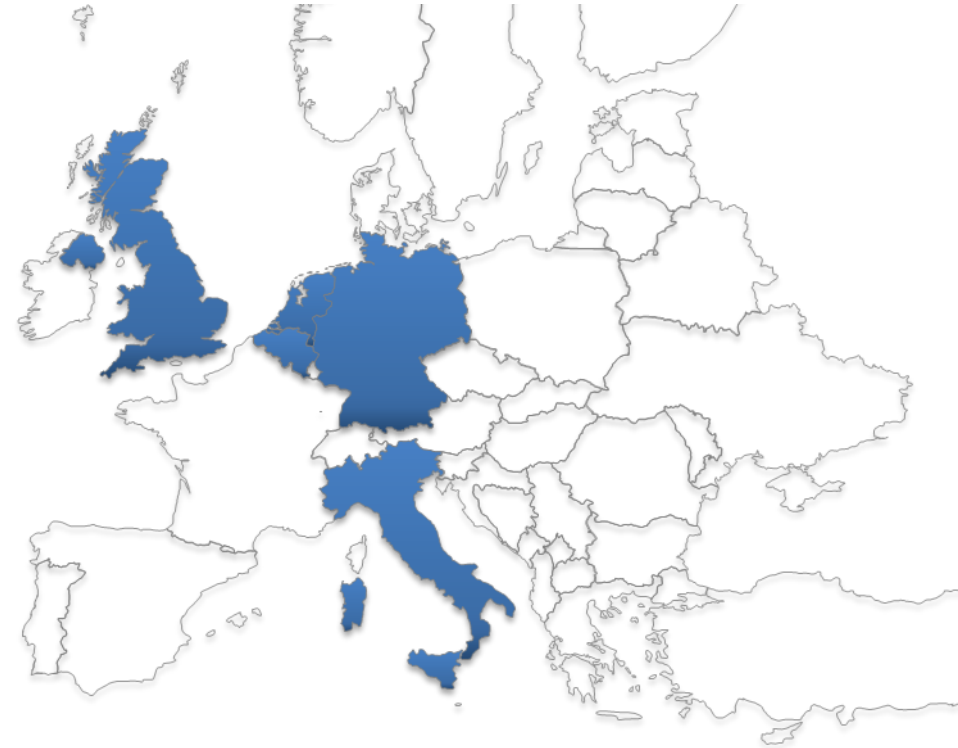
Britain

Belgium

Netherlands

Germany

Italy



European gas trade – market expansion

National markets continue to open
and trade spreading south and east

European gas markets assessed by ICIS daily – 2015/6

Number – 10

Britain

France

Belgium

Austria

Netherlands

Spain

Germany

Slovakia

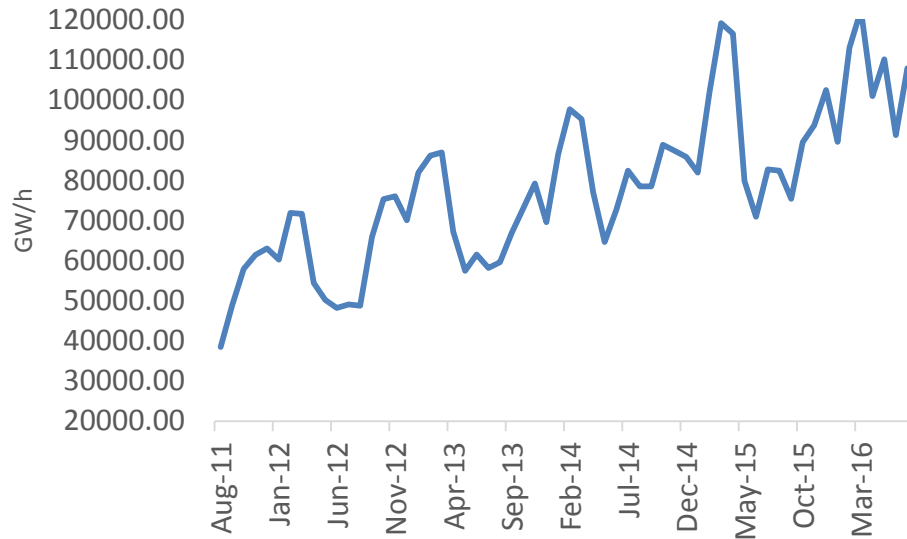
Italy

Turkey



European gas trade – market expansion

Traded volumes continue to grow



National markets continue to open and trade spreading south and east



European gas trade – trading venues

Trading venues
have expanded

- Brokerages



MAREX SPECTRON



OTCex



42 | Financial
Services

European gas trade – trading venues

Trading venues
have expanded

- Exchanges

 **Nasdaq** Commodities

 **Ice**

 **CME Group**

eeX

apx  **endex**

 **PEGAS**
Pan-European Gas Cooperation

 **CEGH**

powerlib
Powering the next markets

mibgas
Mercado Ibérico del Gas

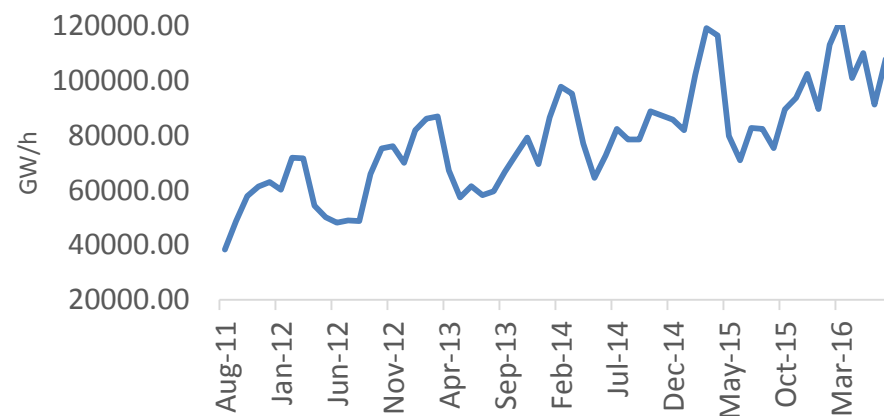
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European gas trade – venue expansion

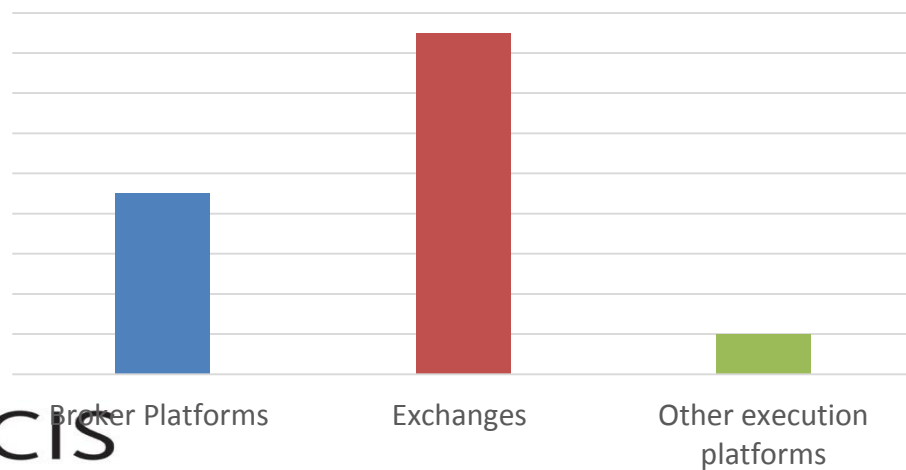
Traded volumes continue to grow



National markets continue to open and trade spreading south and east

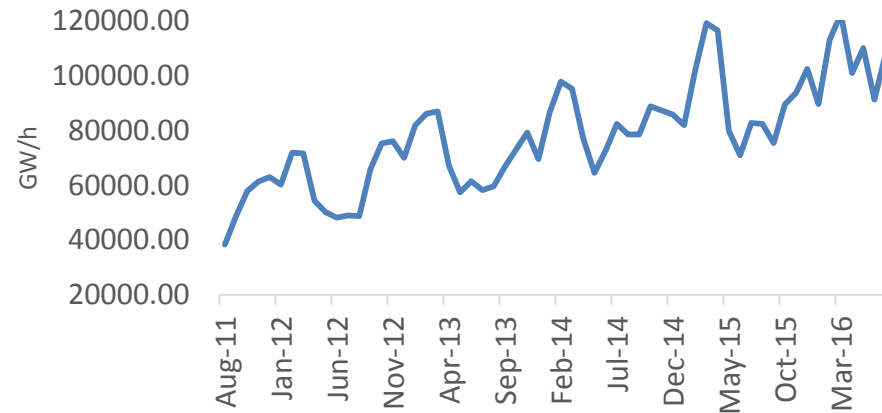


Trading venues have expanded

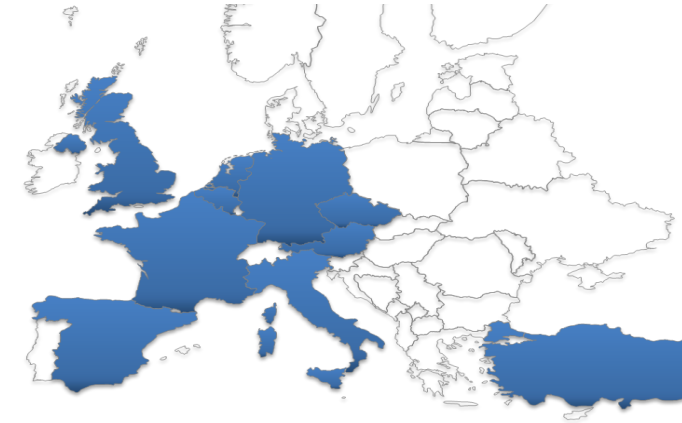


European gas trade – increased regulatory oversight

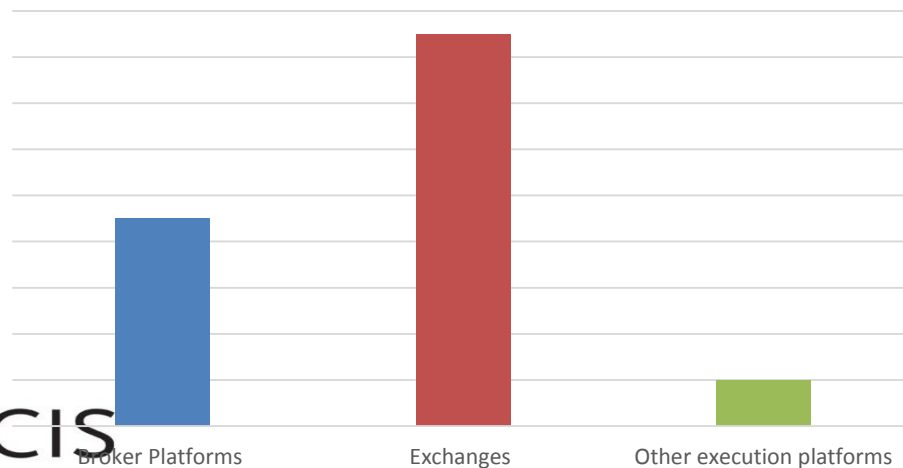
Traded volumes continue to grow



National markets continue to open and trade spreading south and east



Trading venues have expanded



Market participants are having to manage regulatory complexity and uncertainty

- REMIT reporting
- Financial regulation – EMIR, MAR, MiFID II
- Future regulation – FTT?

Trade liquidity developments



No single consistent measure of market liquidity

Volume

- Broker and exchange platforms
- Price reporting agencies – includes bilateral where possible
- Transmission system operators – varying methodologies, some include long-term title transfer at hub, the majority net trade.

Churn Ratio

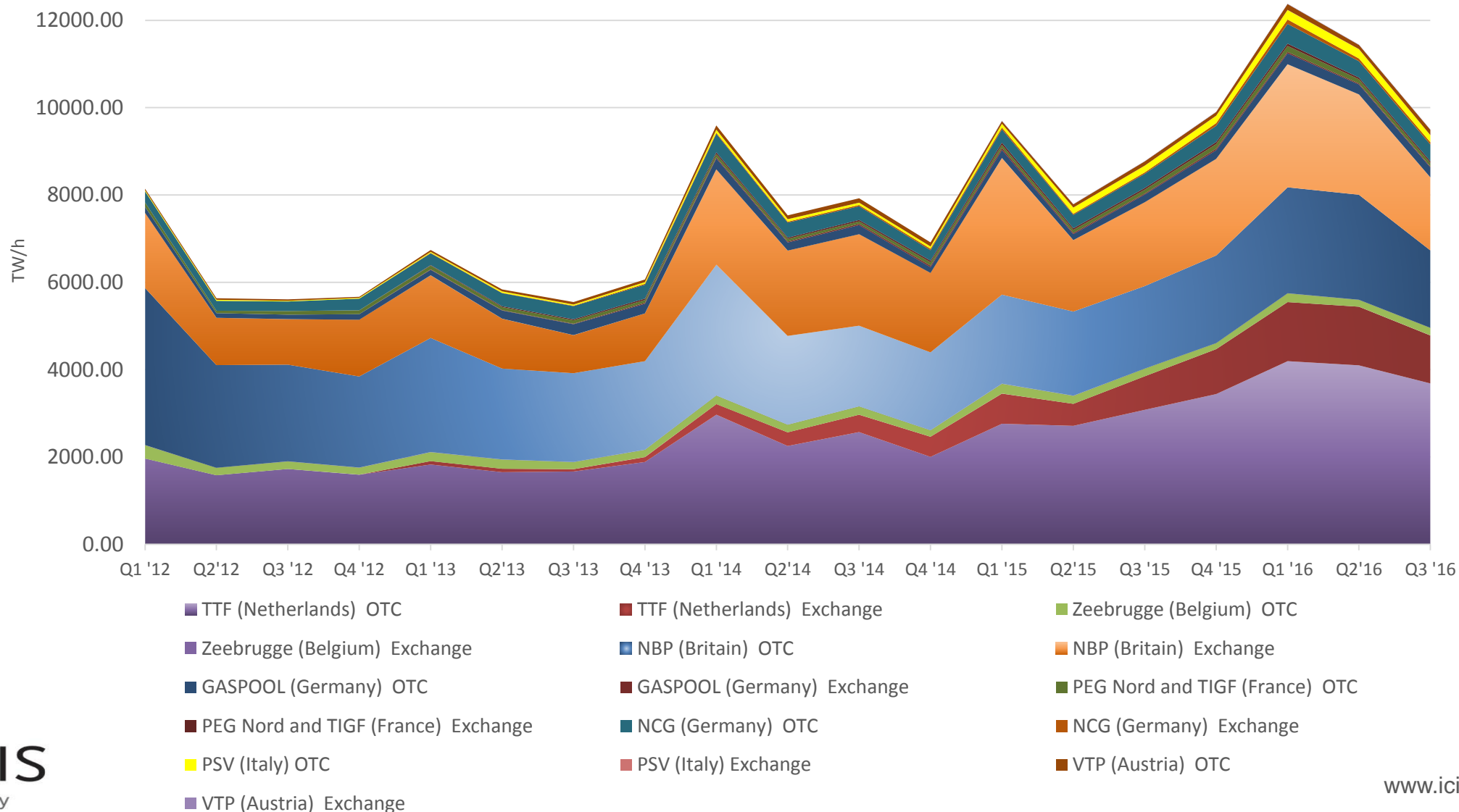
- Various methodologies – generally measures number of times every unit of energy delivered has changed hands. Measures maturity most effectively, but no consistent unified exchange/OTC measurement yet.

Bid-offer spread

- Bid-offer spread – difficult to get a scientific or complete breakdown. Only PRAs currently can judge bilateral as well as brokered.
- Depth of bid-offer spread – can only be used with real-time data from all brokers, choice and screen – and can't capture bilateral trade.

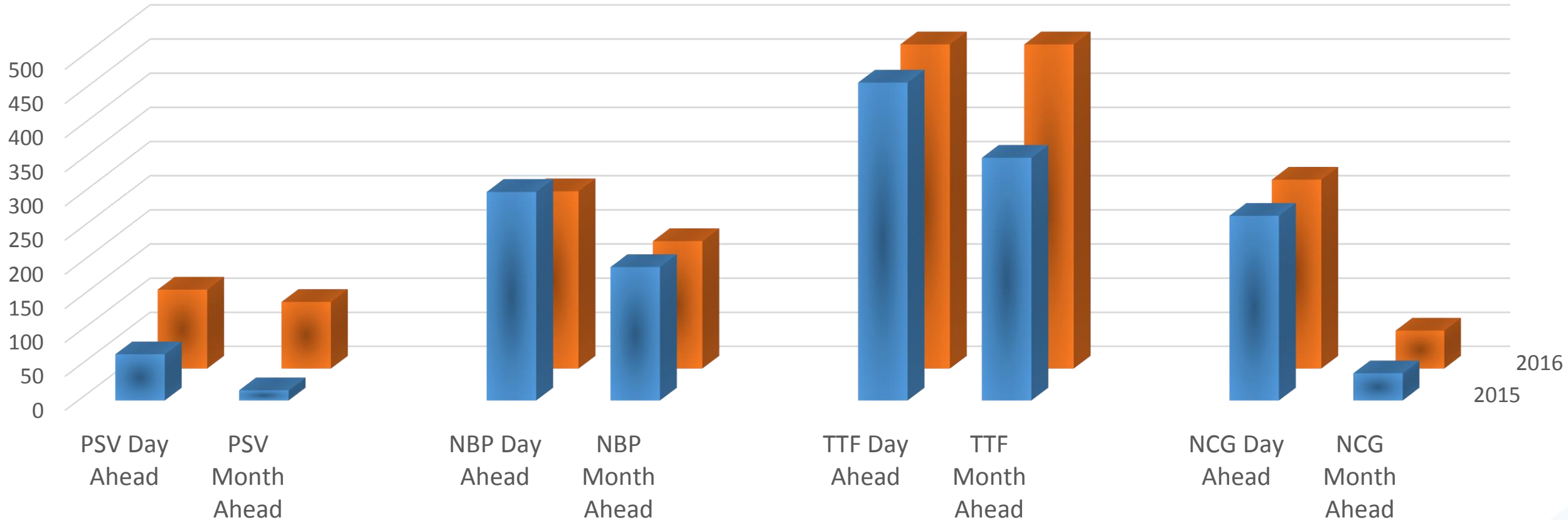
OTC and Exchange traded volumes 2012-16

Source: ICIS, ICE, EEX, Powernext, PEGAS, CEGH



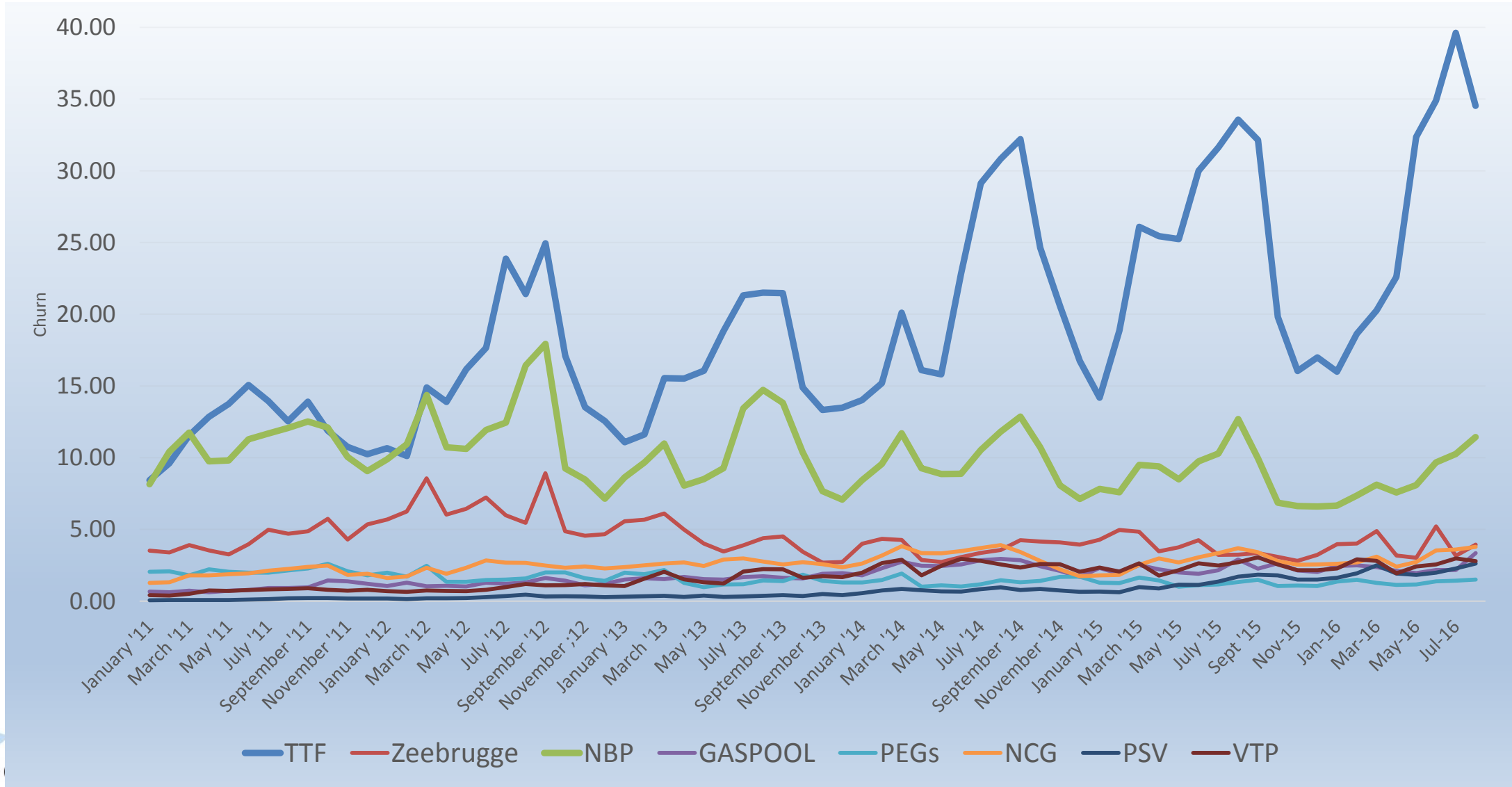
Average daily number of OTC trades 2015/6

Source: ICIS



ICIS OTC churn ratios 2011 – 2016

Source: ICIS European Gas Hub Report



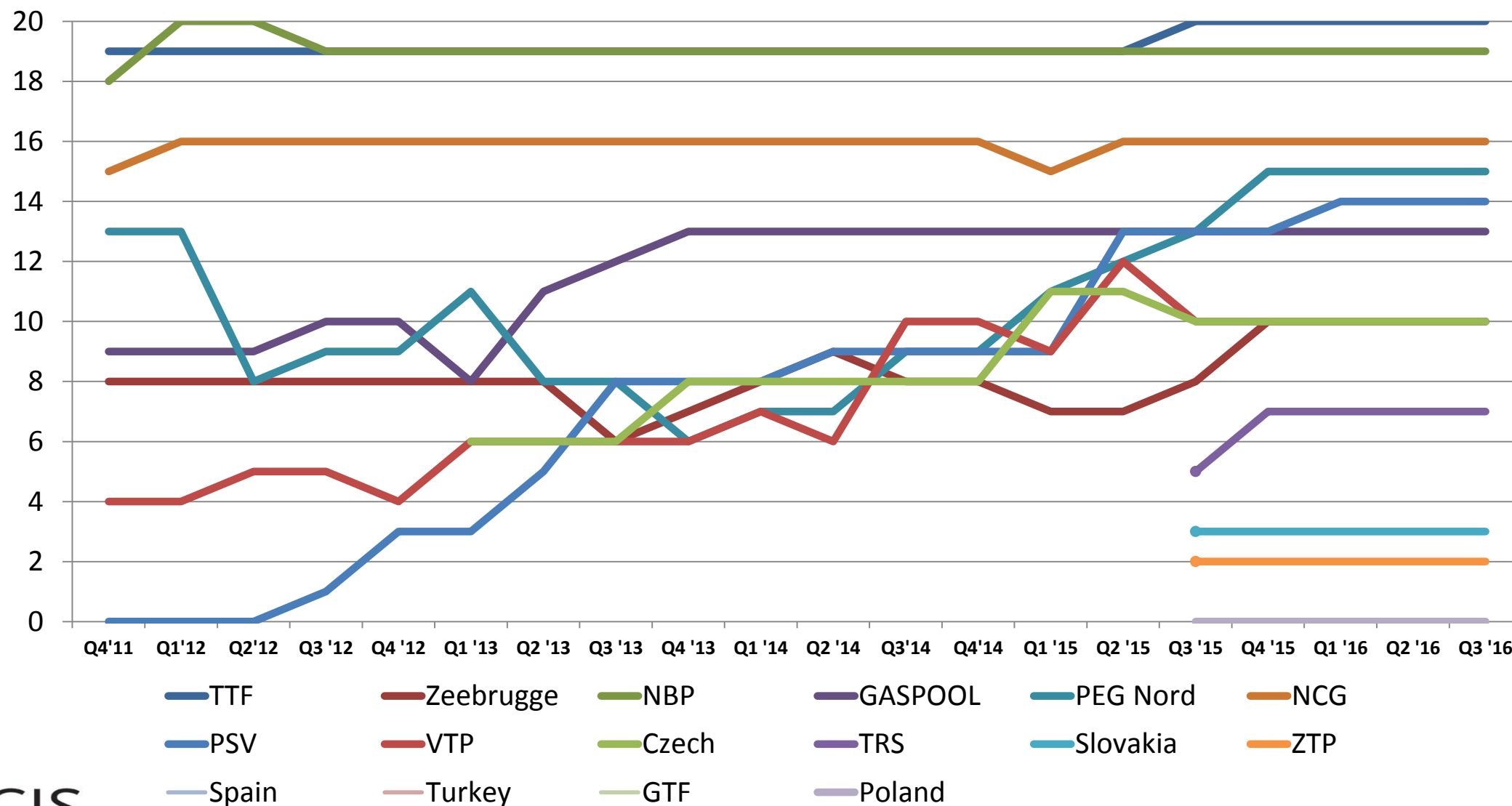
ICIS Tradability Index – measuring the bid/offer spread

| ICIS Tradability Scores* | | |
|--|-----------------|--------------|
| Contract | Width of spread | Availability |
| Within-day | < €0.5/MWh | 0 |
| Day-ahead | < €0.5/MWh | 1 |
| Balance-of-month | < €0.5/MWh | 1 |
| Month-ahead | < €0.5/MWh | 1 |
| Next quarter | < €0.5/MWh | 1 |
| Next season | < €0.5/MWh | 1 |
| Two seasons ahead | < €0.5/MWh | 1 |
| One year ahead | < €0.5/MWh | 1 |
| Two years ahead | < €0.5/MWh | 1 |
| Three years ahead | < €0.5/MWh | 1 |
| Within-day | < €0.3/MWh | 0 |
| Day-ahead | < €0.3/MWh | 1 |
| Balance-of-month | < €0.3/MWh | 0 |
| Month-ahead | < €0.3/MWh | 1 |
| Next quarter | < €0.3/MWh | 1 |
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| Two years ahead | < €0.3/MWh | 1 |
| Three years ahead | < €0.3/MWh | 0 |
| Total | | 16 |
| *Bid-offer spread typically available every day to all interested counterparties | | |

- ◆ Compiled by price reporters.
- ◆ As each contract reaches the threshold spread width it is assigned 1 point out of 20.
- ◆ Applied to contracts from Within-day to 3 years ahead.
- ◆ Applies for a full quarter –the spread had to be there every trading day.

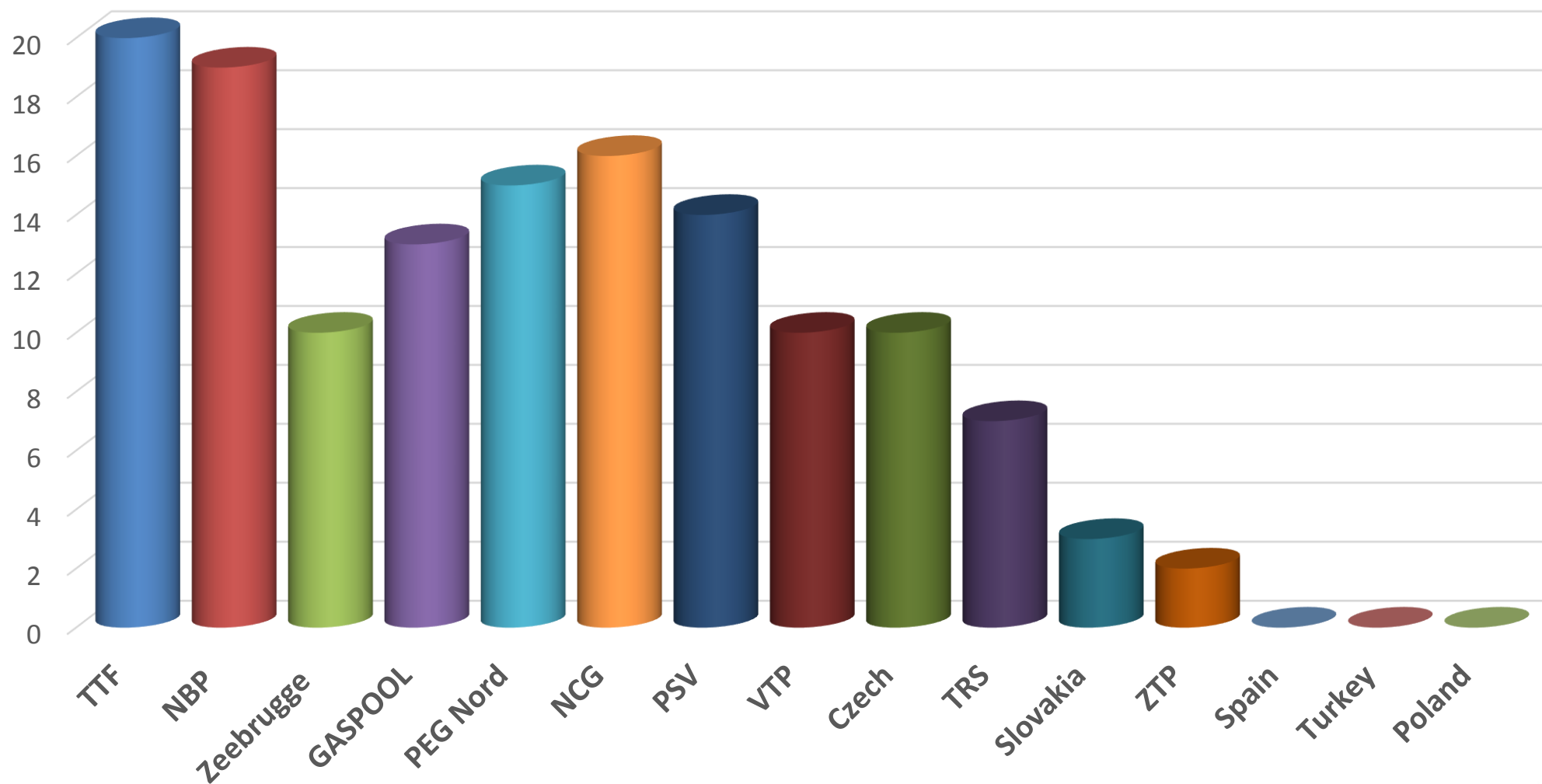
History of ICIS Tradability Index 2007 – 2016

Source: ICIS European Gas Hub Report



Latest Tradability Index for Europe – Q3 2016

Source: ICIS European gas hub report

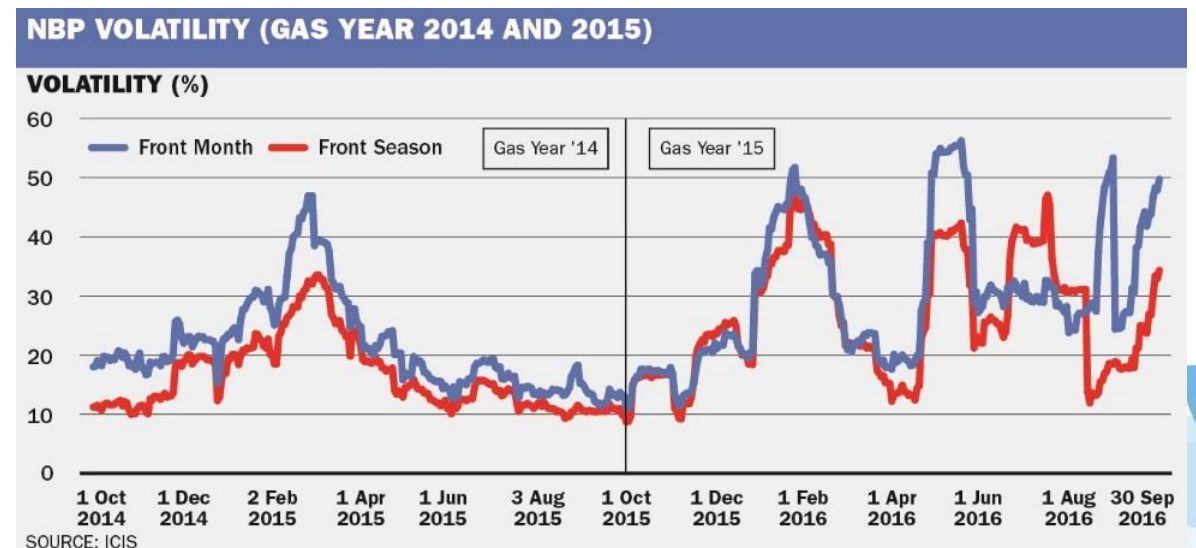
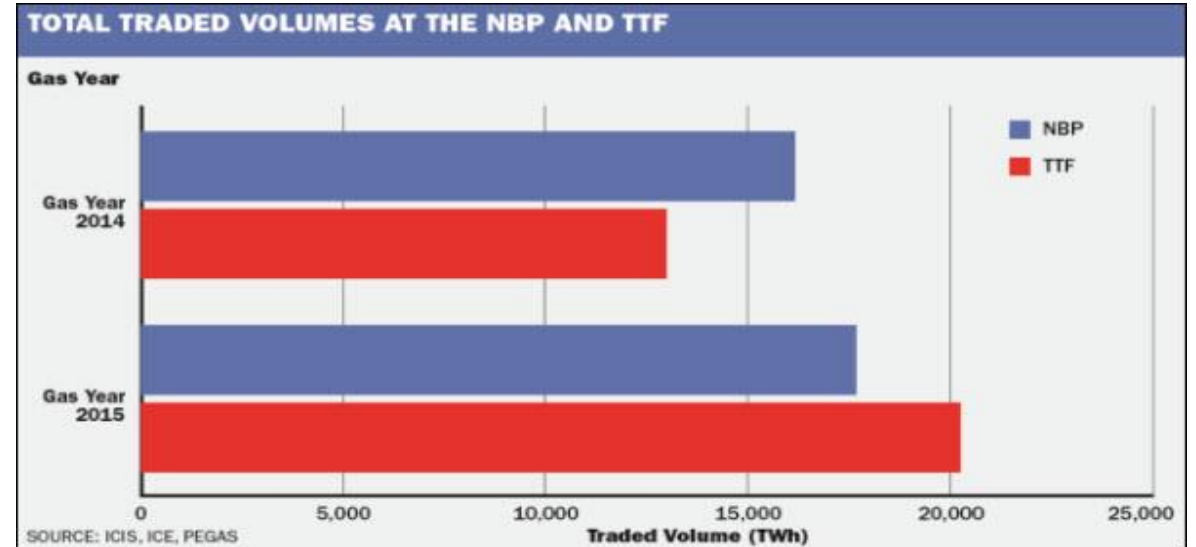


Main Trading Hubs – recent developments



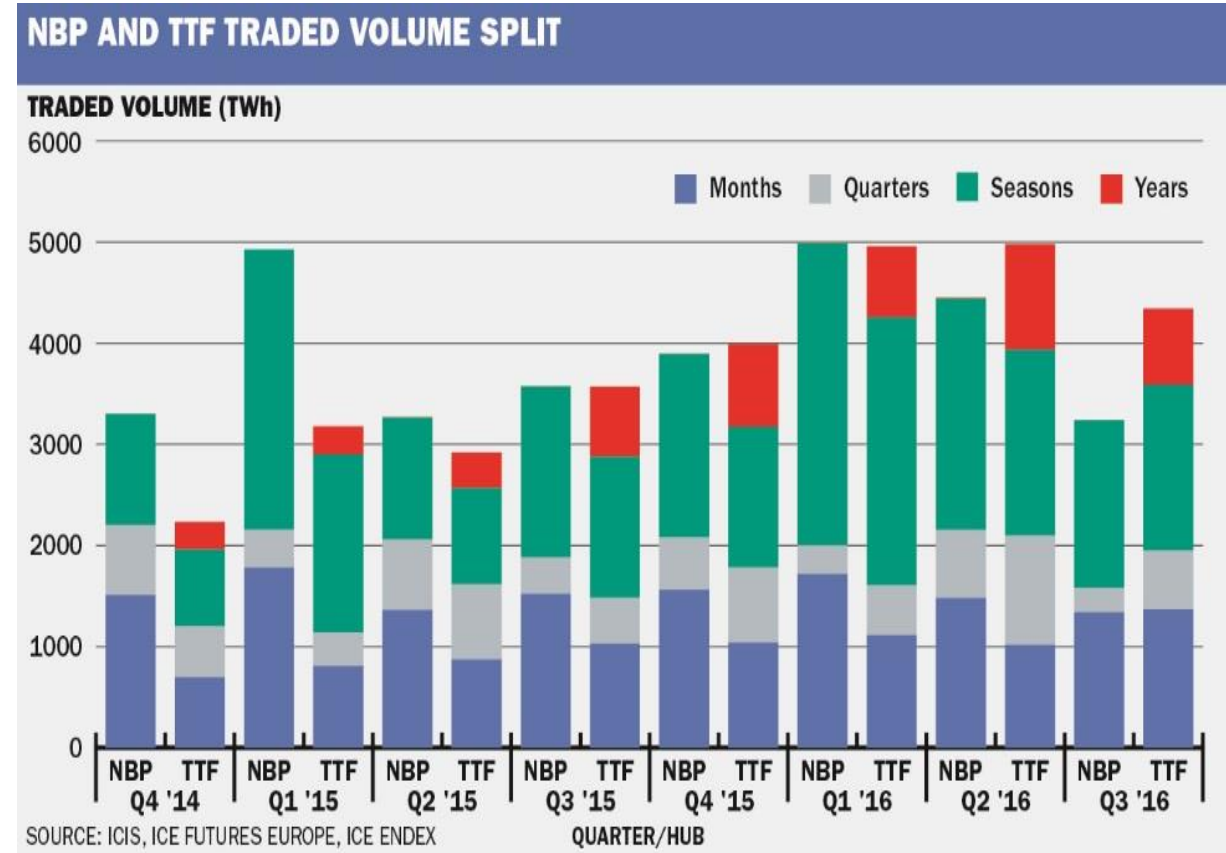
NBP – OTC volume rebounds as market volatility returns

- NBP total (OTC and exchange) volumes rise by approx. 10% in GY16, although eclipsed by TTF.
- Trading boosted by increased market volatility – Rough outage, Groningen cap, Brexit uncertainty, ‘short squeeze’
- OTC trading regains ground - growth in gas generation encourages more physical participants to trade.
- The NBP still has a strong influence on European prices and is likely to be the



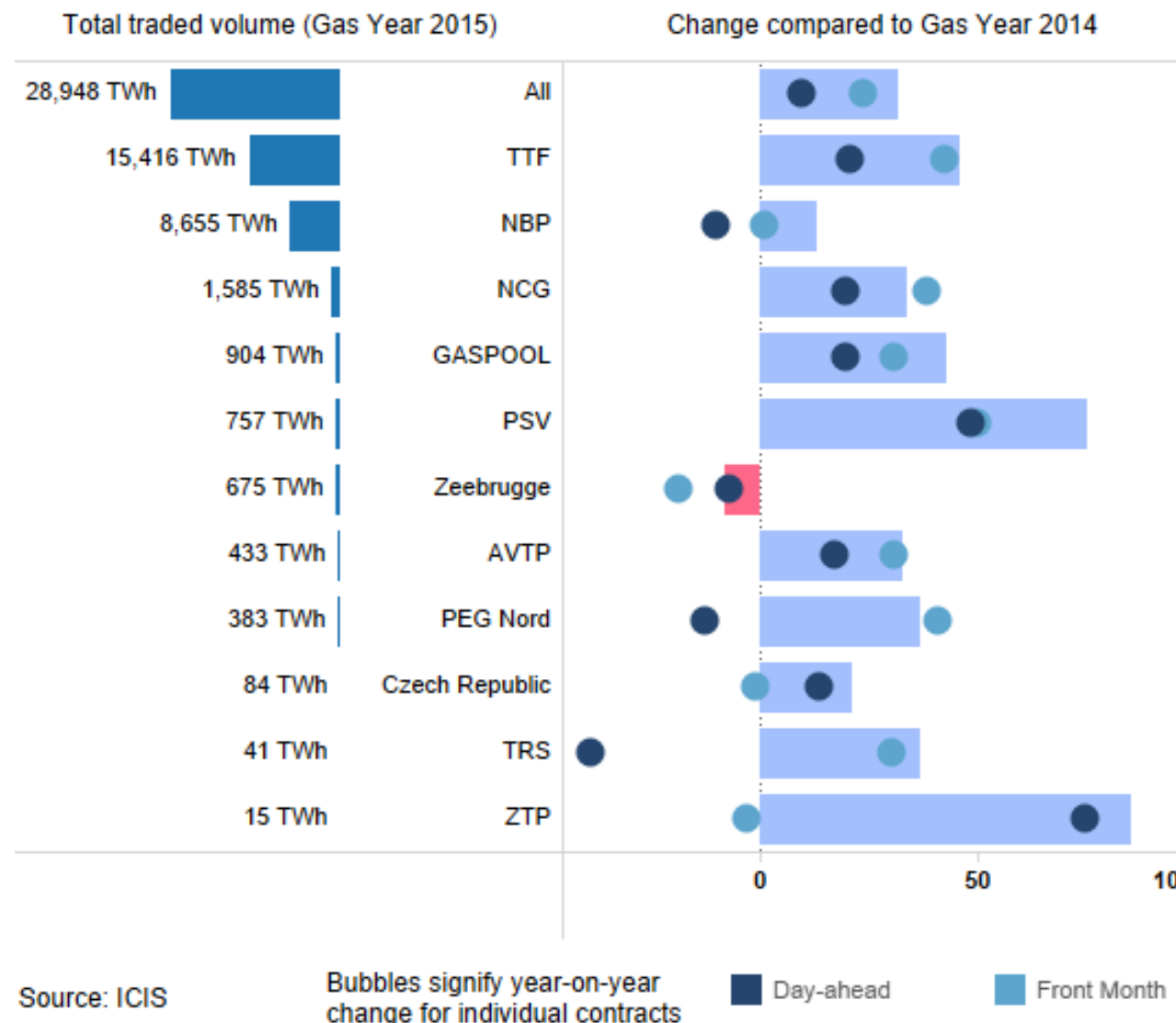
TTF – the road to market ascendancy

- TTF total (OTC and exchange) volumes surge by 56% in GY2015, buoyed by market conditions and structural changes
- More contracts move to hub-pricing, disproportionality benefits TTF with increasing hedging activity on the curve.
- Removal of Groningen as a flexible production source creates some uncertainty in the market and likely to increase volatility.
- TTF will remain a crucial venue for global LNG forward hedging, which should support further growth on the far curve.



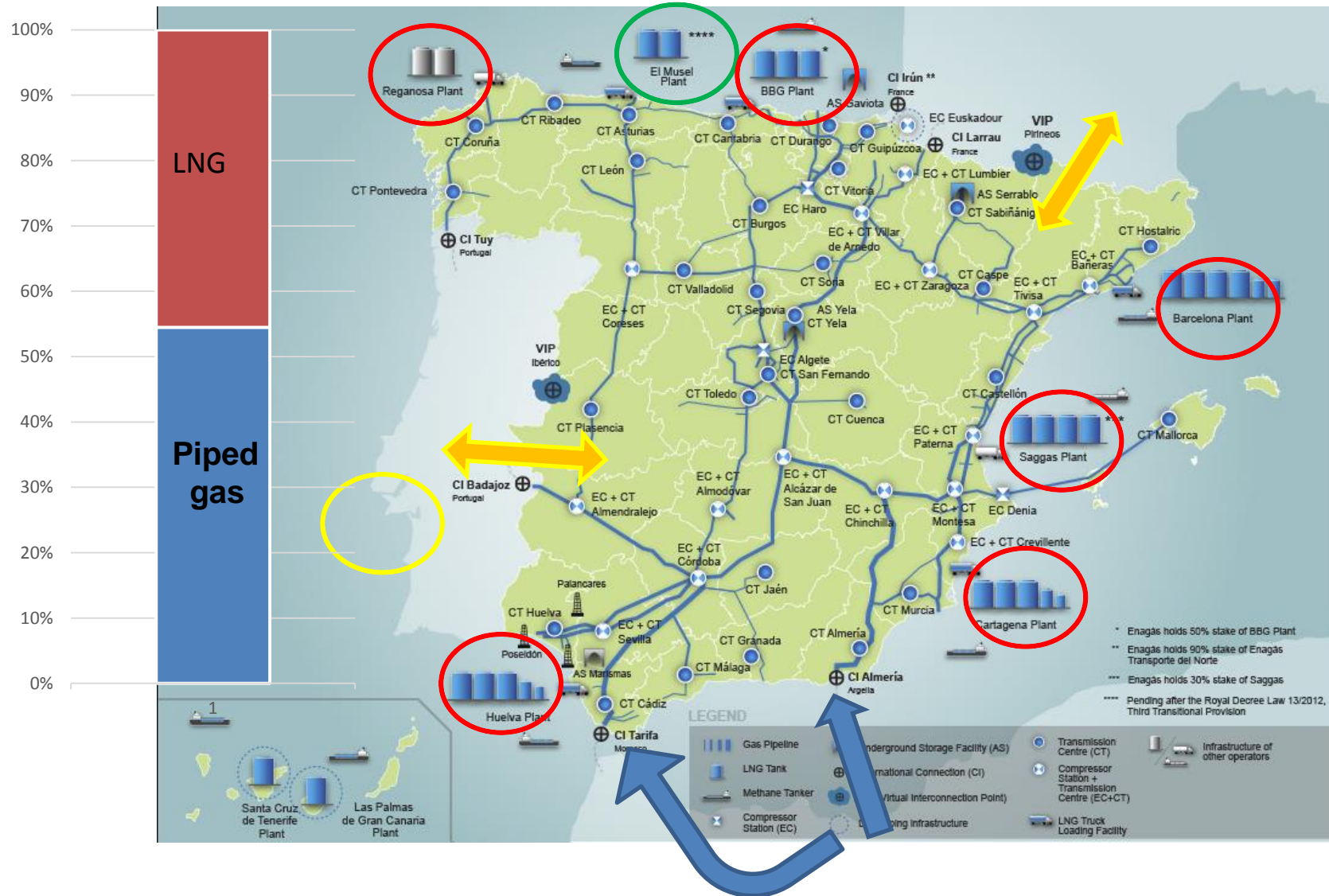
Europe's medium-sized hubs on growth trend

- Volumes on Europe's medium-sized hubs all rise with exception of Zeebrugge.
- Supported by market volatility and growth largely centred on prompt and near curve contracts
- Increasing market confidence supports PSV liquidity, although questions still surround participation in new balancing platform

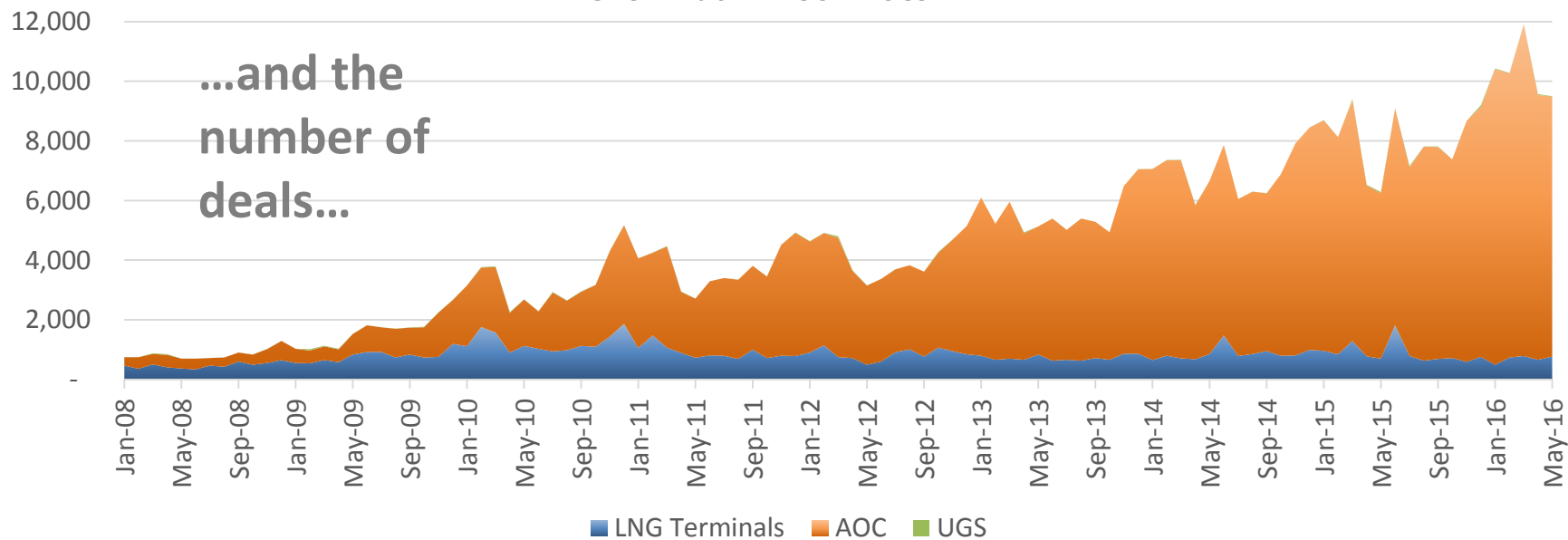
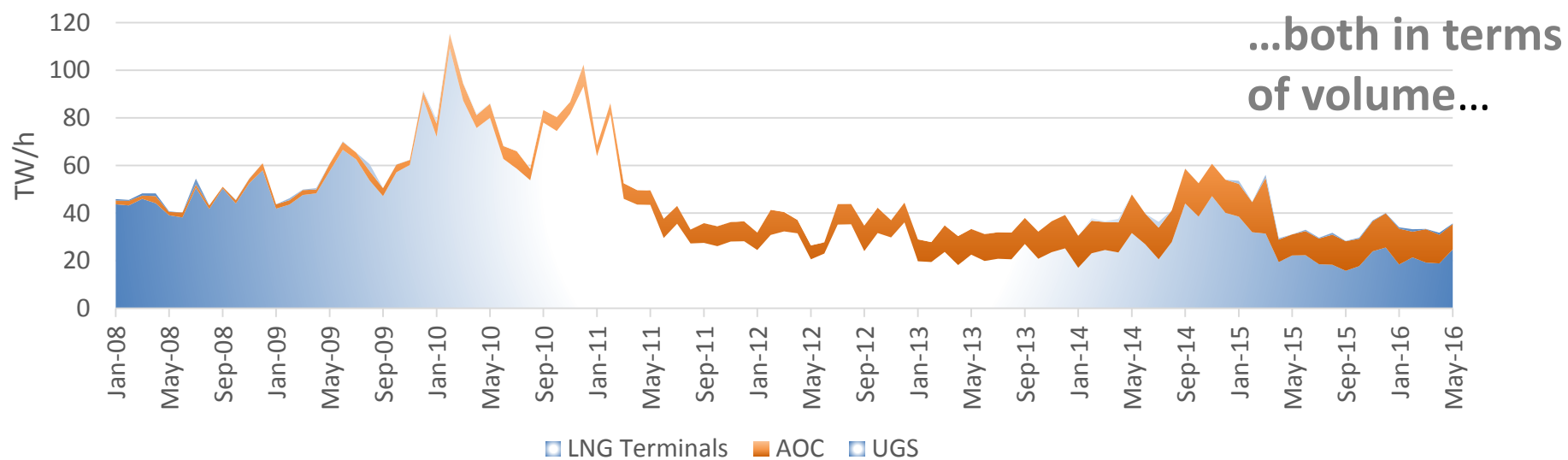


Market developments in Iberia

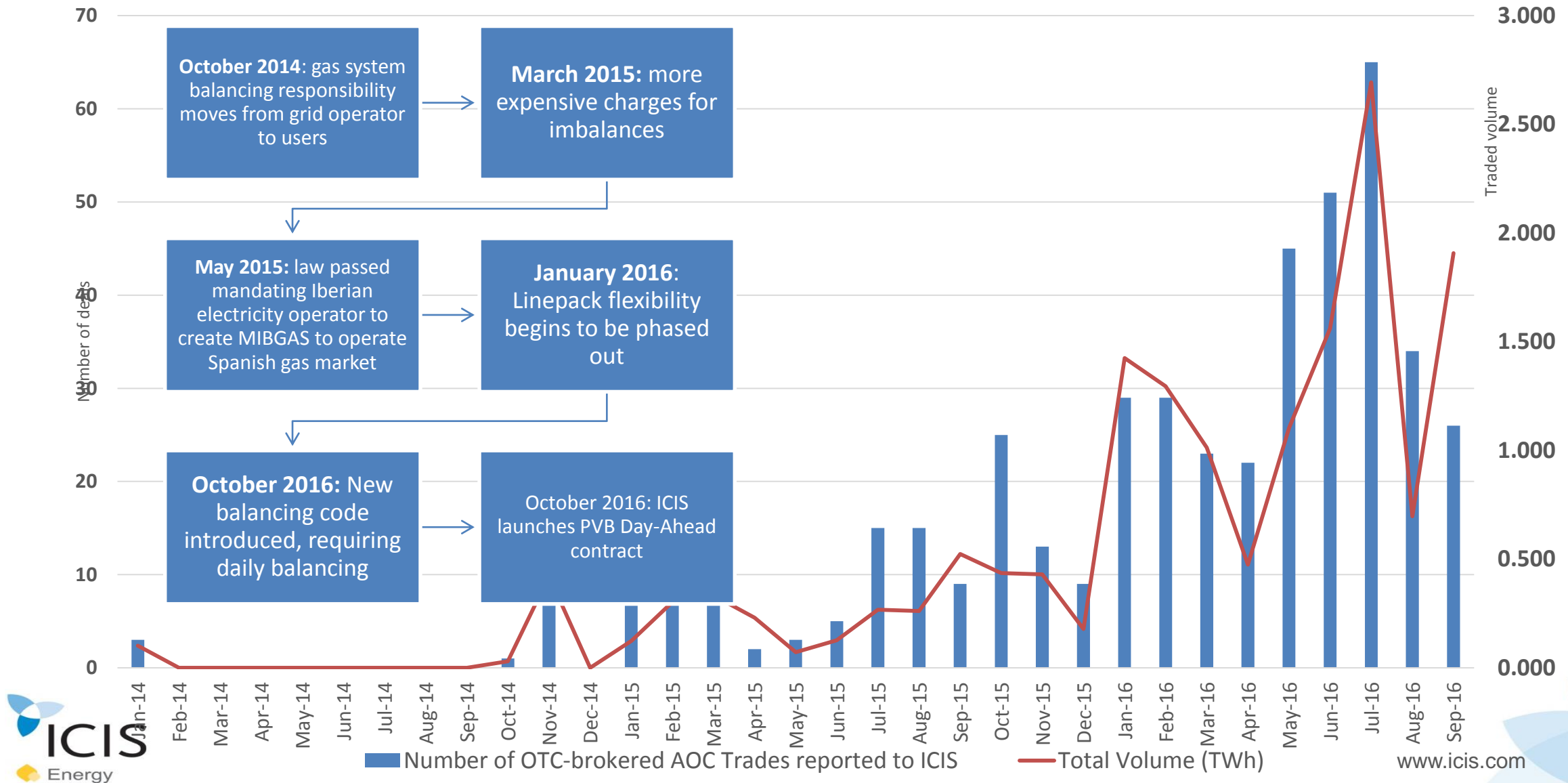
Spain: An LNG market with pipeline gas



Spain as a venue for trading has grown steadily in recent years



Spain's gas hub development has required multiple pieces of legislation, but is progressing ...



Opportunities and challenges for developing Spanish PVB hub

| Positive | Negative |
|---|--|
| Spain has been an enthusiastic adopter of EC regulations and a willing exponent of energy market liberalisation | A lack of interconnections keeps Spain and Portugal as an 'energy island', cut off from other EU hubs |
| The prevalence of LNG makes Iberia a good source of flexibility globally... | ...but LNG's prevalence caused Iberia to develop separately and keeps it more plugged in to global markets than EU |
| Trade increase set to be generated by redesign of balancing system | Even Spain and Portugal together may be too small to sustain a market |
| Steering information provision improved from October 2016, but systems unproven | Consequences of abolishing bundled storage for shippers remain untested |
| Obligation to trade should cut appeal of time and location swaps between rival companies | Spain is a secondary market with oil-linked long-term contracts and no primary supply |

Outlook

European gas trade – key themes

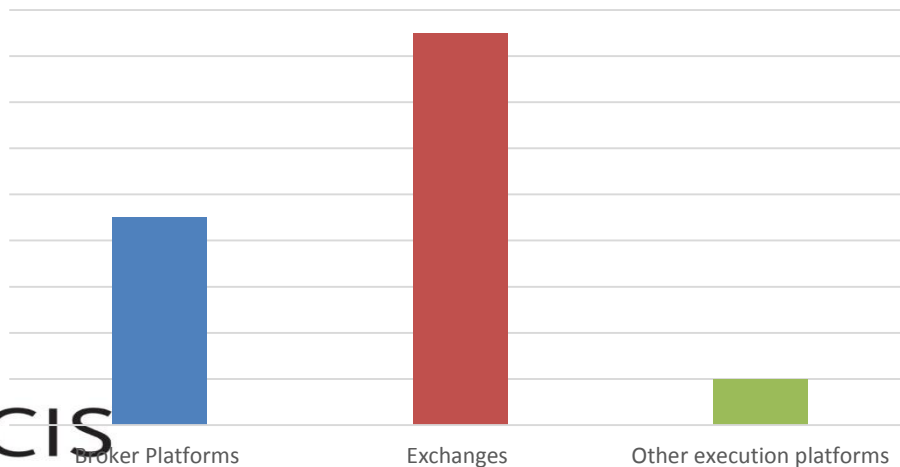
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Outlook for growth – what will European trade look like in 2020?

Market Trend

- TTF will be the pre-eminent European hub and the only continental European hub with any noticeable liquidity on the far curve or significant futures trading activity.
- Volatility may increase as flexible supply infrastructure is decommissioned (Groningen) or continues to age (e.g. Rough) without investment in new flexible infrastructure.
- Global LNG supply/demand will continue to have a major impact on liquidity and prices as more swing Atlantic Basin (i.e. US) volumes enter the global market.
- Uncertainty surrounding nature of Brexit, but NBP will continue to exert influence on European prices and will be major trading hub with deep liquidity.

Thank you.....

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