European gas and power
Russia, LNG and the accelerating power market
Ifiec Energy Forum 2016
Matthew Monteverde
21 April 2016
Introduction
European gas prices continue to slide

Front-month Dutch and German gas prices are at their lowest since 2009

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Gas prices in more detail

NBP forward month prices collapse over three consecutive gas years

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Gas prices in more detail

Forward month price ranges – 2013-14
Gas prices in more detail

Forward price ranges – 2013-14 v 2014-15

Added political risk premium on low prompt prices
Gas prices in more detail

Forward price ranges – 2013-14 v 2014-15 v 2015-16

May     Aug     Nov     Feb     May     Aug

Range GY 13-14  Range GY 15-16  Range GY 14-15

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Forward prices are also lower

Dutch forward prices down almost 40pc on the year

31-Mar-16 31-Mar-15 31-Mar-14
Forward prices are also lower

Average TTF forward quarterly price lowest since 2004

Average forward quarterly prices at 31 March
Measuring seasonality

Dutch forward curve as of 31 March 2016

\[ \text{Seasonality} = \frac{\text{ABS}(P_{q1} - P_{q2})}{\text{AVG}(P_{q1}, P_{q2})} \]
Forward seasonality also in decline

Seasonality of forward TTF prices at 31 March

- Average forward quarterly prices at 31 March
Forward seasonality also in decline

Seasonality of forward NBP prices at 31 March

Average forward quarterly prices at 31 March
Russia and the 2015-16 winter
The historic dip in peak-winter supply
Nordstream deliveries

Opal

- 2013-14
- 2014-15
- 2015-16

Nel

- 2013-14
- 2014-15
- 2015-16

+5bn m³
The old onshore routes

**Eustream**

- 2013-14
- 2014-15
- 2015-16

**Yamal (at the German border)**

- 2013-14
- 2014-15
- 2015-16

+11bn m³

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Russian supply largely offsets lower local production

- NL/NO/UK production
- RU
- N Africa
- LNG
European supply sources

Western European supply — including storage

Jan 10  | Jan 12  | Jan 14  | Jan 16

- RU
- NL/UK production
- NO
- N.Africa
- LNG
- Net Storage

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Russian supply offsets storage — LNG unchanged
The year before, everything was reversed

Year-on-year change in daily deliveries — storage offsets Russia

-150 -100 -50 0 50 100 150 200

mm m³/d

NL/UK production  NO  RU  N.Africa  LNG  Net storage

W15-16 v W14-15  W14-15 v W13-14

illuminating the markets

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Russian supply offsets storage — LNG unchanged

Year-on-year change in daily deliveries — winter 2015-16 v winter 2015-16

-100 -80 -60 -40 -20 0 20 40 60 80 100 120

Year-on-year change in daily winter gas supply

<table>
<thead>
<tr>
<th>Region</th>
<th>Change (mm³/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL/UK production</td>
<td>-50</td>
</tr>
<tr>
<td>NO</td>
<td>0</td>
</tr>
<tr>
<td>RU</td>
<td>100</td>
</tr>
<tr>
<td>N.Africa</td>
<td>0</td>
</tr>
<tr>
<td>LNG</td>
<td>-20</td>
</tr>
<tr>
<td>Net storage</td>
<td>80</td>
</tr>
</tbody>
</table>

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Evolving US role in the global market

But what does this have to do with European prices?
Three stage growth of LNG production capacity

LNG liquefaction capacity, cumulative

- Brunei
- UAE
- Oman
- Peru
- Australia
- Qatar
- Equatorial Guinea
- PNG
- Indonesia
- Trinidad and Tobago
- Norway
- US
- Malaysia
- Nigeria
- Russia
- Angola

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Three stage growth of LNG production capacity

LNG liquefaction capacity, cumulative as of April 2016

- Brunei
- Australia
- UAE
- Oman
- Peru
- Qatar
- Equatorial Guinea
- PNG
- Indonesia
- Trinidad and Tobago
- Norway
- Malaysia
- Nigeria
- Russia
- Angola
- US
- Angola

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Three stage growth of LNG production capacity
Global gas prices are already coming together

Fall in European and Asian gas prices narrows gap to the US

Henry Hub  NBP  Japan LNG
Uniper — half of new LNG will come to Europe

“... we believe that over 50pc of this additional volume will find its way into Europe — either directly or by displacing other swing suppliers which are currently delivering into Asia”

— Richard Baylis, head of LNG, Uniper Global Commodities, LNG 18 conference
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Uniper — half of new LNG will come to Europe

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— Richard Baylis, head of LNG, Uniper Global Commodities, LNG 18 conference

Assumes half of 130mn t/yr = approximately 226mn m³/d of sendout without seasonal swing
Demand
Gas demand
Demand and temperature
UK heating demand

Heating demand displays expected seasonality
Heating demand elasticity and destruction

LDZ demand and temperature – 2005-2015
Heating demand elasticity and destruction

LDZ demand and temperature – 2006

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Heating demand elasticity and destruction

LDZ demand and temperature – 2006 and 2014
Heating demand elasticity and destruction

LDZ demand and temperature – 2006, 2014 and 2015
Heating demand elasticity and destruction

LDZ demand and temperature

- Linear (2013)
- Linear (2012)
- Linear (2011)
- Linear (2010)
- Linear (2009)
- Linear (2008)
- Linear (2007)
- Linear (2006)
- Linear (2014)
- Linear (2015)
Heating demand elasticity and destruction


Efficiency in heating use
Lightbulbs
German consumption is also falling
German household gas and power demand falling

Household gas and power demand in decline

- Gas
- Power

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Power sector gas demand
Spark and dark spreads less discouraging

Day-ahead generating margins slowly expand for gas-fired plants

- Dark spread 38pc ARA coal
- Spark spread 49.13pc Gaspool

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New CCGTs can compete with older coal (ish)

Early summer slump in fuel prices pushes new gas-fired plants back to the margin

Breakeven 35pc coal vs 59pc gas
But CCGTs run even when sparks are negative...

Weekday German power output v day-ahead spark spread since February 2011

Day ahead spark spreads (49pc) v gas-fired power generation

R² = 0.2656
Intraday power trade and generating margins
Towards an intra-day spark spread

For weekdays between 7am and 7pm since 6 January:

The NCG or Gaspool within-day market traded within 15 minutes of each 15-minute power delivery period start for 43pc of periods.

A spark spread for a 50pc efficient CCGT was calculated using the average of those gas prices and the high, low, last and average price for each 15-minute power contract.
German intra-day prices

15-minute average price vs day-ahead spark spread

Spark spread - average intraday price vs Day-ahead spark spread
Hedging behaviour as a measure of price outlook
Producer hedging

Reported minimum producer hedging (company A)

Per cent

0 10 20 30 40 50 60 70 80 90 100

1 2 3 4 5 6 7 8 9 10 11 12 13

2012 2013 2014 2015 2016 2017
Producer hedging has accelerated
Producer hedging has accelerated

Reported minimum producer hedging (company B)

- 2012
- 2013
- 2014
- 2015
- 2016
- 2017

Per cent

0 10 20 30 40 50 60 70 80 90 100

1 2 3 4 5 6 7 8 9 10 11 12 13
The trend is not universal

Reported minimum producer hedging (company C)

Per cent

2012  2013  2014  2015  2016  2017
Conclusions?
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