International perspectives on energy prices
IFIEC Europe Energy Forum 2018
Matthew Monteverde
16 May 2018
Three lessons
Summer 2018: not a storage problem, a gas problem?
Storage depleted by late cold snap

European working gas stocks

Source: GSE/Argus
Storage depleted by late cold snap

European working gas stocks

+55mn-70mn m³/d of extra supply
What will it take to fill storage?

**European working gas stocks**

- +55mn-70mn m³/d of extra supply

**Summer supply by year**

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

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Finding extra supply from limited sources

European working gas stocks

+55mn-70mn m³/d of extra supply

Summer supply by year + extra

- RU
- NO
- N.Africa
- LNG
- Extra

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The Netherlands?

Dutch gas production

Assuming a 2017 baseline

01 Jan 01 Feb 01 Mar 01 Apr 01 May

Dutch gas production

2017 2018

0 20 40 60 80 100 120 140 160 180 200

mn m³/d

S 2017 S 2018

0 200 400 600 800 1,000 1,200

mn m³/d

NO N Africa UK/NL RU LNG Extra
The Netherlands?

Year-on-year change

-25mn m³/d of Dutch supply

Assuming a 2017 baseline, -25mn m³/d

NL

Illuminating the markets

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Norway?

NO summer production already a record

Assuming a 2017 baseline, -25mn m³/d
NL

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2010-11 LNG was enough…

+81 mn m³/d of LNG

Assuming a 2017 baseline, -25 mn m³/d

Non-Snohvit production @ 60 mn m³/d

ILLUMINATING THE MARKETS

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The effect on price – Europe still below Asian-LNG

TTF front-month around 75¢/mn Btu below northeast Asia so far this summer
And LNG shipping is not free (mostly)

**Europe-northeast Asia price spread and freight cost bands**

- West Africa (75-90¢)
- Trinidad/USGC ($1-90¢)

-2.00
-1.50
-1.00
-0.50
0.00
0.50
1.00
1.50
2.00

$/mn Btu

2012
2015
2018

TTF-ANEA spread
And LNG shipping is not free (mostly)

**Europe-northeast Asia price spread and freight cost bands**

- **Australia/southeast Asia ($1-1.25)**
- **Qatar/Middle East (20¢)**
- **West Africa (75-90¢)**
- **Trinidad/USGC ($1-90¢)**

*illuminating the markets*
We need to talk about China
Global demand is asymmetric

About 65pc of LNG demand is in the Asia-Pacific region
Global demand is asymmetric

China accounts for around 14pc of global demand
Global demand growth tilts heavily towards China

But China’s demand growth was larger than any single region

- mn t LNG

-20 -10 0 10 20 30 40 50

-30


Europe Americas MENA/S. Asia Asia-Pacific ex China China
Chinese apparent demand is increasing

- Apparent demand
- Production
- Imports

Demand rising faster than production
LNG imports now more than half the total

Composition of Chinese gas imports

Pipeline  LNG

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How quickly can demand grow?

Cumulative new regasification projects – China

- Proposed

<table>
<thead>
<tr>
<th>Year</th>
<th>Cumulative New Regasification Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>10 mn/lyr</td>
</tr>
<tr>
<td>2018</td>
<td>10 mn/lyr</td>
</tr>
<tr>
<td>2019</td>
<td>15 mn/lyr</td>
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<tr>
<td>2020</td>
<td>25 mn/lyr</td>
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<td>2022</td>
<td>45 mn/lyr</td>
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<tr>
<td>2023</td>
<td>55 mn/lyr</td>
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</tbody>
</table>

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How quickly can demand grow?

Cumulative new regasification projects – China, Bangladesh and Pakistan

- China
- Bangladesh
- Pakistan
How quickly can demand grow?

Cumulative new regasification projects – China, Bangladesh, Pakistan and Kuwait

- China
- Bangladesh
- Pakistan
- Kuwait

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And what about supply?

Proposed liquefaction rises more quickly than the big new importers

- China
- Bangladesh
- Pakistan
- Kuwait
- Liquefaction
And we need to talk about Russia
Additional LNG deliveries have been to southern Europe
European dependence on Russian supply increases

Declining indigenous production increases the need for imports

RU NL/UK production NO N.Africa LNG
European dependence on Russian supply increases

Declining indigenous production increases the need for imports

Market share of major supply sources

Jan 07 | Jan 09 | Jan 11 | Jan 13 | Jan 15 | Jan 17

RU  | NL/UK production | NO  | N.Africa | LNG
Nord Stream deliveries

Opal

Nel
The old onshore routes

**Eustream**

**Yamal (at the German border)**

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How does Gazprom do this?

Storage supports peak deliverability in excess of production
Cold weather, resilience and renewables
Late cold snap stresses supply

March cold snap triggers increased demand

Average temperature (°C)

Oct Nov Dec Jan Feb Mar


2005-2017 range  2017-18
Late cold snap stresses supply

But this winter was milder than 2010-11

Average temperature (°C)

Oct Nov Dec Jan Feb Mar


2005-2017 range 2017-18 2010-11

illuminating the markets

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The season overall was only slightly below average

Average temperatures

Average temperature (°C, October-March)
The season overall was old slightly below average
UK gas heating demand and temperature
UK gas heating demand and temperature

![Chart showing the relationship between mm m³/d and °C for 2017-18. The chart indicates a strong negative correlation, with demand decreasing as temperature increases.]
UK gas heating demand and temperature

2017-18 v 2006-7

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Is efficiency slowing?

UK heating demand at temperature slowly climbing

LDZ demand at 0°C v 2005-06 base
The power sector
The generation mix was more renewable

Winter power output

GW of generation required, baseload

2015-16: +1.2pc
2016-17: -3.9pc
2017-18:

Total (DE, ES, FR, UK)
The generation mix was more renewable

**Winter power output**

- 2015-16: 250 GW
- 2016-17: 200 GW (+1.2pc)
- 2017-18: 150 GW (-3.9pc)

**Winter power by fuel**

- Nuclear
- Coal/Lignite
- Gas
- Hydro
- Wind/Solar

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The generation mix was more renewable

Change in winter power by fuel

<table>
<thead>
<tr>
<th>Year-on-year change in output by source (%)</th>
<th>W16-17 change</th>
<th>W17-18 change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear</td>
<td>40%</td>
<td>0%</td>
</tr>
<tr>
<td>Coal/Lignite</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>Gas</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>Hydro</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>Wind/Solar</td>
<td>0%</td>
<td>-5%</td>
</tr>
</tbody>
</table>

Winter power by fuel

GW of generation required, baseload

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Gas briefly priced out of generation

TTF gas prices and fuel switching scenarios


- 58:36
- 57:37
- 56:38
- 55:38
- 55:39
- 55:40
- 55:41
- 54:41
- 53:42
- 52:43
- 51:44
- 50:45
- 49:46

TTF day-ahead
Renewables, weather and retail prices
Big picture – lowest UK fuel for power since 1968

Efficiency and renewables weigh on fuel consumption

Fuel input for power generation (TWh)
Big picture – lowest UK fuel use for power since 1968

Efficiency and renewables weigh on fuel consumption

- Fuel input for power generation (TWh)
- Electricity expenditure

Electricity as % of total consumers expenditure

TWh

0 200 400 600 800 1000 1200

Little fossil-fuel left to lose other than gas

Power-sector fuel demand in decline

UK generating mix by fuel

Coal
Nuclear/Renewable
Gas
Interconnectors
Little fossil-fuel left to lose other than gas

**Wind load factors**

- Onshore Wind
- Offshore Wind

**UK generating mix by fuel**

- Coal
- Nuclear/Renewable
- Gas
- Interconnectors
Instead of arguing about renewable intermittency
We consider the coldest week of 2018
And the insulation provided power prices by the wind.

February power price spike far less pronounced than gas.
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