A winter landscape featuring a snow-covered path leading towards a sunset over a city skyline. The sun is low on the horizon, casting a warm orange glow across the sky and snow. Bare tree branches are visible in the foreground and middle ground.

nationalgrid

# Winter Review & Consultation

July 2015

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## Foreword



**Welcome to our Winter Review and Consultation Report. It looks back and analyses the supply and demand for electricity and gas in Great Britain last winter. It also launches our winter consultation, where we aim to gather views as we look ahead to next winter. The consultation process is part of our ongoing stakeholder engagement which ensures that we have robust, reliable data on which to base our analysis for our upcoming Winter Outlook Report.**

To inform the debate and to give an early view of what we expect over the coming winter, we have included the anticipated generation margins for electricity and a supply outlook for gas. The good news is we are confident that electricity margins remain manageable for winter 2015/16. We have taken action to support security of supply and procured balancing services so that we have the right tools in place to balance the system. To do this we undertook a robust procurement process which delivers at a competitive cost for consumers and greater certainty for generators and demand-side participants providing those services.

Turning to gas, similarly to last year we anticipate there to be enough capacity to meet every demand scenario. We recognise that global supply patterns are dynamic, so monitoring the fast-moving changes to sources of supply, and understanding what that means to the network, remains important.

Those are the headlines; what is really important now is that we gather your views to make our upcoming consultation as collaborative and productive as possible. The forecasts we made for winter 2014/15 were well informed and accurate, thanks to the information received from a wide cross-section of stakeholders via this process throughout 2014.

We would like your input this year too. The consultation window is open from 15 July until 14 August but the engagement doesn't stop there and your continued input is welcomed. There are lots of ways to get involved in the consultation process, which will form an ongoing dialogue between now and the publication of this year's Winter Outlook Report in early October. You can respond by email, through the online survey, at one of our upcoming events or contact us directly.

I hope you find this report informative and engaging. We look forward to hearing your views through the consultation. Your input is valuable whether you complete our full online survey or just choose to answer one question.

You can join the debate in real time on Twitter using [#NGWinterOutlook](#), on our LinkedIn [Future of Energy](#) page or email us at [marketoutlook@nationalgrid.com](mailto:marketoutlook@nationalgrid.com)

**Cordi O'Hara**  
Director of Market Operation

# Executive summary

## Electricity: Winter Review 2014/15

### Electricity margins turned out to be greater than expected

The level of margin between actual demand and available generation was adequate across the winter. At times of peak demand milder than average weather was experienced. This means that we did not experience levels of demand that would be associated with the normal colder weather of winter, represented by our “ACS (average cold spell) demand” scenario in the Winter Outlook Report.

Electricity demands were broadly in line with our forecasts and remained flat in comparison with previous years, with a weather corrected peak demand of 53.2 GW. Given the accuracy of our forecasting and the capacity margins that we saw at peak demand times, we can be confident that we would have been able to balance the system using the balancing tools available to us if demand had risen to 1 in 20 year levels. This scenario was presented in our arduous forecast scenario in the Winter Outlook Report in October 2014.

We saw high continental imports with 3,000 MW consistently flowing to GB at peak. There was also a greater than expected level of plant availability, as power stations that were unavailable over the summer due to fire or unplanned maintenance returned during the winter. Average wind load factor for the winter was 48%, which is higher than previous years.

### New balancing services were bought and remained in reserve

We were fully prepared for a cold winter. To manage the uncertainty and tightening margins coming into winter 2014, we procured new balancing services: Demand-Side Balancing Reserve (DSBR) and Supplemental Balancing Reserve (SBR).

The services were not called upon to help balance the system during winter 2014/15. This was due to a combination of lower than average demand at peak, high interconnector flows, high levels of output from wind generation and high generation plant availability. We could just as easily have seen a winter where any or all of these factors had gone the other way. Had this happened, the new balancing services were available to ensure security of supply.

⚡ Peak demand  
**53.2 GW**

⚡ Generation margins at peak demand  
**9.4% (5.1 GW)**

⚡ Generation margin that would have been expected if we had seen ACS demand  
**4.7% (2.8 GW)**

⚡ Minimum generation margin  
**3.5 GW (7%)**

⚡ Interconnector Flows – Continental Europe  
**3 GW** consistently flowing to GB at peak

⚡ Total new balancing services procured  
**1.1 GW**

## Gas: Winter Review 2014/15

### International conditions resulted in no disruption to gas supplies in GB

There was sufficient level of gas supplies to meet the demand that we experienced on the transmission system last winter. The total gas consumed over the winter period was identical to the projected levels in our Winter Outlook Report, at 47.5 billion cubic metres per day (bcm/day), though there was some variance against forecast between sectors.

Supplies from the UK Continental Shelf (UKCS) and Norway turned out close to our forecast values at 33% and 38% of total supplies respectively. The relative prices of gas in Asia and Europe meant that more liquefied natural gas (LNG) was available to Northwest Europe. This resulted in higher than expected LNG flows into GB, at 10% of total supplies. Continental flows were slightly lower as a result of the higher LNG flows and supply issues on the continent, down at 8% in comparison to 13% the previous year.

Gas prices were much lower than the previous winter but were not low enough to make gas the preferred fuel for power generation.

The continuing tension between Russia and Ukraine did not lead to any disruption to supplies to the UK. As the analysis in our 2014 Winter Outlook Report showed, impact on the GB market would have been minimal under all scenarios except for full curtailment of gas into Europe and an extremely cold winter. This did not happen and so no supply issues were experienced in GB.

### Secure gas supplies from unpredictable sources

Our gas in Great Britain comes from an increasingly wide range of sources: from the UKCS, Norway and continental interconnection, to LNG sourced in the global market. This provides a high level of security of supply but can present operational challenges for us as System Operator, with unpredictable flows of gas being experienced on the system.

### Total winter demand

**47.5** billion cubic metres (bcm)

### Peak demand

**366** million cubic metres per day (mcm/day)

### Amount of total gas supply by source

**Norway** 38%

**UKCS** 33%

**LNG** 10%

**Continental** 8%

**Storage** 10%

### Linepack swing

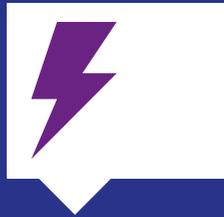
**38.6** mcm/day

Increase in maximum linepack variation

# Preparing for winter 2015/16

## A look ahead

On the electricity side, we have taken action to support continued security of supply. We have procured balancing services for winter 2015/16 to ensure we have the tools in place to help us balance the system. This is in line with actions taken for 2014/15. The capacity from generation and these tools shows a loss of load expectation (LOLE) of 1.1 hours/year and a de-rated margin of 5.1% for our base case scenario. As a result, we are expecting the upcoming winter to be manageable.



On the gas side, we are expecting supplies to be sufficient to meet demand. There is currently a restriction on production from the Groningen field in the Netherlands, and a reduction in the capacity of the Rough long-range storage site. We are expecting to have more information on both of these before the winter and will be updating our analysis before the publication of the Winter Outlook Report in October.



## Winter consultation 2015/16

The views of our stakeholders play an important role in informing the analysis we conduct for our Winter Outlook Report. At the end of this publication you will find the Winter Consultation Report. This provides a first look at the security of supply picture for electricity and gas for winter 2015/16. We also present a series of questions on gas and electricity supply and demand that we invite you to consider.

We urge you to respond to this consultation to provide us with a wide range of views on the questions posed. We will use this information to produce the 2015 Winter Outlook Report, scheduled to be published in October. Please respond to the questions that you feel are relevant to you. Responses to a few of the questions are as welcome as a complete response to all of the areas covered. The consultation period closes on 14 August.

# Market outlook stakeholder engagement

The publication of this report marks the start of our winter consultation. This is part of an annual process of National Grid engaging with stakeholders to gather market intelligence that informs our analysis for the Winter Outlook Report. The Winter Outlook Report is published in October every year. It is our view on security of supply for the gas and electricity networks for the coming winter.

In order to deliver a well-informed view of the market conditions and potential issues related to security of supply, we collect views from a broad range of stakeholders. There are three ways that we collect data to inform our analysis:

## 1 Future Energy Scenarios (FES) consultation

Our annual consultation for the FES provides a starting position for the analysis on the security of supply for the coming winter. For example our forward-looking view of gas supplies is based on intelligence gathered through the FES process. More detail is included on page 49.

## 2 Operational responsibilities

We constantly receive a huge amount of data from our stakeholders through our duties as System Operator. This data is used to inform our analysis on security of supply. For example the data we receive on electricity generation availability, known as OC2 data, informs our capacity margin analysis.

## 3 Responses to winter consultation

The responses we receive to this consultation report are used to inform our analysis. We use the information we receive from electricity generators, gas shippers and other industry stakeholders to build on our analysis and present a evidenced, up-to-date view in the Winter Outlook Report.

Interest in our outlook reports has increased recently. We improved the 2014 winter consultation process by using an online survey. This resulted in a tenfold increase in the number of responses when compared with the previous year.

Over the winter and spring, we have been reviewing our outlook reports. We have

been engaging stakeholders through bilateral meetings, surveys and at events such as our operational forums and customer seminars.

The table below shows the improvements we are making to the Winter Review and Consultation Report and the following consultation process.

## You said...



Explanation of complex concepts could be clearer.

Structure should be logical, easy to follow and give different levels of detail.

Stakeholders rely on the Winter Review to show what happened the previous winter.

Keep the consultation-only approach and drop the draft analysis of the Winter Outlook Report.

More responses to the consultation and improved quality of information received would enhance analysis in the Winter Outlook Report.

## We did...



Working on improving plain English definitions of key terms, using breakout boxes to help the reader understand the topics we cover.

Reordered chapters within each section to cover bigger picture first, such as gas supplies or generation margins. Detail on topics such as demand and fuel prices is then covered later.

Have kept the detail of the Winter Review and improved the reader experience with a new structure and additional information.

No longer present a full draft of the Winter Outlook Report analysis as part of the consultation. This report includes only headlines on the winter ahead and stakeholder questions, from page 54.

Improving the promotion of the consultation through:

- online survey
- active contact with stakeholders
- presence at National Grid events.

# National Grid's role

National Grid owns the high-voltage electricity transmission network in England and Wales and is the System Operator of the high-voltage electricity transmission network – the country's power motorways – for the whole of Great Britain. We are responsible for managing the flows of electricity to homes and businesses on a real-time basis.

We don't generate the power – neither do we sell it to consumers. We all pay our bills to energy suppliers, who buy enough electricity to meet their customers' needs from the power stations and other electricity producers.

Once that electricity enters our network, our job is to 'fine tune' the system to make sure supply and demand match second by second.

On the gas side, we are the system owner and operator of the gas transmission network for the whole of Great Britain, responsible for managing the flow of gas to homes and businesses.

Like electricity, we do not own the gas we transport and neither do we sell it to consumers; that again, is the responsibility of energy suppliers and shippers.

Together, these networks connect people to the energy they use.



# Electricity Winter Review

This chapter looks back at the electricity supply and demand results for 2014/15.

The information is presented in a new format to improve the reader experience. We have reordered the chapters into the following order:

- Generation margins
- Demand levels
- New balancing services
- Interconnected markets.

Outturn data is presented alongside National Grid's published forecast ranges with commentary to inform our stakeholders on events that had an impact. A summary table is included at the end of each chapter. The table provides an at-a-glance view of what was forecast in our 2014 Winter Outlook Report and how this compares to what actually happened over the winter.



## Generation margins

The level of margin between actual demand and available generation was adequate across the winter. We experienced lower than average demands at peak times and mainly full imports from the continent. No system warnings were issued.

### Key terms

**Generation margin:** the sum of generators declared as available during the time of the peak demand, minus the expected demand at that time minus a basic generation reserve requirement. This is presented as a percentage of demand.

**Breakdown rate:** the breakdown rate of conventional generation is used to take account of breakdowns and outages that are unplanned. These are derived per fuel type using the actual capacity of the units offered during winter peaks against their actual rated total capacity, taking into account when they were on planned outage. The forecast is based on the average of the previous three years.

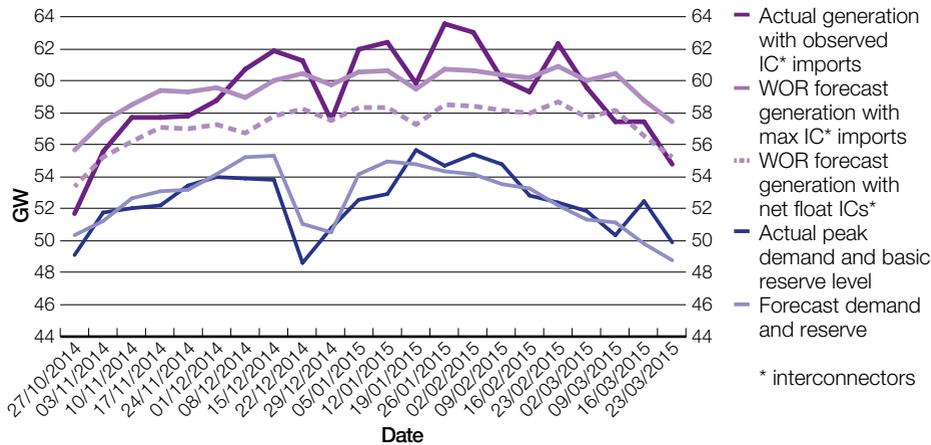
## Actual margin levels

The level of margin was adequate across the winter with the demand level we encountered and with mainly full imports from the continent. No system warnings were issued throughout the whole winter.

This shows that there were no occasions where we anticipated inadequate supply for the demand level.

Figure 1 below shows our forecast of assumed generation with maximum interconnector imports and the actual generation availability with actual interconnector imports<sup>1</sup>.

**Figure 1**  
Winter 2014/15 actual generator availability



If we had seen demand at an ACS<sup>2</sup> level of 54.4 GW on the day of the peak demand, with interconnectors at net float the margin would have been 2.8 GW (4.7%) against a forecast of 2.3 GW (4.1%).

The margin observed at the time of the demand peak for the winter was 5.1 GW (9.4%).

We observed a minimum margin of 3.5 GW (7%) on Wednesday the 29 October 2014. This included the flow observed on the interconnectors. This was only three days after the clock change and was caused by the late return of units from planned outage and the expected increase in demand. This increase is due to an increase in use of electricity in the evening, mainly due to an increase in use of lighting.

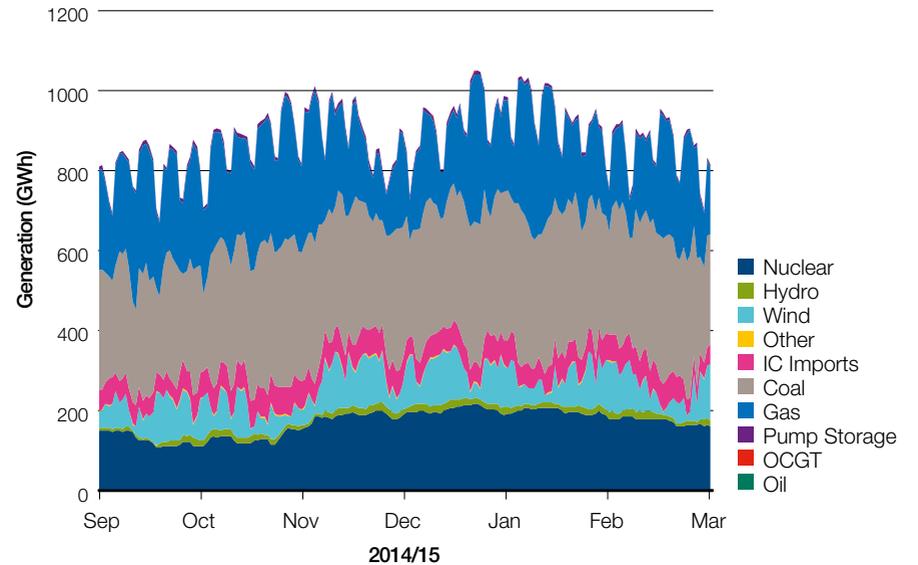
<sup>1</sup> All figures quoted in this section are market provided availability so are excluding any additional reserve through new balancing services.

<sup>2</sup> Average Cold Spell – see page 19 for definition.

## Generator performance

Figure 2 shows the generation output mix by fuel type for winter 2014/15.

**Figure 2**  
Winter 2014/15 generation output mix by fuel type



Coal-fired generation output was slightly higher than gas for providing the greatest proportion of the total, with gas being the marginal fuel type. Coal generation continued to be cheaper than gas due to the relative price difference between the two fuels.

Oil-fired generation did not run as a market participant. It ran at a very low level for a short period as part of the testing of the supplemental balancing reserve (see new balancing services section below). This is a volume too small to be noticed in Figure 2.

Wind output varies naturally and there was a marked increase in wind generation compared to last winter which was both due to an increase in installed capacity and higher wind levels.

At the Winter Outlook Report forecasting timeframe wind is not easily predicted. We used 23% equivalent firm capacity (EFC) as a reference point for making our margin forecasts in the Winter Outlook Report.

**Key term**

**Equivalent firm capacity (EFC):** provides an assessment of the entire wind fleet's contribution to capacity adequacy. It is defined as the amount in MW of 100% available conventional plant that could theoretically replace the entire wind fleet and leave the capacity adequacy risk index (loss of load expectation – LOLE, see page 50 for definition) unchanged.

Averaged out over the whole winter at daily demand peaks, the output of wind was 48%. Wind has natural variation and this figure is an average; it was both higher and lower than this on different days. Table 1 shows the differences between our forecast breakdown and shortfall rates by fuel type used for margin forecasting in the Winter Outlook Report.

**Table 1**

Winter 2014/15 forecast and actual breakdown rates of conventional plant

Power station type	Forecast breakdown rates at demand peaks	Actual breakdown rates at demand peaks
Nuclear	10%	14%
Hydro generation	12%	10%
Coal (inc. biomass)	10%	11%
Oil	21%	N/A
Pumped storage	2%	2%
CCGT	3%	3%
CCGT	13%	8%

The notable differences between forecast and actuals were on nuclear and CCGT plant. The nuclear breakdown rate was higher than expected due to the delayed return of plant after the safety cases of Heysham and Hartlepool units and then their reduced capacity once returned.

The breakdown rate of CCGT plant out turned slightly lower than we forecast.

The actuals show what was observed during the peak demand periods of the winter<sup>3</sup>. The forecast factors below are built from the average of the last three years actuals. They were used to apply to the data that we received from generators, called OC2 data, which already included planned outages.

Oil does not have an actual observed value as this did not run between November and February except for the low level of SBR testing.

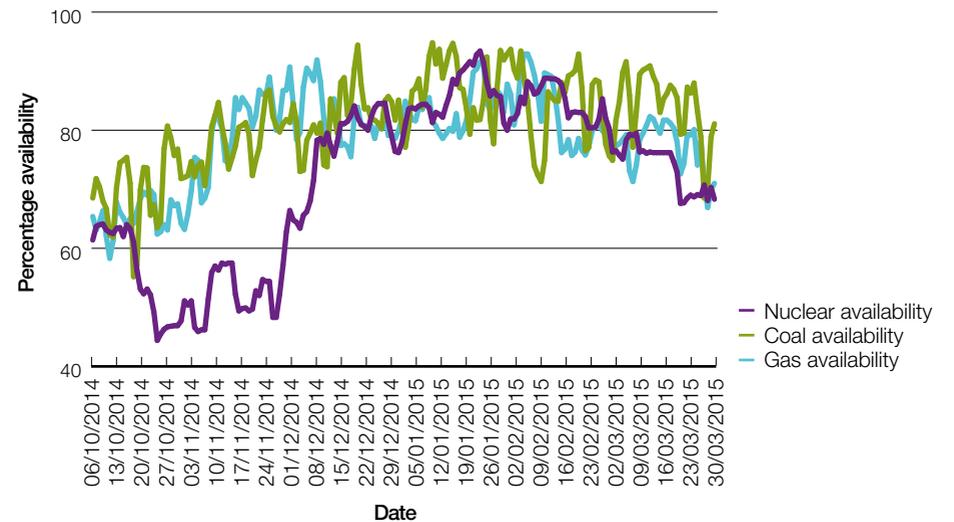
The increase in the output from wind and lower breakdowns than forecast on CCGTs was offset by the losses in the nuclear fleet.

<sup>3</sup> Peak demand periods of winter are the top 20% of demand half hours, between November and February between 10am and 8pm Monday to Thursday.

# Generation availability

Figure 3 shows the availability of conventional fuel types across the whole winter period. These are nuclear, coal and gas generation. This availability data is inclusive of breakdowns, shortfalls and planned outages.

**Figure 3**  
Winter 2014/15 generation availability by main fuel types



The beginning of the winter saw lower availability on the whole due to the late return of plant from planned outages. Nuclear was particularly low due to the precautionary inspection outages on

Heysham and Hartlepool units and when they did return they were at reduced capacity. A number of breakdowns on gas units led to gas availability being reduced in December and February.

**Was there a difference to Winter Outlook?**

What actually happened	What we said in the Winter Outlook Report	Why there was a difference
Margins were tight on some days, but overall better than expected. Minimum ACS margin actual of 2.8 GW (4.7%). Minimum observed margin of 3.5 GW (7%) on Wednesday 29 October 2014.	Margins may be tight this winter. Minimum ACS margin forecast of 2.3 GW (4.1%). Minimum forecast margin of 3.8 GW (7%) in the Winter Outlook Report (with normalised weather).	Mild weather and full import from continent on most peak days. Nuclear availability was down, gas availability and wind levels were higher than expected.

# Demand levels

Electricity demands were broadly in line with our forecasts and demand level remained flat in comparison with previous years. At times of peak demand milder than average weather was experienced. This means that we have not seen levels of demand that would be associated with the normal colder weather of winter, represented by our ACS demand scenario in the Winter Outlook Report.



## Key terms

**Weather corrected demand:** demand calculated with the impact of the weather taken out. This is sometimes known as “underlying demand”. Weather is one of the main drivers of the difference in demand from one day to the next. We take out the impact of the weather to understand other important underlying trends.

**Average cold spell (ACS) demand:** the expected level of peak demand for the winter based on 30 years of historical weather data. This has a 50% chance of being higher. So it is the median (50th percentile) of 5,000 possible demands modelled using historical data.

**1 in 20 demand:** using the same method as above with ACS demand. We calculate conditions that result in a 5% chance that the demand will reach this level on average over the winter.

**Transmission system demand (TSD):** demand that we as System Operator see at grid supply points (GSPs), which are the connections to the distribution networks. It includes demand from the power stations generating electricity, demand from pumped storage pumping and interconnector exports (to France, the Netherlands and Ireland).

**National demand:** same as transmission system demand above, excluding station demand, pumping demand and interconnector exports.

The national demand peak was 51.9 GW on 9 December 2014, on a weather-corrected basis. This is comparable to a weather-corrected transmission system demand of 53.2 GW.

Demand-side response (DSR) and customer demand management (CDM) were at a similar level last winter. On average approximately 1,200 MW was experienced on high demand days. This is known as “triad avoidance”, where demand-side response providers are financially incentivised to reduce their demand on the highest days of demand, or “triads.”

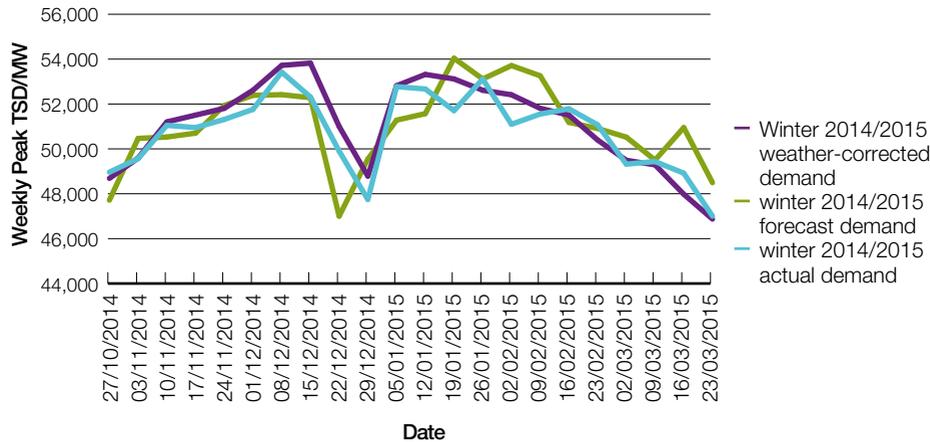
Station demand is the power that generation plants use to operate their facilities and start up their plant. This demand is accounted for in transmission system demand. It is estimated to have been approximately 600 MW for the last winter period.

The base case of interconnector exports at peak demand is 750 MW. This was made up of 0 MW to France and the Netherlands, and 750 MW to Ireland over the Moyle interconnector. This is in line with the Winter Outlook Report published in October 2014.

The underlying demand level over the winter period remained flat when comparing it to the previous year, as shown below.

	2013/14	2014/15
Weather-corrected peak demands	51.8 GW	51.9 GW

**Figure 4**  
Forecast and actual weather corrected demands and actual demand outturn for winter 2014/15



**Was there a difference to Winter Outlook?**

What actually happened	What we said in the Winter Outlook Report	Why there was a difference
Actual weather-corrected transmission system demand peak of 53.2 GW.	Weather-normalised peak forecast of 53.6 GW. ACS peak forecast of 55.0 GW. 1 in 20 demand peak forecast of 56.3 GW.	In line with forecast. Milder than average weather at peak demand times. We have therefore not seen the higher levels of demand that would be associated with the normal colder weather of winter, represented by our ACS demand scenario in the Winter Outlook Report.



# New balancing services

Ahead of winter 2014 we identified a requirement for additional reserve in the market and procured 1.1 GW of new balancing services (NBS). We didn't need to use them over the winter due to lower than average demand at peak, high interconnector flows, high levels of wind output and availability of generation.

If we had not been faced with such favourable conditions in 2014, NBS may have been needed to ensure electricity supply met demand. Any change in factors such as lower interconnector and wind generation contribution and higher demand or generator breakdown rates could have led us to utilise these short-term balancing services.

**Key terms**

**Demand-Side Balancing Reserve (DSBR):** targeted at large energy users who volunteer to reduce their demand during winter weekday evenings between 16:00 and 20:00 in return for a payment.

**Supplemental Balancing Reserve (SBR):** targeted at keeping power stations in reserve that would otherwise be closed or mothballed.

These services will act as a safety net to protect consumers, only to be deployed in the unlikely event of there being insufficient capacity available in the market to meet demand.

In addition to the traditional methods<sup>4</sup> used to manage security of electricity supplies, we developed a set of new balancing services (NBS) to help us to manage the uncertainty and tightening margins over last winter.

The services measures are Demand-Side Balancing Reserve (DSBR) and Supplemental Balancing Reserve (SBR), which provide National Grid, as System Operator, the option of accessing additional reserve if it is needed. These measures sit outside the market and are only to be called on if necessary.

The additional reserve was not factored into the margin calculations in our Winter Outlook Report. This means that the picture for weeks that appear tight is less so than the analysis suggested.

### Procurement

Initially in June 2014 an NBS volume requirement of 330 MW (de-rated) was identified for winter 2014/15. This was calculated in accordance with the approved Volume Requirement Methodology<sup>5</sup>, based on the backgrounds used for the Future Energy Scenarios (FES) published in July 2014. Analysis showed that procuring 330 MW would reduce LOLE below the 3-hour reliability standard, set by the government, for all the credible sensitivities assessed.

The approved SBR and DSBR procurement methodologies allowed for the DSBR service to be piloted, without the need to procure SBR if the requirement was marginal (e.g. < 500 MW).

National Grid ran a tender through June and July 2014 for the provision of Demand-Side Balancing Reserve (DSBR) as part of a pilot for the winter of 2014/15.

Tenders were received from 13 companies representing 25 DSBR units with a total capacity of 336 MW.

Contracts were offered to 319 MW of DSBR. The de-rated equivalent volume of additional capacity procured was assessed to be 136 MW.

Subsequently a number of events introduced additional uncertainty into the outlook for winter 2014/15:

- nuclear plant at Heysham and Hartlepool was taken offline as a precautionary measure while a boiler fault was investigated at Heysham
- Barking Power announced closure of their CCGT plant in London
- E-On announced that they would not be returning a unit at Ironbridge which was damaged by fire
- plant at Didcot and Ferrybridge both experienced damage from major fires.

Given these events, the level of available plant for winter 2014/15 was forecast to reduce by over 1 GW. A precautionary SBR tender was run in September 2014.

When the SBR tender closed, the volume requirement for winter 2014/15 was reassessed against the uncertain background. The requirement increased to 1,050 MW, which represented the cost optimal volume. This would reduce the loss of load expectation (LOLE) below the 3-hour reliability standard for all but one of our sensitivities.

Tenders were received from 8 companies representing 26 units across 13 sites, with a total capacity of 5.4 GW, of which 2.3 GW was not presently available in the market.

Four units were contracted. These four units provided 959 MW of 'additional' de-rated capability, which was added to the 136 MW of de-rated DSBR procurement under the pilot, to meet the 1,050 MW requirements.

The level provided by this 1,050 MW of additional reserve provided support for security of supply, increasing the de-rated capacity margin from 4.1% to 6.1% and reducing the forecast LOLE from 1.6 hours to 0.6 hours for the base case scenario.

### Utilisation

Due to mild windy weather, high continental imports and greater than expected levels of plant availability, the new balancing services were not called upon to secure demand during winter 2014/15. Nonetheless, these services were available to support security had these factors gone the other way, providing an important insurance policy on behalf of consumers. Both services were tested to ensure the service would be available if needed.

### Costs

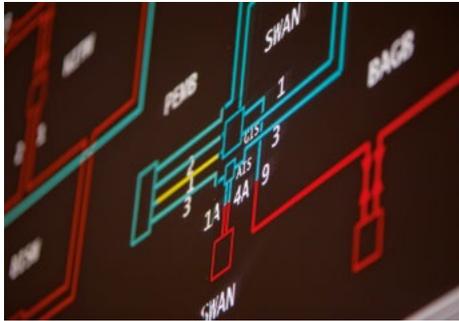
The total costs incurred in the procurement and testing of the new balancing services was £31.2m. These have been recovered via 2014/15 balancing charges.

**Table 2**  
Cost breakdown of SBR and DSBR

	Capability Payments	Testing Costs	Total	
SBR	£23.5m	£6.0m	£29.5m	
	Set-up Fees	Admin Fees	Testing Costs	Total
DSBR <sup>6</sup>	£0.8m	£0.1m	£0.8m	£1.7m
<b>Overall Cost</b>			<b>£31.2m</b>	

<sup>4</sup> These include the emergency assistance service from interconnectors, the maximum generation service and voltage reduction.  
<sup>5</sup> <http://www2.nationalgrid.com/WorkArea/DownloadAsset.aspx?id=36489>

<sup>6</sup> DSBR costs reflect the current expectation of cost recovery and may be subject to further adjustment pending any disputes and successful cost recovery.



# Interconnected markets

Over the GB peak interconnector flows have been more consistent than for the previous two winters, importing at approximately 3,000 MW. However more volatility was seen between 07:00 and 09:00 due to a narrowing of the spread between GB and European prices. This was driven by conventional generator availability, renewable generation output and short-term weather changes.

## Key terms

**Import:** interconnectors flowing electricity into GB.

**Export:** interconnectors flowing electricity out of GB.

**Net import/export:** sum of total generation flowing via interconnectors either into or out of GB.

## European markets review

- This winter generally saw mild weather conditions across Europe, resulting in sufficient margins and manageable conditions
- German and French prices hit record lows at certain points over the winter due to mild temperatures and low cost of coal. Germany also saw all-time high wind generation levels in a few instances, contributing further to low prices and increasing exports from the country
- The availability of French nuclear plant (which makes up 75% of the country's total generation capacity) was generally high this winter, reducing the need for additional imports into the country. However, there were strikes in the power industry during November and January, reducing the generation output of France by approximately 5,000 MW each time
- The Belgian power market saw tighter margins this year due to unavailability of some nuclear plant. This meant that imports from France and other neighbouring countries were relied on heavily
- French and Belgian supply is expected to be relatively tight until 2020 due to closure of old fossil fuel plant and some nuclear reactors. As conditions vary and put more stress on the market in coming years, this could lead to more volatile prices and therefore interconnector flows between GB and the continent. This is particularly the case over the peak demand of the day.

## Interconnector performance

Interconnexion France-Angleterre (IFA) is a 2,000 MW capacity high voltage direct current (HVDC) electrical interconnector between the British and French transmission systems. Last winter there were a few instances where this capacity was restricted due to essential maintenance work. However, the link was at full capacity for the majority of the winter.

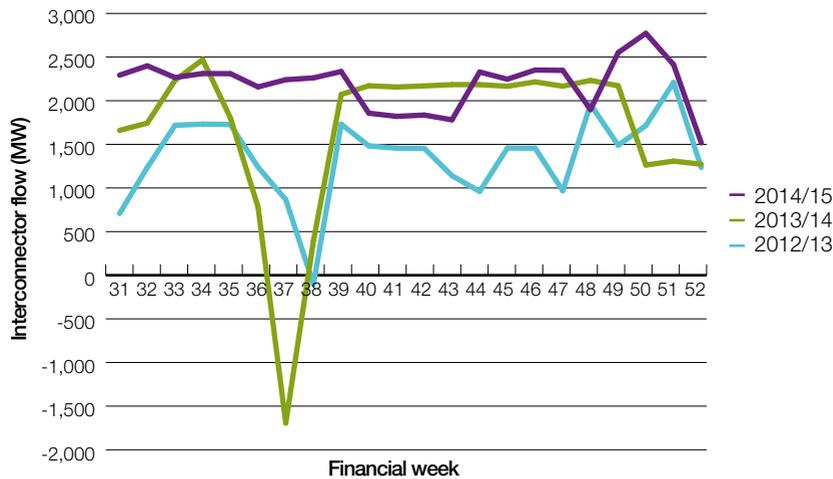
BritNed is a 1,000 MW capacity interconnector to the Netherlands. There were no technical restrictions to its capacity this winter.

The East West Interconnector (EWIC) connects GB with the Republic of Ireland and has a maximum capability of +500/-530 MW. It operated at this capability for the vast majority of winter, apart from a two-day period during March where the link was unavailable.

The Moyle interconnector connects GB with Northern Ireland. It has a reduced capability of +/-250 MW from +/-500 MW due to a fault with one of the cables, which is anticipated to be repaired by 2017.

Figure 5 below shows the combined interconnector flow for the last three winters at the GB weekly demand peak.

**Figure 5**  
Combined interconnector flow at weekly GB peak demand



During last winter the total interconnector flow was more consistent over the weekly peaks than the previous two years, remaining around 2,000 MW import. It was not exporting at any point. This could be attributed to the fact that day-ahead peak prices in GB were generally higher than the prices on the continent.

The previous two winters saw exceptionally high French energy prices due to low levels of plant availability in France. This pattern has not been seen this year due to increased availability of plant, additional renewable generation combined with milder winter weather.

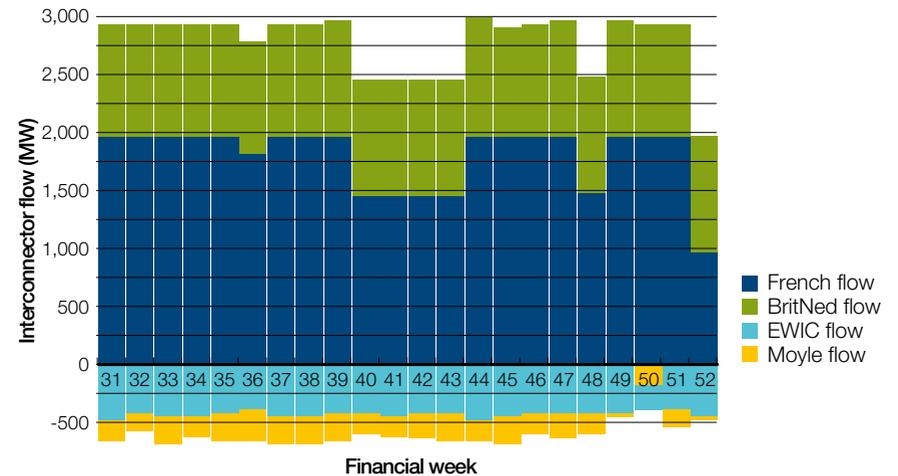
The dip from weeks 40 to 43 can be attributed to the technical limitations on IFA for that period.

Price differentials between the GB and continental markets are the main driver for flow levels across interconnectors.

Over the course of the winter there were weekday periods when the difference in price between GB and the continent narrowed, leading to more volatile interconnector flows and net flows reducing from maximum import. At some points during December, January and February net flows were exporting, particularly over the morning demand increase (between 06:00–08:00). However, interconnector flows over the peak demand of the day remained consistently importing throughout the entire winter period. At weekends, GB power prices were consistently higher than the French and NL markets, meaning full import into GB.

Figure 6 below shows the breakdown by interconnector of the flows at the weekly demand peaks during Winter 2014/2015.

**Figure 6**  
Interconnector flows at weekly GB peak demand



Overall, net imports from the continent and net exports to Ireland were experienced. The dips in French flow are mainly attributable to outages on either a pole or bi-pole (the interconnector is built of four 500 MW capacity poles, grouped into two 1,000 MW bi-poles).

This is in contrast to BritNed, which was consistently at maximum import over the weekly peaks. EWIC and Moyle exported consistently to Ireland at maximum flow over the peaks, except for week 52 which represents an outage on the EWIC interconnector. Overall flows were strongly importing over the peaks.

**Was there a difference to Winter Outlook?**

What actually happened	What we said in the Winter Outlook Report	Why there was a difference
Net export to Ireland. Net import from the continent. Consistent import at peak, mostly at 3,000 MW.	Net export to Ireland. Net import from France and Netherlands.	An increase in wind in Ireland has meant that surplus energy in Ireland led to some fluctuations in the flows.

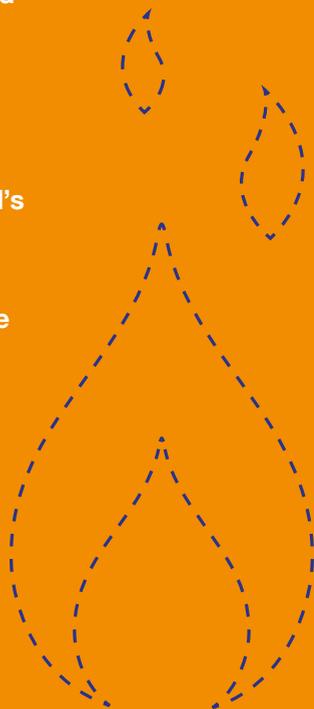
# Gas Winter Review

This chapter looks back at the gas supply and demand over the winter of 2014/15. The section is split into three areas covering gas supply, demand and operational challenges. Gas supply provides detail on supply by location, and the impact of the Russia and Ukraine dispute.

The information is presented in a new format to improve the reader experience. We have reordered the chapters into the following order:

- Gas supplies
- Demand levels
- Operational overview.

Outturn data is presented alongside National Grid's published forecast ranges with commentary to inform our stakeholders on events that had an impact. A summary table is included at the end of each chapter. The table provides an at-a-glance view of what was forecast in our 2014 Winter Outlook Report and how this compares to what actually happened over the winter.



# Gas supplies

In the Winter Outlook Report we forecast that there would be sufficient gas available to meet demand and this was borne out by experience through the winter.

Supplies from the UK continental shelf (UKCS) and Norway turned out close to our forecast values in the Winter Outlook Report. LNG flows were slightly higher than we forecast, as global gas prices meant that more LNG was available to Northwest Europe. Continental flows were slightly lower than expected, due in part to the higher than anticipated LNG flows but also possibly due to supply issues on the continent. The continuing tension between Russia and Ukraine did not lead to any disruption to supplies to the UK.

## Key terms

**Million or billion cubic meters of gas (mcm or bcm):** volumetric quantity used in describing the amount of energy demand over a period of time. As a simplification we typically use the conversion factor of 11,000 to convert from BCM to GWh of natural gas energy.

**Composite weather variable (CWV):** temperature explains most of the variation in gas demand, but a better fit can be obtained by including other variables. The combination of temperature and other weather variables is called the composite weather variable.

**Liquefied Natural Gas (LNG):** formed by chilling gas to  $-161^{\circ}\text{C}$  so that it occupies 600 times less space than in its gaseous form. This makes it an ideal way of storing and transporting large volumes of gas from countries such as Algeria, Trinidad and Qatar. Some countries in East Asia are dependent on LNG imports for the majority of their gas.

**Long-range storage:** there is one long-range storage site on the national transmission system: Rough, situated off the Yorkshire coast. Rough is owned by Centrica and mainly puts gas into storage (called 'injection') in the summer and takes gas out of storage in the winter.

**Medium-range storage:** these commercially operated sites have shorter injection/withdrawal times so can react more quickly to demand, injecting when demand or prices are lower and withdrawing when higher.

## Gas supply by source

In the Winter Outlook Report we said that we were expecting a similar pattern of supply to that observed in winter 2013/14 and that there was a wide range of supply options to meet demand through the

winter. Table 3 shows that supplies from the UK continental shelf (UKCS) and from Norway in winter 2014/15 were similar to the previous two winters. Continental supplies were slightly lower than previous winters, while LNG supplies were slightly higher. Changes in continental and LNG supplies were small in absolute terms but both represented a large change as a proportion of the total supply type. Overall demand was 2 bcm higher than last winter.

**Table 3**  
Historical gas supply by source

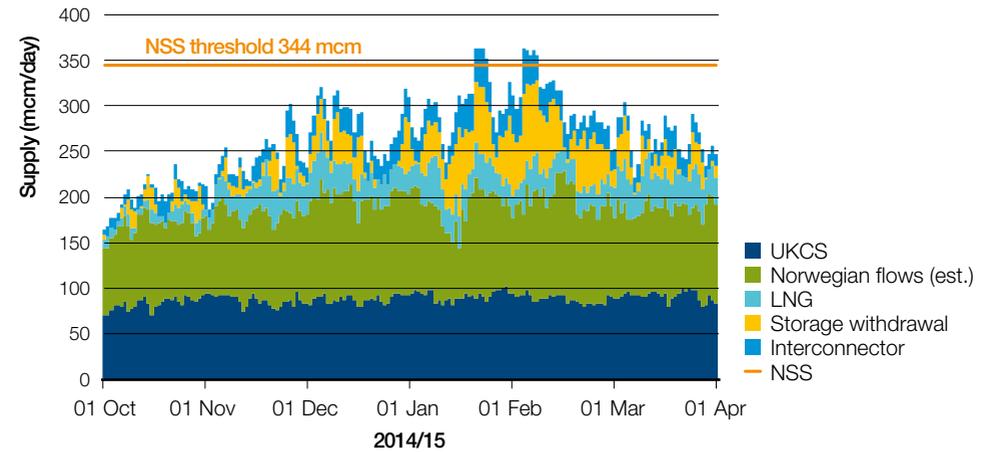
	2012/13		2013/14		2014/15	
	bcm	%	bcm	%	bcm	%
UKCS	16	30%	17	37%	16	33%
Norway	18	34%	17	37%	18	38%
Continent	9	17%	6	13%	4	8%
LNG	4	8%	3	7%	5	10%
Storage	6	11%	3	7%	5	10%
<b>Total</b>	<b>53</b>		<b>46</b>		<b>48</b>	

Note: the values shown for storage are for gross withdrawal, not the net of withdrawal and injection.

Daily supplies for the winter are shown in Figure 7. The chart also shows the non-storage supply (NSS) threshold, at 344 mcm/day. This represents an upper

expectation of supply associated with cold weather and high demand and is discussed in more detail in the section 'Supply in cold weather' below.

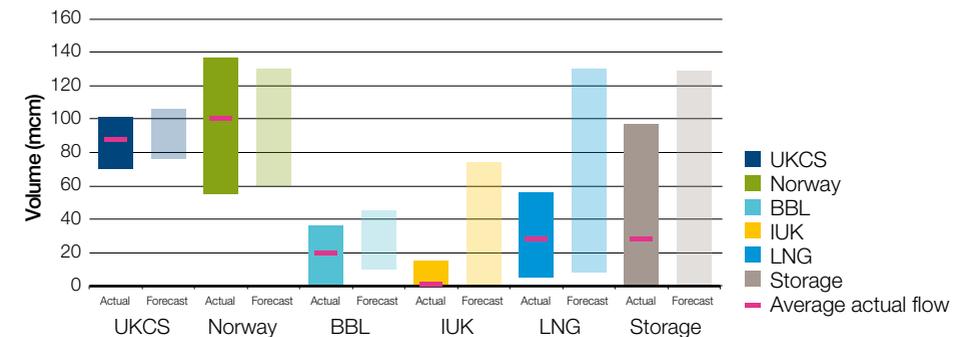
**Figure 7**  
Daily gas supply



Supplies for the winter are compared to our forecasts in Figure 8. The darker coloured bars show the range of actual

flows, with the average level shown by the magenta bar. The paler coloured bars show our forecast range.

**Figure 8**  
Actual and forecast supplies by source



For the UKCS and Norway the forecast ranges were based on analysis carried out for our Future Energy Scenarios in summer 2014 and any subsequent intelligence that we received.

For continental imports through BBL and IUK and for LNG imports the forecast ranges were based on the experience of recent winters; in all three cases the forecast maximum flow was the maximum

capacity of the facility. The wide range in the forecasts reflects the uncertainty in the sources of gas in the import market. Supplies from storage in any winter can be expected to show the greatest range of flexibility and range from no flow at times of lower demand to maximum flow from all facilities in times of high gas demand or price. Our forecast in the Winter Outlook Report is reflected in this range.

## Supply by location

In the Winter Outlook Report we showed a forecast of peak flows expected at each terminal. Table 4 shows our forecast together with the observed maximum flows at each location.

The forecast maximum flow represents the maximum that we might have expected to see under any conditions, though not necessarily at the same time. This includes, for example, IUK flows at the maximum capacity of the pipe. Although this is an extreme case, the upper limits for each component at each location are values that have been seen in the last few years.

**Table 4**  
Forecast and actual flows by location

(mcm/d)	2014 forecast max flows	Actual max flows
Bacton	151	75
Barrow	9	7
Grain	59	22
Easington	78	82
Milford H.	86	56
Burton P.	2	3
St Fergus	97	87
Teesside	17	17
Theddlethorpe	9	12

## Supply in cold weather

In the Winter Outlook Report we published a forecast for each component of the NSS at high demand levels. This is used in assessing whether a Margins Notice<sup>7</sup> should be issued to the industry, indicating that there is a potential imbalance between supply and demand in the coming gas day.

Table 5 shows our forecast range for each NSS supply type, together with the cold

day forecast and the actual range seen in winter 2014/15. A 'cold day' was historically defined as a day with total demand over 400 mcm/day. As demand has not reached this level for the last three winters we now make the forecast for a day where the composite weather variable is at zero degrees (see 'Review of weather' section below). In Winter 2014/15 the weather did not get as cold as zero degrees CWV, so our cold day forecast was for a colder day than was seen. We have shown the range of demand for the nine days when demand exceeded 350 mcm/day in Table 5. The highest demand in winter 2014/15 was 366.2 mcm on 2 February.

**Table 5**  
Historical gas supply by source

(mcm/d)	2014 forecast	Cold day	2014/15 actual	350+ range
	range		range	
UKCS	76–109	99	70–100	85–97
Norway	60–130	110	55–136	88–132
BBL	3–45	40	1–36	3–13
IUK	0–74	45	0–15	0
LNG Imports	8–130	50	5–56	25–40

Total NSS		344	
Storage	0–129		0–97 66–95

<sup>7</sup> Margins Notice and Gas Deficit Warning – <http://www2.nationalgrid.com/uk/industry-information/gas-transmission-system-operations/balancing/gas-deficit-warnings-and-margins-notices/>

# Supply components in detail

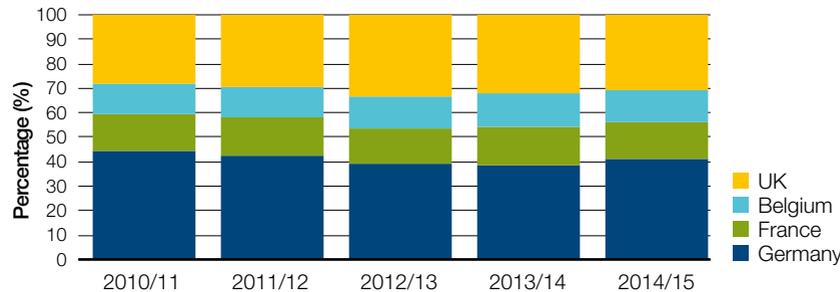
## UKCS

UKCS flows were very close to our forecast levels, both for the winter as a whole (Figure 8) and at high demand (Table 5).

## Norway

Norwegian flows were also close to forecast levels, though the range of flows seen was slightly greater than we forecast. The maximum flow was greater than we expected and the minimum flow lower than we expected. Flows from Norway depend not only on Norwegian production, but also on the distribution of Norwegian gas between continental Europe and the UK. In the Winter Outlook Report our forecast range for Norwegian supplies includes the two extreme cases; high flows to Europe and lower flows to the UK, and lower flows to Europe and higher flows to the UK. Figure 9 shows that the UK received slightly less gas than previously as a percentage of total Norwegian production, though the difference is small.

**Figure 9**  
Destination of Norwegian gas



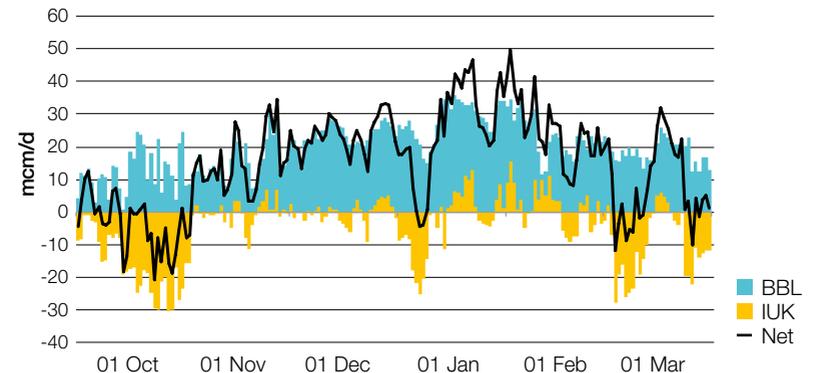
bcm	UK	Belgium	France	Germany
UK	15.8	16.9	19.1	17.6
Belgium	7.1	7.1	7.4	7.4
France	8.4	9.3	8.2	8.4
Germany	25.2	24.5	22.5	21.1
	18.2	7.6	9.0	24.3

# Interconnector UK and BBL

Interconnector UK (IUK) is a bi-directional interconnector between the UK and Belgium, and BBL is a single direction pipeline flowing from the Netherlands to the UK. As it can be useful to consider the net position of the two pipelines together, we have shown this in Figure 10. IUK has been shown to respond well to the price differential between GB and Belgian markets at the NBP and Zeebrugge. From November onwards gas flowed in both directions, though never approached the maximum flow rates of 74 mcm/day import or 58 mcm/day export. Flows through BBL are more influenced by long-term contracts than spot prices.

Net flows through the two pipes reached a maximum in early February, corresponding to a period of high GB demand. On 10 February the Dutch government introduced further restrictions to production from the Groningen field. Groningen makes up over half of Dutch production. Although the gas from the field is unsuitable for export through BBL we could expect that any restriction would have an effect on the balance of flows in the Dutch market and consequently on exports. In the 30 days following the new restriction the flows through BBL were on average 10 mcm/day lower than the previous 30 days. However at the same time the gas demand in GB fell by around 10 mcm/day, and this was accompanied by a 20 mcm/day reduction in net imports of continental gas. The reduced demand makes it difficult to be certain how much of the fall was due to the Groningen restrictions.

**Figure 10**  
IUK and BBL flows

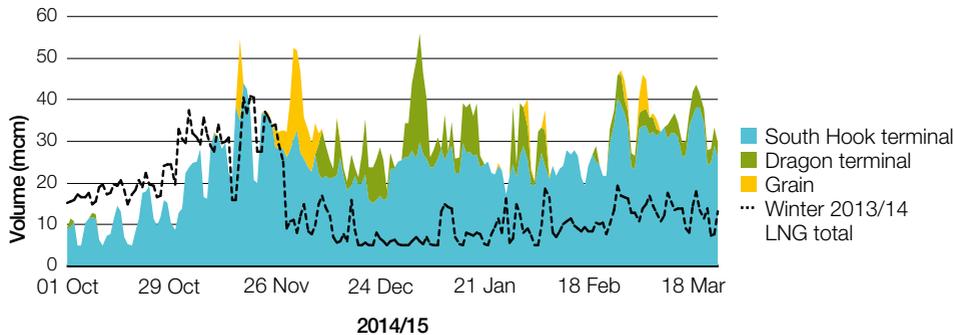


## LNG

LNG flows are strongly influenced by the gas price in different markets. When we published the Winter Outlook Report we expected that prices in the East Asian market, principally Japan and South Korea, would be higher than the GB

price. In that case East Asia would be the preferred market for most traded and spot LNG. However during the winter the relative prices of the two markets changed and more LNG became available to the European market. Figure 11 shows how daily flows increased towards the end of November and then remained significantly higher than last year's flows for the rest of the winter.

**Figure 11**  
LNG flows by terminal



## Storage

Storage levels were high at the start of the winter and injection continued through the first few weeks, leading to a record aggregate stock level by 4 November. Over the last few years storage has been the major source of flexibility or swing in gas supplies; this is one reason why it is hard to predict storage flows ahead of the winter. Daily flows can be seen in Figure 7, and aggregate stock position in Figure 12.

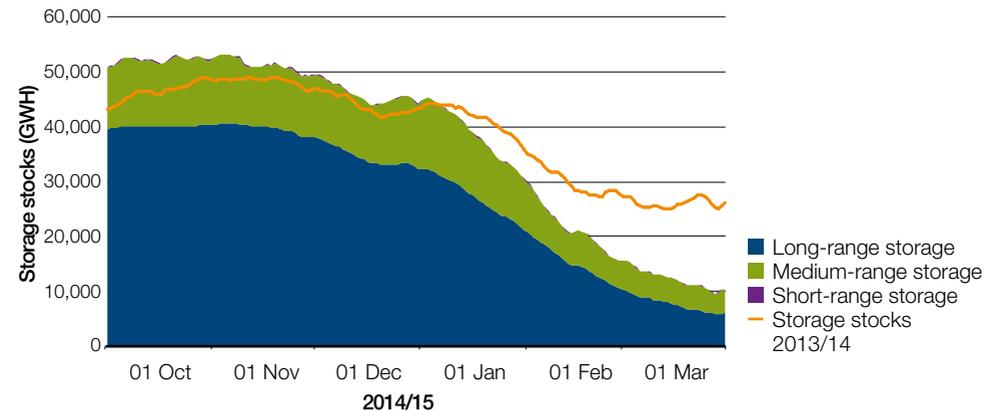
There was some injection into mid-range storage through the winter to replace withdrawals, particularly in October and November, and then again when demand was low during the Christmas holiday with less activity between January and March. Withdrawals from the long-range storage facility at Rough continued until just before the end of March, leaving the aggregate storage level at the end of the winter much lower than last year.

## Rough and Hornsea storage facilities

In March Centrica Storage announced a reduction to the capacity of the Rough facility for up to six months as a precautionary measure while some investigative work was undertaken.

Withdrawal and injection rates were unaffected so there was no significant effect on operations. At the end of March SSE announced that one third of the withdrawal capacity of the medium range Hornsea facility would be mothballed from 1 May, reducing the rate from 18 mcm/day to 12 mcm/day. There was also a reduction of around 10% in total capacity. The effect of these restrictions will be considered in the 2015/16 Winter Outlook Report later this year.

**Figure 12**  
Aggregate stock level



## Russia and Ukraine

In the Winter Outlook Report we considered the potential impact on gas supplies of the dispute between Russia and Ukraine. We found that there would

only be a disruption in the GB market in the extreme case of a very cold winter and a complete halt to all Russian supplies, not just the flow through Ukraine. The winter turned out to be warmer than average and there was no significant disruption to any Russian supply to the EU, so there was no disruption to supplies to the GB market.

### Was there a difference to Winter Outlook?

What actually happened	What we said in the Winter Outlook Report	Why there was a difference
UKCS and Norwegian gas similar to last year. More supply from LNG. Less supply from continental Europe.	Supply patterns to be similar to 2013/14 and range of supply options to meet peak demand.	Asian and European prices converged. Continental supplies reduced, possibly in response to restrictions on the Groningen field in the Netherlands.
There was no interruption to supplies of Russian gas to Europe.	No disruption from Russia except with full Russian interruption in cold weather.	No supply issues, in line with analysis.

# Gas demand

The total gas consumed from October 2014 to March 2015 was identical to the projections in our Winter Outlook, at 47.5 bcm.

However between sectors there were significant variances that offset each other. The residential market was lower than forecast by 2%. National Transmission System (NTS) industrial demands were also down against forecast. Power generation was higher, offsetting the reductions in other sectors.

### Key term

**Non-daily metered and daily metered (NDM and DM):** the classification of customers, NDM stands for non-daily metered customers that are typically residential, commercial or smaller industrial consumers. DM stands for daily metered customers and are larger users.



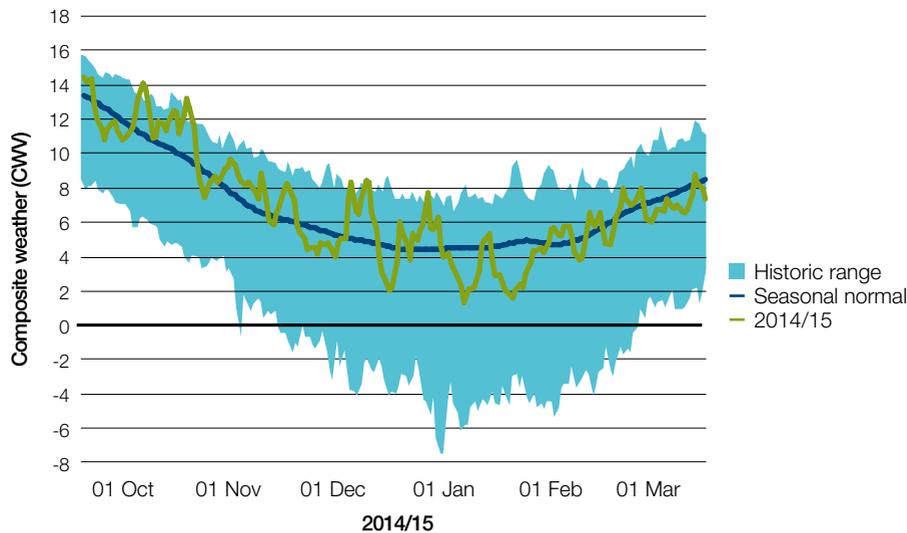
## Review of weather

The 6 months from October 2014 to March 2015 were warmer than seasonal normal conditions leading to lower gas demand for heating. This period was the 11th warmest when compared to the last 87 winters. The coldest day was on 20 January 2015 and was the 10th warmest “coldest day” when compared to the last 87 years.

For the 3-month mid-winter period from December to February, the severity was 1 in 3 warm. This means we would expect 1 in every 3 winters to be as warm or warmer, and 2 in every 3 winters to be colder.

Figure 13 compares the winter 2014/15 weather in terms of composite weather variable (CWV) with the daily maximums and minimums since October 1928. The seasonal normal line has been adjusted for climate change and is not the average of the historical values.

**Figure 13**  
Winter composite weather 2014/15

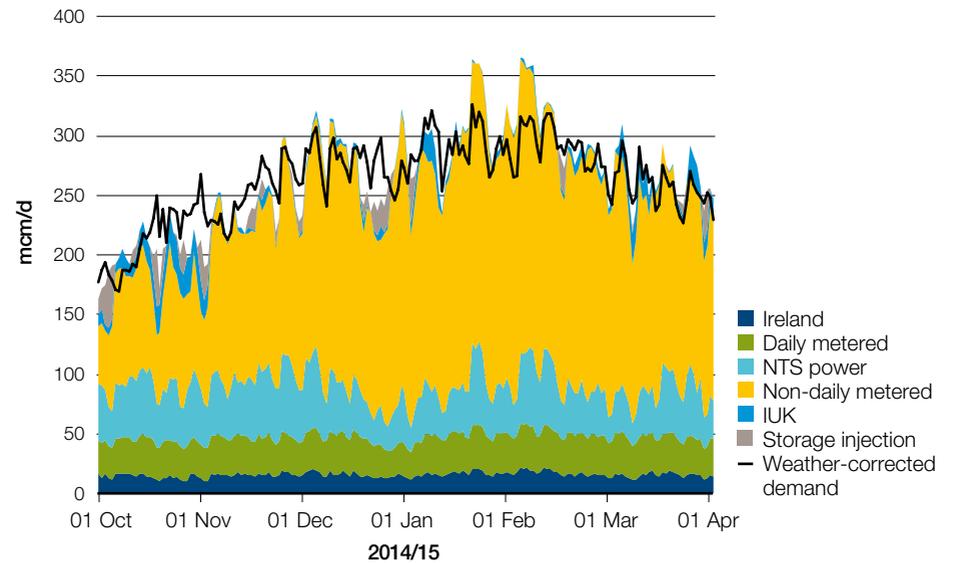


## Review of demand

The highest demand day in winter 2014/15 was 2 February 2015 with a demand of

366 mcm. Whilst this is 3% higher than the highest demands experienced in winter 2013/14, it remains towards the lower levels seen in recent winters. This is due to a combination of a relatively warm “coldest day” and decreasing industrial and non-daily metered (NDM) demand.

**Figure 14**  
Winter gas demand 2014/15



NDM demand was 1–2% lower than forecast, even after taking weather into consideration. The winter temperatures were generally between warm and seasonal normal leading to a marginal difference in weather variance overall. Demands from NDM customers were lower until December as a result of both an underlying variance to forecast and warmer conditions. The underlying variance continued into the new year when conditions reverted to largely seasonal average levels.

Demand for power generation was higher than forecast, offsetting the lower NDM demands until the Christmas period. There were occasional increases in power generation demand in January, February and the end of March.

**Figure 15**  
Gas demand 2014/15 versus forecast

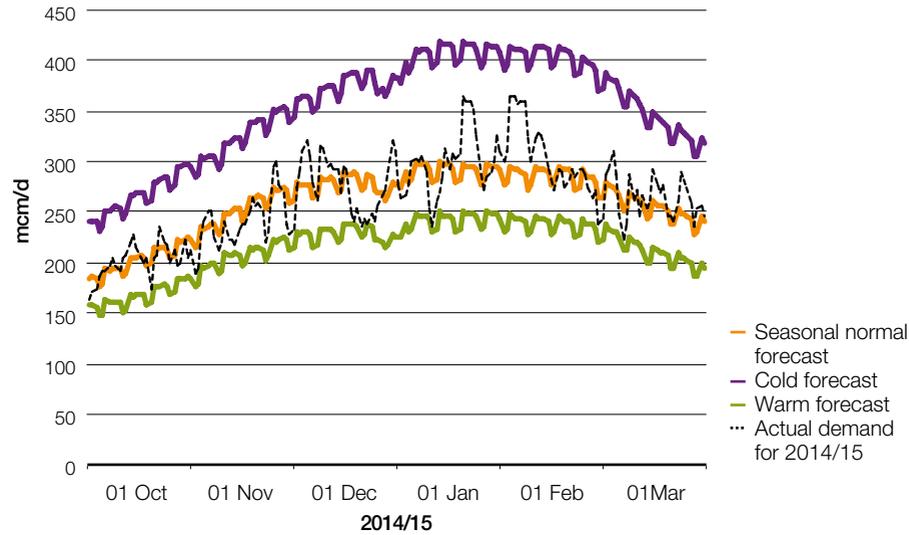


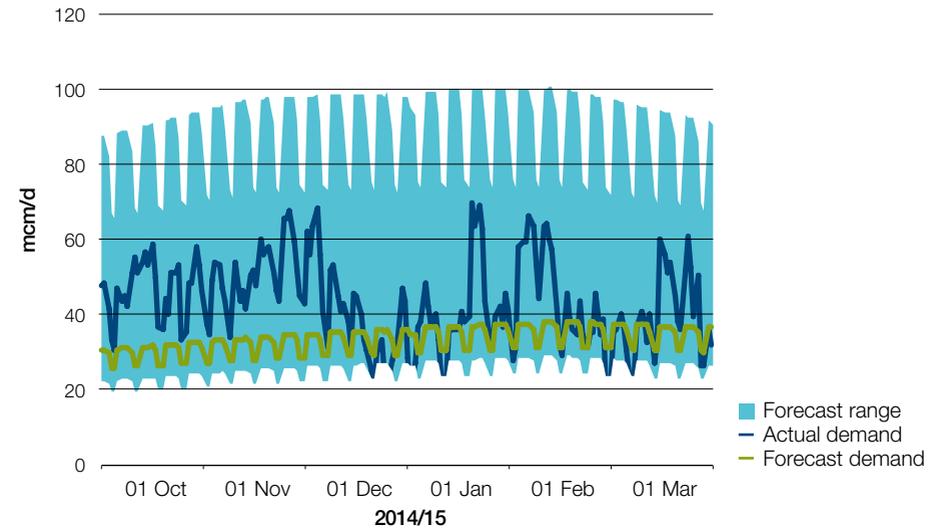
Figure 15 shows the total gas demand compared against the seasonal normal forecast and cold and warm forecast ranges. Overall the outturn demand was broadly aligned to our forecast in the 2014 Winter Outlook Report with demand remaining well within the ranges projected.



Figure 16 shows the National Transmission System (NTS) connected power generation demand for winter 2014/15 together with the pre-winter base forecast and forecast range. The range reflects generation merit orders depending on whether gas is base load or marginal generation.



**Figure 16**  
Winter NTS power generation demand 2014/15



The chart shows that NTS power generation was higher than forecast before December 2014 and over certain periods during the rest of winter. The forecast predicted gas to be at low levels as a result of favourable coal prices relative to gas. This largely remained the case over the winter period. However there were a number of unplanned power generation outages impacting on base

load nuclear and coal-fired plant. The unplanned outages contributed to higher requirements on the marginal gas fleet prior to December.

‘The review of gas supplies’ section provides further information on the demand associated with IUK exports and storage injection.

**Was there a difference to Winter Outlook?**

What actually happened	What we said in the Winter Outlook Report	Why there was a difference
Actual demand was 47.5 bcm. Maximum daily demand of 366 mcm/day.	Projected demand of 47.5 bcm over winter. Peaks not to exceed 425 mcm/day.	Total demand was aligned but deviations in non-daily metered and power generation demand that offset each other.

# Operational overview

A mild winter with lower than average demands. Strong storage stocks and increased LNG deliveries combined with reduced flows seen from European Interconnectors ensured supplies were diverse and difficult to predict.

Supply and demand profiling continues to generate increased levels of linepack swing seen on the network.

## Key term

**Linepack swing:** the difference between the amount of gas in the system at the start of the day and the lowest point during the day.



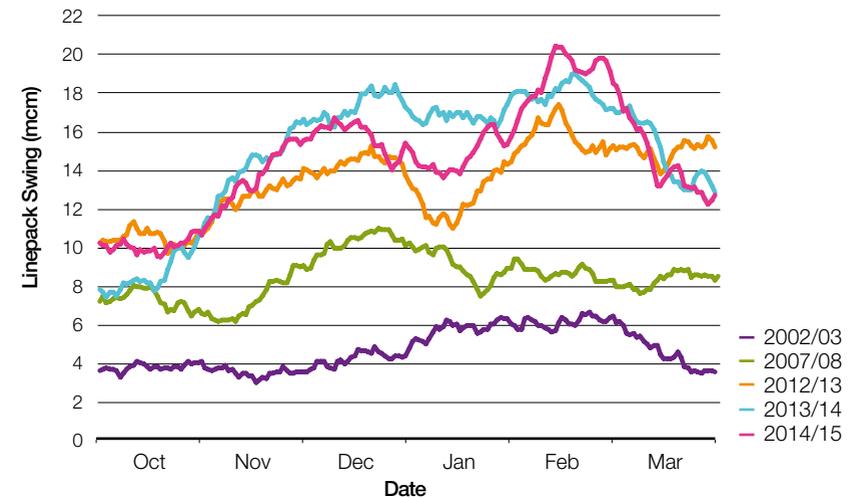
## Linepack utilisation

Average within-day linepack swing decreased from levels seen last winter, however the maximum swing increased by 8.7mcm to 38.6mcm.

An increase in the amount of linepack utilisation at the beginning of February meant that meeting customer pressure obligations proved challenging. Residual balancing actions were down by 10% this winter and the ratio of buys to sells has shifted from 50/50 to 75/25 in favour of buy actions taken.

This translates into more challenging planning and real-time operation activity compared to that experienced historically. The present suite of contractual rules were built up considering a steady state 1/24th design principle and may no longer be fit for purpose. Ongoing assessment and engagement with our customers and stakeholders under Network Flexibility is being undertaken in this area.

**Figure 17**  
Comparison of swing of NTS Linepack (mcm) – 30-day rolling average



### Was there a difference to Winter Outlook?

#### What actually happened

Uncertainty of supply sources were experienced. Increase in the maximum linepack variation.

#### What we said in the Winter Outlook Report

Day-to-day supply uncertainties, unplanned events and within-day linepack variations are key operational challenges.

#### Why there was a difference

Challenges last winter were largely as predicted. However, maximum linepack utilisation seen on a single day increased to a level in excess of volumes anticipated.

# Fuel prices

The price of gas was sufficiently high that coal was the favoured fuel for generation as predicted.

Fuel prices can influence energy demand and form an important part of our analysis. Fuel prices for power generation are largely governed by the spot markets so the choice of fuel for the most profitable operation can change from day to day. In contrast prices for end users are generally based on tariffs that respond

## Fuel prices for power generation

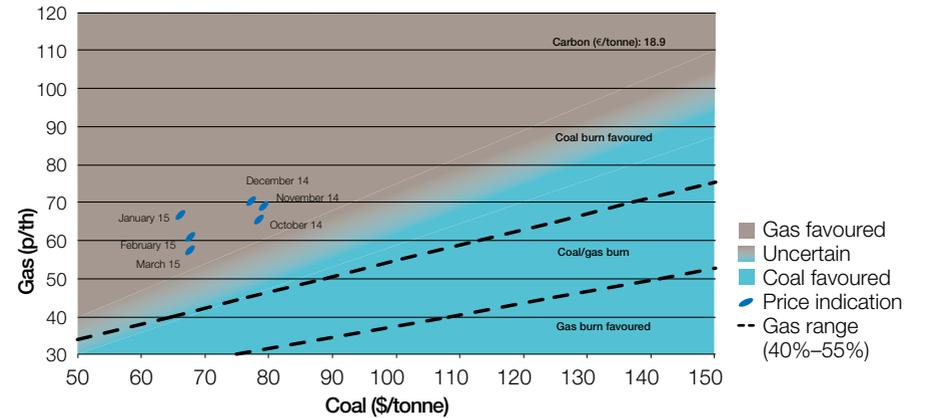
In the Winter Outlook Report we discussed the effect of the relative prices of gas and coal on the power generation market. We looked at forward prices of both fuels plus the cost of carbon; this analysis suggested

to longer term trends in wholesale prices. As a result, any uncertainty in fuel prices over a short time period, such as the winter ahead, is likely to have a greater effect on the choice of fuel for power generation than on end-user demand so we concentrate on this aspect in our Market Outlook Reports.

that coal would be the favoured fuel for generation, with gas only used for marginal generation, as shown in Figure 3 of that report.

Analysis after the winter shows that the range of actual prices observed was wider than the forward prices suggested would be the case, but that the relative prices of the two fuels favoured coal-fired generation throughout, as shown in Figure 18.

**Figure 18**  
Relative power generation economics for winter 2014/15



### Was there a difference to Winter Outlook?

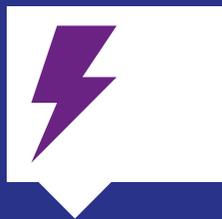
What actually happened	What we said in the Winter Outlook Report	Why there was a difference
The price of gas remained sufficiently high that coal was the favoured fuel for generation as predicted.	Prices of coal and gas for the winter were likely to favour coal-fired electricity generation over gas-fired generation.	No difference.

# Winter Consultation 2015/16

This section looks ahead to winter 2015/16. It gives a first look at the security of supply picture on the electricity and gas systems. We then ask industry stakeholders a series of questions to gather valuable market intelligence that will be used to inform our analysis in the 2015 Winter Outlook Report. The consultation closes on 14 August 2015.

On the electricity side, we have taken action to support continued security of supply. We have procured balancing services for winter 2015/16 to ensure we have the tools in place to help us balance the system. This is in line with actions taken for 2014/15. The capacity from generation and these tools shows an LOLE of 1.1 hours/year and a de-rated margin of 5.1% for our base case scenario. As a result, we are expecting the upcoming winter to be manageable.

On the gas side, we are expecting supplies to be sufficient to meet demand. There is currently a restriction on production from the Groningen field in the Netherlands, and a reduction in the capacity of the Rough long-range storage site. We are expecting to have more information on both of these before the winter and will be updating some of our analysis before the publication of the Winter Outlook Report in October.



## Future energy scenarios

In July 2015 we will present a view of the future of energy based on feedback from a wide range of stakeholders. The stakeholder engagement undertaken provided Ofgem with sufficient comfort that a wide range of views had been taken into account in the development of the

scenarios. One of the uses of the scenarios is to assess the security of supply on the electricity and gas system for the future.

Figure 19 shows our 2015 scenarios, as presented in our Stakeholder Feedback Document in January 2015.

**Figure 19**  
Future Energy Scenarios 2015



The scenarios provide a starting position for our analysis on the security of supply for the coming winter. We also continuously receive operational data from gas and electricity stakeholders through daily interactions in our role as System Operator. We also gather market intelligence through this annual winter consultation.

The combination of these three sources of data is then used to form the analysis for our Winter Outlook Report, which is published in October every year. The Winter Outlook Report gives industry a well-informed view of security of supply over the coming winter.

# A first look at electricity for the coming winter

Our stakeholders told us in the 2014 winter consultation that they want us to present security of supply for electricity in terms of both generation margins and loss of load expectation (LOLE).

## Generation margins

The sum of generators declared as available during the time of the peak demand, minus the expected demand at that time and a basic generation reserve requirement that we hold as System Operator. This is presented as a percentage.

## LOLE

Loss of load expectation (LOLE) is used to describe electricity security of supply. It is an approach based on probability and is measured in hours/year. It measures the risk across the whole winter of demand exceeding supply under normal operation. It does not mean there will be loss of supply for X hours/year. It gives an indication of the amount of time across the whole winter we will need to call on balancing tools such as voltage reduction. In most cases, loss of load would be managed without significant impact on end consumers.

We have conducted analysis on electricity security of supply for the coming winter. In order to ensure that there is enough generation plant available to meet expected winter peak demand, the results showed it would be prudent to take action. We have procured additional electricity reserve in the form of Demand-

Side Balancing Reserve (DSBR) and Supplemental Balancing Reserve (SBR). The requirement for DSBR and SBR for the coming winter has been determined in line with the revised Volume Requirement Methodology<sup>8</sup> that was recently approved by Ofgem<sup>9</sup>. More details of our analysis and assumptions are included below.

<sup>8</sup> <http://www2.nationalgrid.com/UK/Services/Balancing-services/System-security/Contingency-balancing-reserve/Methodologies/>

<sup>9</sup> <https://www.ofgem.gov.uk/publications-and-updates/decision-approve-revised-sbr-and-dsbr-volume-requirement-procurement-and-operational-methodologies>

## Procurement of new balancing services

On 3 June 2015, we announced the procurement of the 2.56 GW of additional electricity reserve for the winter 2015/16, following the conclusion of a second tender round for SBR and DSBR<sup>10</sup>. Our analysis shows that this results in an LOLE of 1.1 hours/year for the base case, equivalent to a capacity margin of 5.1%.

We run stress tests to cover a range of sensitivities. The impact of procuring 2.56 GW results in some cases with LOLE below 3 hours/year and others with LOLE higher than 3 hours/year. The full range of LOLE values across the sensitivities is 0.1–3.5 hours/year.

If we had not taken action to procure these new balancing services for winter 2015/16,

our analysis shows that the LOLE for the base case would have been 8.9 hours/year, equivalent to a de-rated margin of 1.2%. Therefore our expectation is that there will be an increased requirement to use the products this coming winter.

The services procured include around 2.38 GW SBR and 0.18 GW DSBR. The unit cost of these services was lower than the previous winter and represents around fifty pence a year on the electricity bill of the average consumer. The decision to procure this reserve in May 2015 provides early certainty to the electricity market and means that a further tender round is unlikely unless a specific need arises.

We are not currently licensed to procure SBR and DSBR services beyond winter 2015/16. We will therefore be consulting with the industry during July 2015. This will consider whether the SBR and DSBR arrangements should be extended, whether changes are required or whether an alternative solution should or could be developed in an appropriate timescale.

## Assumptions

The analysis to determine the requirement of SBR and DSBR has been based on the assumptions in FES 2015. For 2015/16 these assumptions include:

- **Generation:** overall reduction of 2.2 GW compared to what was assumed in FES 2014 due to plant closures and recent Transmission Entry Capacity (TEC) changes

- **Demand:** expected to remain fairly flat year on year with a narrow range (variation ~ 0.1 GW) between the four scenarios for 2015/16
- **Interconnectors:** 1 GW of net imports are assumed, comprising 1.8 GW imports from the continent and 0.8 GW exports to Ireland in all scenarios. This is an increase from last year, when we assumed 0.8 GW imports from the continent were balanced with 0.8 GW exports to Ireland.

<sup>10</sup> <http://media.nationalgrid.com/press-releases/uk-press-releases/corporate-news/additional-reserve-secured-for-winter-1516/>

In addition to the four scenarios, we also considered a range of credible sensitivities. The sensitivities are designed such that we could analyse a wide range of credible outcomes, for example different weather conditions and interconnector flows. This gives us a broader range of results than if we had only analysed the scenarios and ensures that we mitigate a wider range of credible risks.

The sensitivities cover outcomes that are both more and less severe than the scenarios. The sensitivities were only applied to one scenario, which is referred to as the 'base case'. The base case is the scenario that has a LOLE closest to the average of all four scenarios; it is not the scenario that we think is most likely to occur. When reporting LOLE values, we report both the base case value and the full range across all sensitivities.

However, whenever a single LOLE value is reported, this only refers to the base case. The base case for winter 2015/16 is Slow Progression.

The requirement for SBR and DSBR was determined from analysis of the base case and credible sensitivities. We determine the volume of SBR and DSBR that would be required for each of these cases to reach the target of 3 hours/year LOLE. This results in a range of volumes to select from (i.e. one for each case). We don't know which of these outcomes will actually occur and so the procurement decision uses a cost-optimised approach to select one, balancing the risk of under or over procurement. This ensures that we do not procure too much, exposing consumers to excess costs, nor do we risk not procuring enough, exposing consumers to unacceptable risk to security of supply.



# A first look at gas for the coming winter

We expect gas supplies this winter to be sufficient to meet demand. Our view of supplies for the winter, and in particular the non-storage supply (NSS), is used in the determination of the trigger levels for the Margins Notice. This is issued when there is a potential or actual risk to the end of day NTS physical system balance.

There are some potential/current issues where we currently have insufficient information to comprehensively analyse the impact. We continue to explore these areas, which include:

- the recently announced decision on the production cap for the Groningen field in the Netherlands for the second half of 2015. This was made after the analysis for this document was completed. The analysis in this document assumed this is in line with

- the restrictions previously in place
- the total capacity of the Rough storage site is currently restricted by between one quarter and one third. Deliverability is unaffected. An announcement from Centrica Storage, who own and operate Rough, as to whether this restriction will be maintained over the winter is expected before October
- the Security of Supply Significant Code Review (SCR) is to be implemented on 1 October 2015 and aims to reduce the likelihood, severity and duration of a gas supply emergency. The proposed changes will ensure that in an emergency, the market rules provide appropriate incentives on gas shippers to balance supply and demand. This is achieved by reforming cash-out arrangements in an emergency.

**Table 6**

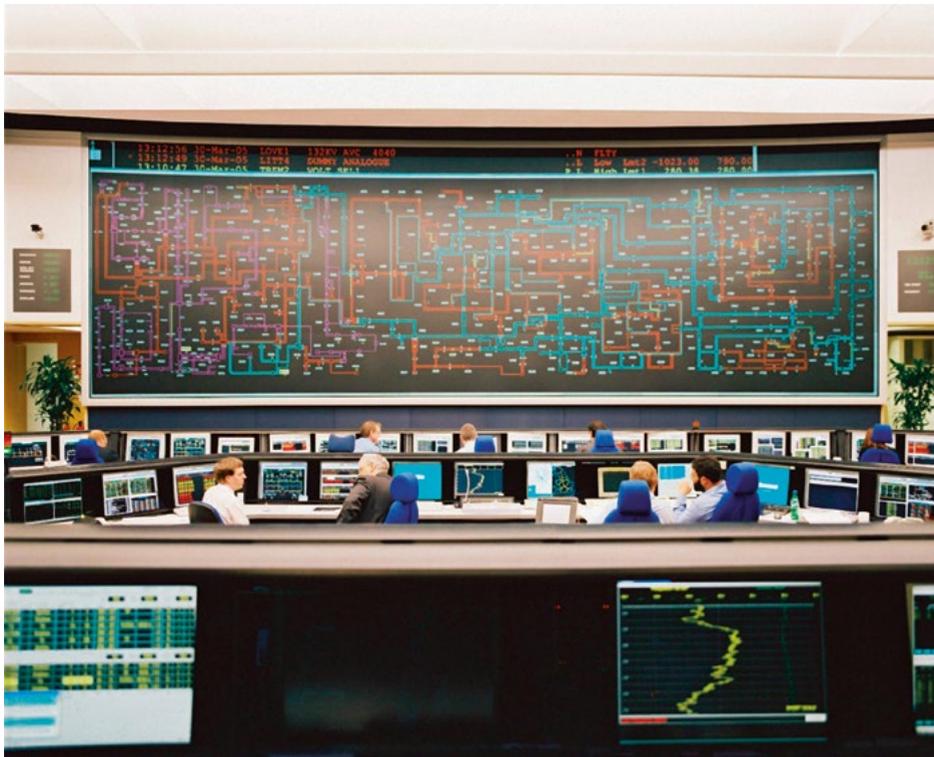
Preliminary view of supplies for winter 2015/16

(mcm/d)	2014/15		2015/16	
	Range	350+ range	Range	Cold day
UKCS	70–100	85–97	70–112	100
Norway	55–136	88–132	60–136	110
BBL	1–36	3–13	1–45	40
IUK	0–15	0	0–74	45
LNG Imports	5–56	25–40	5–100	50
<b>Total NSS</b>				<b>345</b>
Storage	0–97	66–95	0–136	

Analysis included in our Winter Outlook Report will also include consideration of the potential for disruption due to the continuing conflict in Ukraine. We currently believe that the risk of any disruption is low and will keep the situation under review. Table 6 summarises the supply range and our supply forecast for a 'cold day'.

Also shown are the actual 2014/15 ranges for the six-month period and the values for the nine days when demand exceeded 350 mcm/day. The ranges for the different supply types represent the maximum and minimum that we might expect. The maximum values could not

all occur simultaneously, but they reflect flows that have been seen in the last few years. We recognise that the ranges are wide, but this reflects the uncertainty in which sources will contribute to meeting demand. For example in winter 2014/15 on the coldest days IUK supplied no gas to GB, while three years ago it supplied gas at the maximum capacity of the pipeline. We stress that these 2015/16 ranges and forecasts for supplies for a cold day should be regarded as provisional with the primary purpose of fostering discussion and comment. They will be revised through our analysis for the Winter Outlook Report.



# Consultation questions for winter 2015/16

Please provide answers to some or all of the questions below to ensure that our analysis for the Winter Outlook is based on a broad range of expert stakeholder views, making it as robust as possible. We include the questions relating to the electricity sections first, followed by gas-related questions.

Responses to the questions can either be emailed to [marketoutlook@nationalgrid.com](mailto:marketoutlook@nationalgrid.com) or completed online [here](#) by 14 August at the latest.

Please include within your response to the consultation whether or not you are happy for your responses to be published online.

## General questions

Number	Question
1.1	What aspects of the Winter Review do you find useful?
1.2	What else would you like to see in the Winter Review and Consultation Report?
1.3	What further analysis, detail and scenario work do you consider would be beneficial for the Winter Outlook Report?
1.4	We are planning on creating a summary document of the Winter Outlook Report in October. What would you like to see in this summary?

## Electricity questions

Number	Question
	<b>Generation margins</b>
2.1	Does the definition, from page 50, of the metric “loss of load expectation (LOLE)” explain the concept clearly? “Loss of load expectation (LOLE) is used to describe electricity security of supply. It is an approach based on probability and is measured in hours/year. It measures the risk across the whole winter of demand exceeding supply under normal operation. It does not mean there will be loss of supply for X hours/year. It gives an indication of the amount of time across the whole winter we will need to call on balancing tools such as voltage reduction. In most cases, loss of load would be managed without significant impact on end consumers.”
2.2	Should we keep the three margin scenarios (Clean, Central, Arduous) that we used in the 2014 Winter Outlook Report?
2.3	If your company has generation that is currently unavailable to the market, what might lead you to return it to service and how long would it take to do so?
2.4	Why do you believe that wholesale electricity prices for winter 2015/16 haven't moved significantly in response to generation plant closures?
2.5	Do you expect any other type of market response in winter 2015/16 to the recent plant closures? For example, an increase in availability of existing plant.
2.6	Do you consider there is any generation that may be at risk of being put into a mothballed state or decommissioned before the end of winter 2015/16 and how great is the risk?
2.7	If your generator has a proportion of its capacity at long notice, do you expect to change this in the future?
	<b>Interconnected markets</b>
2.8	What range of interconnector flows do you think we should consider in our analysis?
2.9	If there were very cold conditions across Western Europe, what would you expect the flow on the interconnectors to be over the GB demand peak?
2.10	How would you expect further development in installed solar PV capacity across Europe to affect the flow on the interconnectors to GB?
2.11	What temperature differential between GB and Europe would you expect to cause a change in the flow on the interconnectors to GB?
2.12	Do you have any market intelligence on the expected market conditions in other European countries that may affect interconnector flows to GB and may be useful for our Winter Outlook analysis?

Number	Demand
2.13	There are multiple definitions of demand used within the Winter Outlook. What definition(s) of demand would you like to see in the Winter Outlook Report?
2.14	How do you use the demands in the Winter Outlook Report?
2.15	What levels of demand-side response do you expect will be delivered over the highest demand peaks by providers over the coming winter?
2.16	What do you believe is the expected trend in demand level for the coming winter?

## Gas questions

Number	Question
	<b>Supply</b>
3.1	How do you see gas prices trending over the winter period? Can you provide information to support your views?
3.2	What is your feedback on our winter supply projections on page 53?
3.3	Do you expect UK storage to be driven purely by short-term price signals or could some volumes be held back strategically to cover, for instances, high demands towards the end of the winter?
3.4	Have you had to alter your strategy to ensure you have sufficient volumes of storage for the winter given the reduced space available in Rough over the summer period? Will your strategy change if the restriction carries on into the winter?
3.5	Do you feel that the restrictions on production at the Groningen field will limit the volumes available to GB for the winter ahead? If so will these restrictions also have an impact on the volumes available during periods of high demand?
3.6	Are there any other issues related to European supply and demand which you feel could have an impact on imports or exports to and from the GB market over the winter?
3.7	Will we see the continuation of the level of within-day profiling over the winter period as seen over previous years?
3.8	What do you believe the key drivers are likely to be that would see large imports or exports through IUK (e.g. price differentials, low continental demands, high stocks in European storage)?
3.9	Can the GB gas market maintain security of supply in the worst case scenario of restrictions on Rough continuing over the winter, restrictions on Groningen production, and a deterioration of the Russia/Ukraine situation? How might this affect prices?

Number	Question
	<b>Supply</b>
3.10	Are you expecting the UK to attract similar levels of LNG this winter compared to those available last winter? If not, what will the difference be?
3.11	Do you expect the new LNG export facilities in the USA and Australia to have a significant impact on LNG deliveries to GB?
3.12	How will the new re-loading facility at the Grain terminal affect LNG deliveries to GB?
	<b>Demand</b>
3.13	Discounting for weather, do you expect any material changes in gas demand over the winter period?
3.14	Do you expect any material changes in industrial and commercial gas demand over the winter period?
3.15	How much might power generation gas demand increase or decrease?
3.16	What are your views on power generation gas demand: will it increase or decrease over the winter period and by how much relative to winter 2014/15?

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Gallows Hill, Warwick.  
CV34 6DA United Kingdom  
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