Winter Outlook 2012/13

British Institute of Energy Economics
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Peter Parsons – Forecasting Manager
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- Fuel Prices
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  - Generation / demand balance
- Conclusions
Fuel Prices

- Baseload Power £/MWh
- NBP Gas Price p/therm
- ARA Coal Price $/tonne
- Brent Oil Price $/barrel
Gas – Relative Power Generation Economics

Prices as of 09/10/12

Carbon (€/tonne): 7.8

Gas Burn

Coal Burn

Coal/Gas Burn

Gas Range (40% - 55%)

Coal ($/tonne)

Gas (p/th)
Gas – 2012 / 13 Demand

01-Oct | 01-Dec | 01-Feb

- Ireland
- Non daily metered
- Interconnector
- Storage injection
- Cold demand
- Warm demand
- Total Power
## Gas – 2012 / 13 Supplies

<table>
<thead>
<tr>
<th>(mcm/d)</th>
<th>2011/12</th>
<th>2012/13</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>400+</td>
<td>Range</td>
</tr>
<tr>
<td>UKCS</td>
<td>125</td>
<td>96 – 130</td>
</tr>
<tr>
<td>Norway</td>
<td>105</td>
<td>70 – 115</td>
</tr>
<tr>
<td>BBL</td>
<td>32</td>
<td>24 – 36</td>
</tr>
<tr>
<td>IUK</td>
<td>20</td>
<td>0 – 30</td>
</tr>
<tr>
<td>LNG Imports</td>
<td>92</td>
<td>30 – 100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>374</td>
<td><strong>220 – 411</strong></td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>65</td>
<td>0 – 108</td>
</tr>
<tr>
<td><strong>Total inc. Storage</strong></td>
<td>439</td>
<td><strong>220 - 519</strong></td>
</tr>
</tbody>
</table>
Japanese power generation mix

- Heavy Fuel Oil estimate
- Crude Oil estimate
- LNG estimate
- Purchased
- Nuclear
- Coal estimate
- Hydro

<table>
<thead>
<tr>
<th>Month</th>
<th>% Heavy Fuel Oil</th>
<th>% Crude Oil</th>
<th>% LNG</th>
<th>% Purchased</th>
<th>% Nuclear</th>
<th>% Coal</th>
<th>% Hydro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov-10</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feb-11</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>May-11</td>
<td></td>
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</tr>
<tr>
<td>Aug-11</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nov-11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feb-12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May-12</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Global LNG supply / demand

- Liquefaction
- Spain
- USA
- Taiwan
- France
- China
- UK
- Other
- Japan
- Korea

mcm/d

Sep-11 Dec-11 Mar-12 Jun-12 Sep-12 Dec-12 Mar-13 Jun-13

Actuals
Forecast
12 month average LNG imports

- Growth in all markets through to Q3 2011
- Fukushima impact is a ‘slow burn’
- Japan’s LNG growth accelerates as Europe declines
- Japan’s LNG demand stabilising?
- Europe’s LNG demand steady too?
Gas - Cold Spell Analysis for Severe Conditions

- Peak day
- Very cold week
- Very cold month
- Very cold winter

- NSS
- Storage
- Supply Range
- Protected Demand
- Other Large Loads
- Large Loads DSR
- Capacity
Gas / electricity interaction (current)

2009/10
• Gas and coal competing for baseload
• Most CCGTs needed for peak ½hr
• Within day gas flow 64-101mcm/d
• Flex from NTS linepack

2011/12
• Coal at baseload, gas marginal
• Most CCGTs still needed for peak ½hr
• Within day gas flow 26-97mcm/d
• Flex from NTS linepack
• Within day variation in wind from 2.6 to 1.3GW (78%-38%)
Gas / electricity interaction (2020)

Assumed daily power profiles for days of highest electricity demand

2020 steady wind
- Gas assumed as marginal plant
- 22GW Wind at 30%
- Most CCGTs needed for peak ½hr
- Within day gas flow 28-98mcm/d
- Flex from NTS linepack

2020 variable wind
- Gas assumed as marginal plant
- 22GW wind, within day range 17.3 to 8.5GW (78%-38%)
- Most CCGTs needed for peak ½hr
- Within day gas flow 0-81mcm/d
- Flex from NTS linepack
- Some coal plant also constrained
Electricity - Demand

Date

Weather Adjusted Monthly Peak Demand (GW)

Seasonally Adjusted Smoothed Demand (GW)

Weather Corrected
Seasonally Adjusted Smoothed
## Electricity – Generation Capacity
### Operational View

<table>
<thead>
<tr>
<th>Power Station Type</th>
<th>Capacity (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear</td>
<td>9.5 ↓</td>
</tr>
<tr>
<td>Interconnectors</td>
<td>3.0 —</td>
</tr>
<tr>
<td>Hydro</td>
<td>1.0 —</td>
</tr>
<tr>
<td>Wind</td>
<td>4.7 ↑</td>
</tr>
<tr>
<td>Coal</td>
<td>26.1 ↓</td>
</tr>
<tr>
<td>Biomass</td>
<td>0.8 ↑</td>
</tr>
<tr>
<td>Oil</td>
<td>2.1 —</td>
</tr>
<tr>
<td>Pumped storage</td>
<td>2.7 —</td>
</tr>
<tr>
<td>OCGT</td>
<td>1.2 ↓</td>
</tr>
<tr>
<td>CCGT</td>
<td>28.0 ↓</td>
</tr>
<tr>
<td>Total</td>
<td>79.1</td>
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</tbody>
</table>
Electricity – Normal Demand and Notified Generation Availability

GW

29/10/12 05/11/12 12/11/12 19/11/12 26/11/12 03/12/12 10/12/12 17/12/12 24/12/12 07/01/13 14/01/13 21/01/13 28/01/13 04/02/13 11/02/13 18/02/13 25/02/13 04/03/13 11/03/13 18/03/13 25/03/13

- Normal Demand
- Operating Reserve
- Generation with 3GW imports
- Generation with 3GW exports
# Electricity – Assumed Availability

<table>
<thead>
<tr>
<th>Power Station Type</th>
<th>Assumed Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear</td>
<td>84%</td>
</tr>
<tr>
<td>Interconnectors</td>
<td>100%</td>
</tr>
<tr>
<td>Hydro</td>
<td>75%</td>
</tr>
<tr>
<td>Wind</td>
<td>10%</td>
</tr>
<tr>
<td>Coal</td>
<td>85%</td>
</tr>
<tr>
<td>Biomass</td>
<td>85%</td>
</tr>
<tr>
<td>Oil</td>
<td>85%</td>
</tr>
<tr>
<td>Pumped storage</td>
<td>98%</td>
</tr>
<tr>
<td>OCGT</td>
<td>94%</td>
</tr>
<tr>
<td>CCGT</td>
<td>87%</td>
</tr>
<tr>
<td>Total</td>
<td>83%</td>
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</tbody>
</table>
Electricity – Normal Demand and Assumed Generation Availability

![Graph showing electricity demand and generation availability](image-url)
Electricity – 1 in 20 Demand and Assumed Generation Availability

[Diagram showing energy generation and demand with specific dates and values]
Winter Outlook 2012/13 - Summary

- **Gas**
  - Forward winter fuel prices strongly favour coal burn over gas
  - Weather corrected gas demand forecast to be lower than last winter
  - Forecast non storage supplies are slightly lower than last winter
  - LNG uncertainty given increased global demand and Japanese power mix
  - 2012/13 storage deliverability – higher than previous winter, should increase further within winter when new facilities are commissioned

- **Electricity**
  - Average cold spell demand forecast 0.9 GW higher than last winter
  - Notified and Assumed Generation availability has increased by approximately 1 GW from last winter
  - Demand and full interconnector exports are expected to be met in 1 in 20 conditions