Summer Outlook Report 2011

Outlook for Summer 2011

Introduction

1. This document sets out National Grid's analysis and views for the coming summer. Previous outlook reports are published on National Grid's website[1].

Industry Feedback

2. National Grid continually seek feedback on our outlook reports to increase their usefulness to the industry and to reflect all changes in trends when they become apparent. To feed back comments on our outlook report please contact us at energy.operations@uk.ngrid.com.

Roles and Responsibilities

3. The competitive gas and electricity markets in Great Britain have developed substantially in recent years and have successfully established separate roles and responsibilities for the various market participants. In summary, the provision of gas and electricity to meet consumer demands and contracting for capacity in networks is the responsibility of suppliers and shippers. National Grid has two main responsibilities: first, as the primary transporter, for ensuring there is adequate and reliable network capacity to meet anticipated transportation requirements; second, as system operator of the transmission networks, for the residual balancing activity in both gas and electricity. The structure of the markets and the monitoring of companies' conduct within it are the responsibility of Ofgem, whilst the Department for Energy and Climate Change (DECC) has a role in setting the regulatory framework for the market.

Legal Notice

4. National Grid operates the electricity transmission network through its subsidiary National Grid Electricity Transmission plc and the gas transmission network through its subsidiary National Grid Gas plc. For the purpose of this report "National Grid" is used to cover both licensed entities, whereas in practice our activities and sharing of information are governed by the respective licences.

5. National Grid has prepared this consultation document in good faith, and has endeavoured to prepare this consultation document in a manner which is, as far as reasonably possible, objective, using information collected and compiled by National Grid from users of the gas transportation and electricity transmission systems together with its own forecasts of the future development of those systems. While National Grid has not sought to mislead any person as to the contents of this consultation document,

[1] http://www.nationalgrid.com/uk/Electricity/SYS/outlook/.

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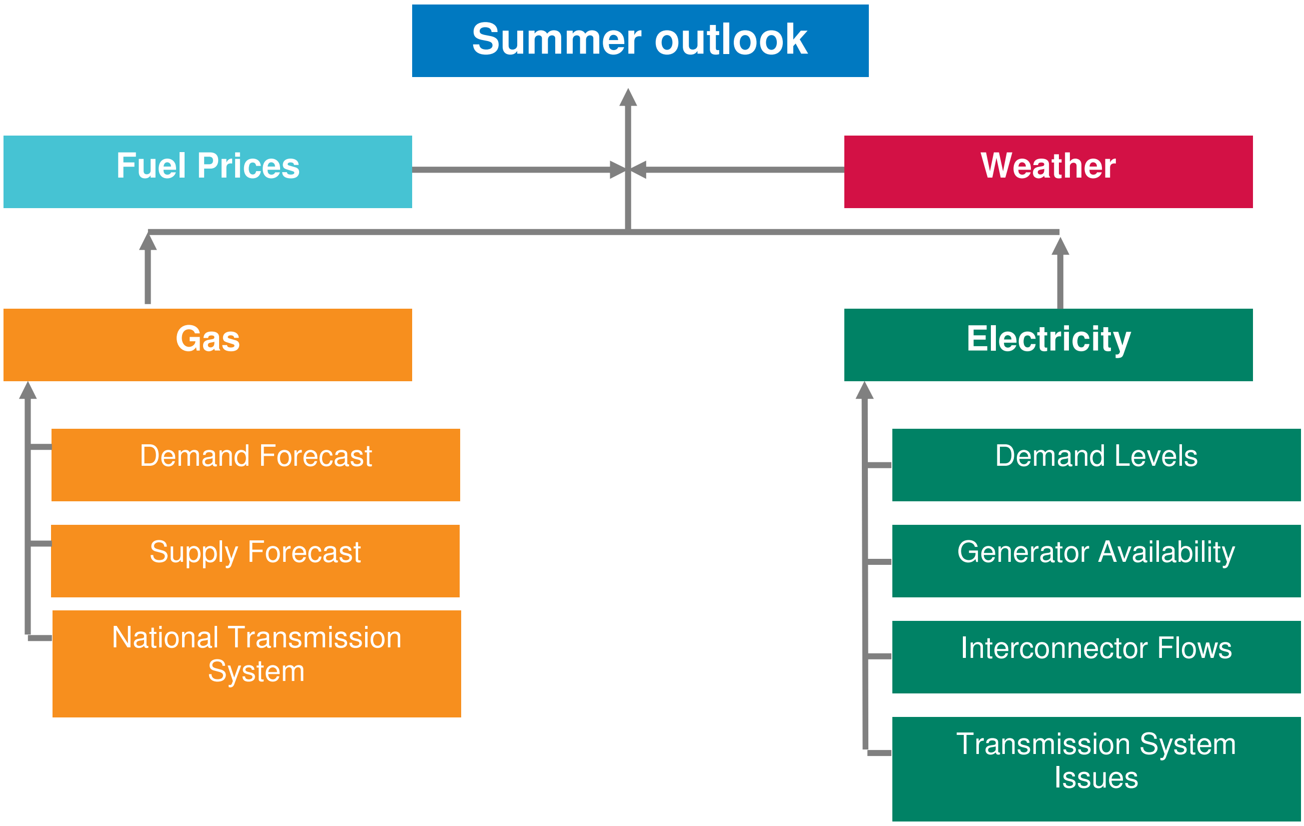
Overall Summary



Summer Outlook - Key Details

Weather

The Met Office probabilities for summer temperatures show a slight weighting towards below normal.

Fuel Prices

Due to global events, energy prices have increased. Forward prices for oil and coal are relatively flat whilst those for gas and base load power show some seasonality.

For power generation, current fuel prices favour coal burn over gas.

Gas

Demand Forecast (maximum) – cold April day	380 mcm/d
Demand Forecast (minimum) – mid summer day, limited exports / storage injection	150 mcm/d
Summer Demand – lower through less power and exports	41 bcm
Summer Supplies – lower UKCS, similar imports	41 bcm

Electricity

Demand Levels (maximum)	40.8 GW
Demand Levels (minimum)	19.0 GW
Generator Capacity	82.8 GW
Generator Availability (maximum)	73.1 GW
Generator Availability (minimum)	62.7 GW
Forecast Surpluses (maximum)	21.5 GW
Forecast Surpluses (minimum)	12.5 GW

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Weather

7. Rather than produce a seasonal forecast, the Met Office report 'global long-range probability maps' on their website[2]. For the UK, as shown on the website's map for Europe, for the period April to September, the data reported in March shows a slight weighting towards below normal temperatures. In terms of probabilities, the charts for the UK show:

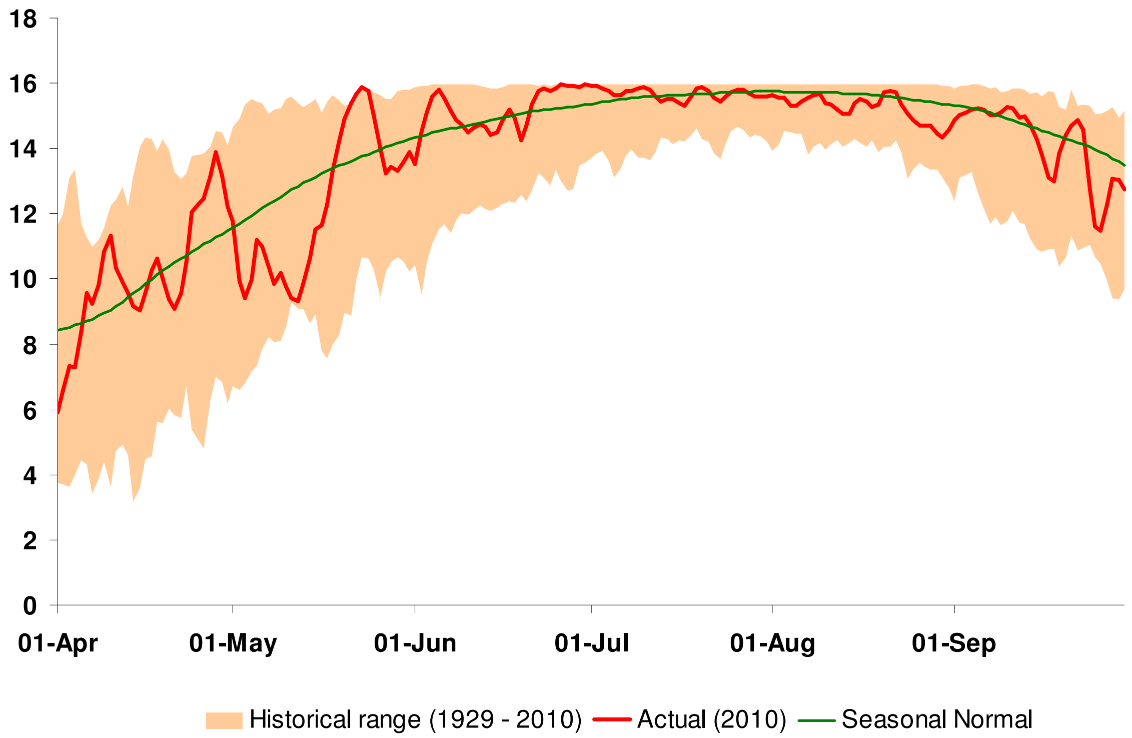
   - a 0 – 40% probability of above normal temperatures
   - a 20 – 40% probability of near normal temperatures
   - a 20 – 60% probability of below normal temperatures

8. In terms of precipitation for the UK, there are similar levels of probabilities for above, near and below normal

[2] http://www.metoffice.gov.uk/science/specialist/seasonal/probability/glob_seas_prob.html

9. **Figure W 1** shows the historical Composite Weather Variable (CWV, essentially a proxy for temperature), seasonal normal conditions and actual conditions for summer 2010. The CWV is capped at 16°C as there is little or no influence of temperature sensitive gas demand above this.

Figure W 1 - Summer Composite Weather (2010 compared to 1929 – 2010)



10. The chart shows that colder conditions are essentially restricted to April and early May. Hence only in these months are the weather sensitive gas demands (non daily metered i.e. domestic) noticeably influenced by the weather.

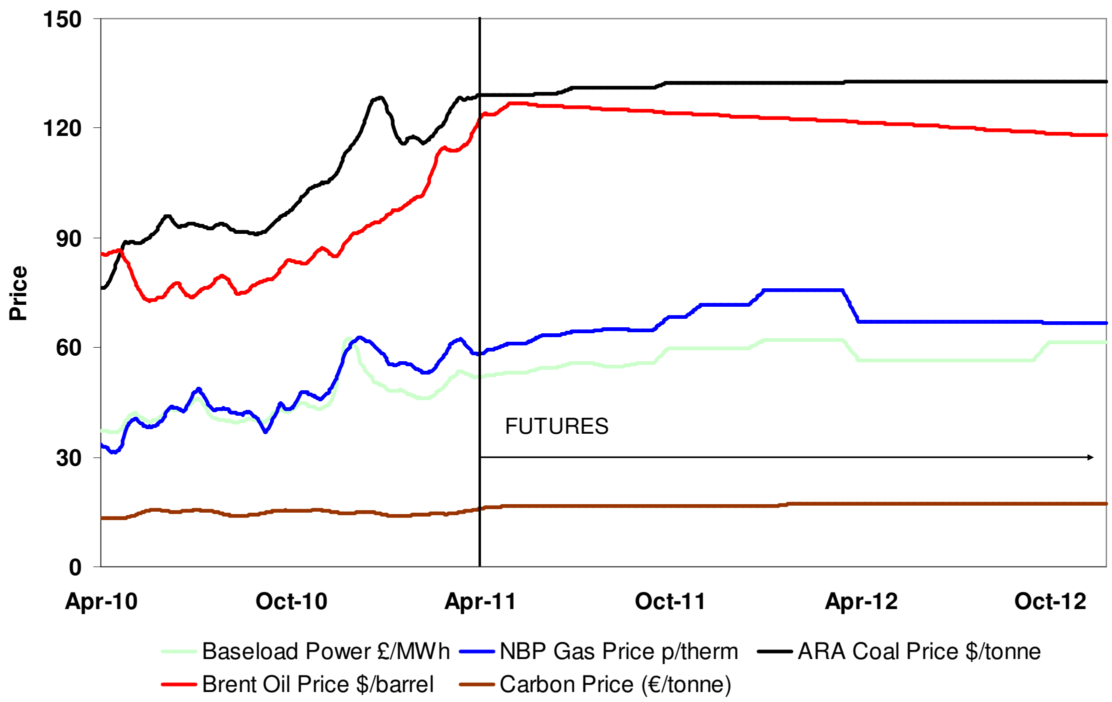
11. For summer 2010, the start of both April and May was relatively cold whilst the end of April and May was relatively warm. This resulted in significant within month gas demand variations. For most other periods, the CWV was close to seasonal normal conditions.

Fuel Prices

12. Recent developments in Japan, Libya and Australia show how volatile energy markets can be and how unforeseen events can impact energy prices on a global basis. As the UK now imports more than half of its primary energy, notably through gas and oil, these events feed through to UK energy prices and can change the short-term view.

13. **Figure F 1** shows the recent history of energy prices for coal, oil, gas, power and carbon, and the future prices, at the time of writing. Sources Heren and Inter Continental Exchange (ICE).

Figure F 1 - Energy Prices - history and forwards



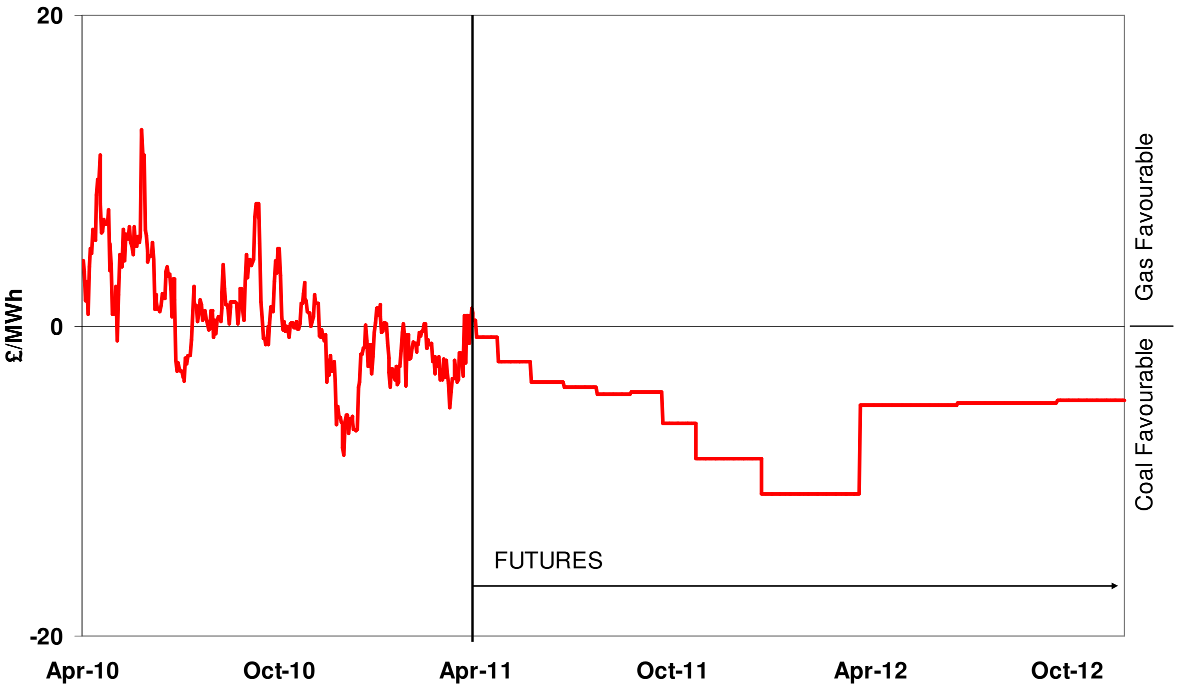
14. The chart shows that all energy prices have increased in the last 12 months:

- Oil due to improving economy and increased demand and more recently, Middle East unrest
- Coal due to improving economy, part linkage to oil and to some extent supply issues, notably from key producing nations
- Gas due to part linkage to oil and recently concerns over supply (notably LNG) due to nuclear problems in Japan
- Electricity primarily due to close linkage with UK gas price increases and recently due to closure of some German nuclear plant

- The EU Allowances (EUAs) market for carbon shows relatively steady historic and forward prices, all typically between €14–16/tCO2. The announcement by Germany to close some nuclear power stations has not materially changed the forward carbon price

15. **Figure F 2** shows a view of the relative economics for generating electricity from burning coal compared to gas based on historic and forward gas and coal prices.

Figure F 2 - Relative power generation economics (1)

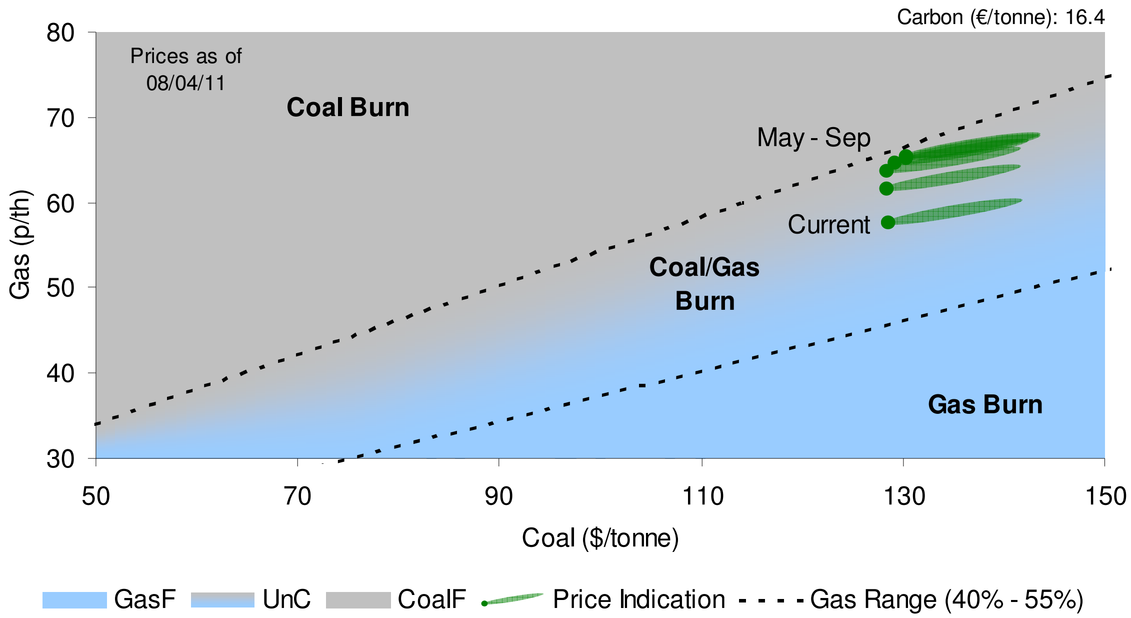


16. The chart shows a general trend over the past year of a shift from gas to coal as the ‘preferred’ source of UK power generation.

17. This simplified approach does not fully address other factors such as individual station efficiencies, generators’ portfolios (including fuel stocks and contracts), environmental restrictions under the LCPD and plant outages. All of these may affect the amount of gas fired generation in the summer.

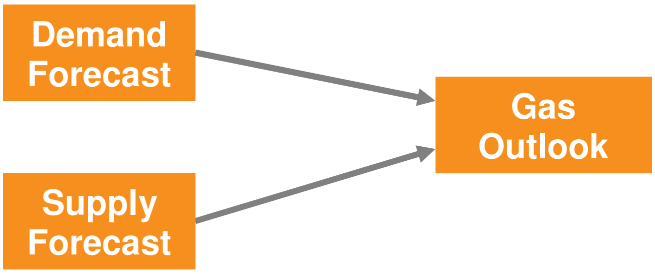
18. **Figure F 3** looks at the effect of station efficiency in terms of the future summer prices for coal and gas.

Figure F 3 - Relative power generation economics (2)



19. The chart shows a very strong bias for all the summer period for coal to be the favoured source of fuel for power generation against most gas stations. The exception being gas fired stations with the highest efficiencies, these include many of the recently commissioned stations. The chart also highlights that a price reduction of about 10 p/therm for gas or a price increase of about $20/tonne for coal would shift the economics to a more balanced position.

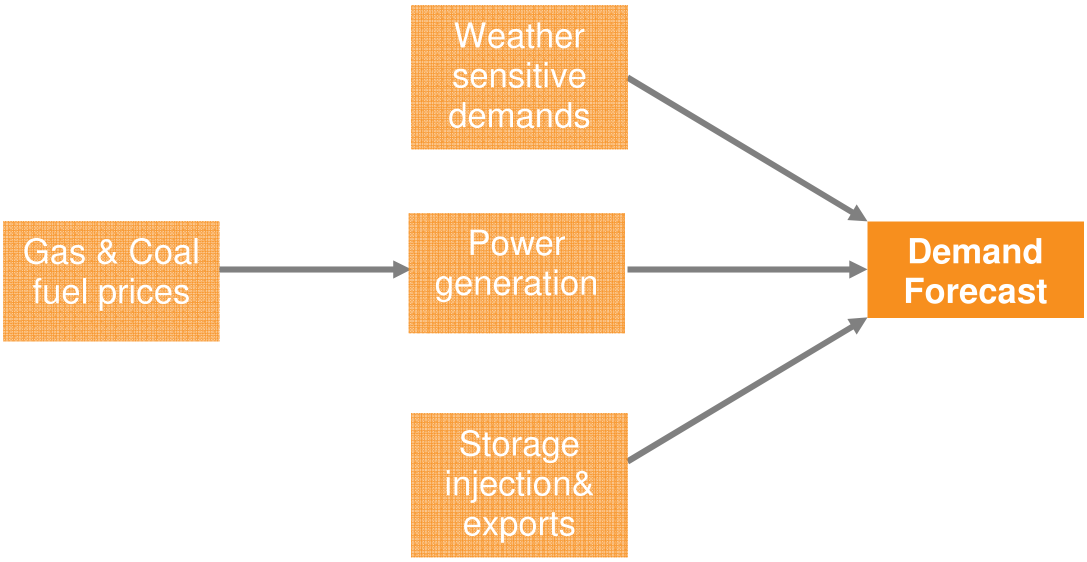
Gas



Overview

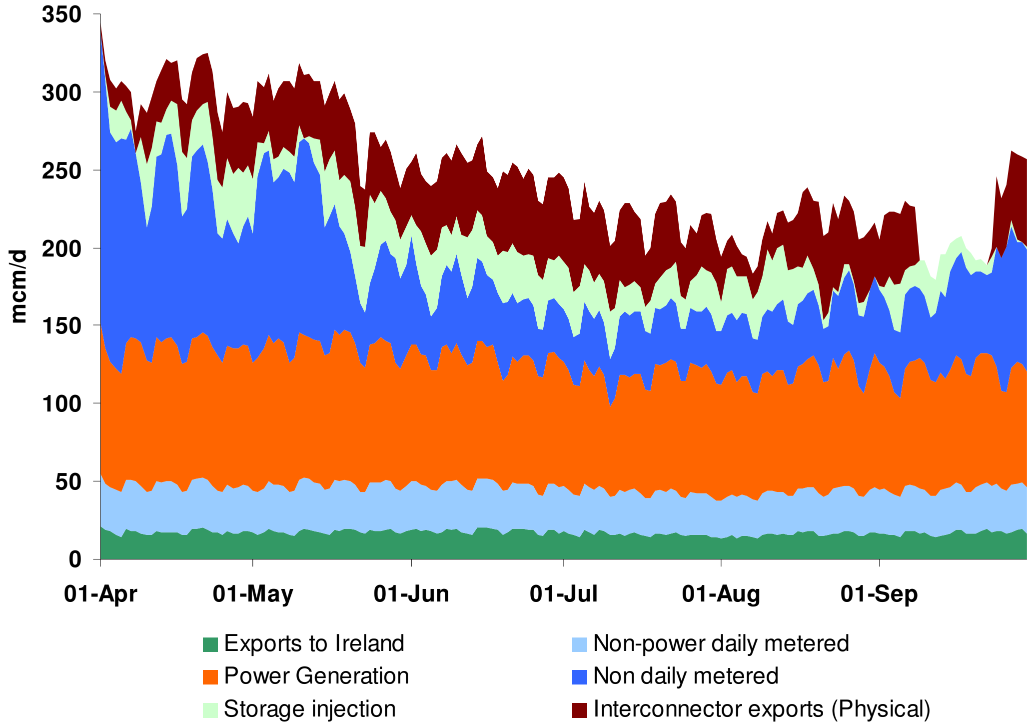
20. This chapter covers the gas supply-demand outlook for the forthcoming summer. Despite storage injection and Continental exports, demands during mid summer are about half those in the winter. Supply availability during the summer is generally high but at times is reduced due to periods of maintenance, this can result in relatively high flow ranges in terms of supply source and entry terminals.

Demand Forecast



21. **Figure G 1** shows the resultant demands in summer 2010.

Figure G 1 - Actual Summer Gas Demand 2010



22. **Figure G 1** shows:

- The influence of weather sensitive demands in April, May and to a limited extent from mid September
- During the peak summer months of June to August the weather sensitive demand reaches a temperature cut-off level above which there is no further drop in demand
- High Interconnector (IUK) exports for most of the summer
- Relatively high storage injection

23. **Figure G 2** and **Table G 1 & G 2** show our forecasts for summer 2011 demand. These forecasts were produced in May 2010 but have been modified for power generation, storage and IUK exports. There is little change from 2010 weather corrected demand in the other market sectors.

Figure G 2 - Forecast Gas Demand Summer 2011

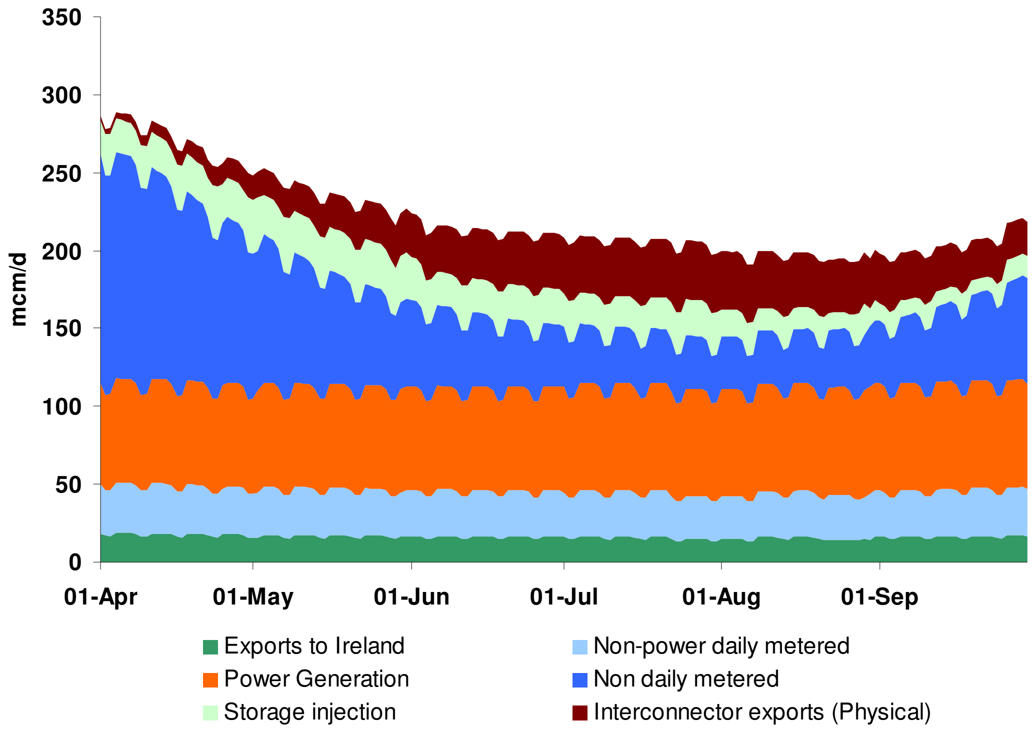


Table G 1 - Forecast Average Gas Demand for Summer 2011

Mcm/d	Daily average			Summer range	
	2010 actual	2010 weather corrected	**2011**	2011 Low	2011 High
NDM	63	59	**60**	25	221
DM + Industrial	29	29	**29**	26	35
Ireland	17	17	**16**	13	19
Total Power	81	81	**66**	61	105
GB Total	193	189	**175**	130	380
IUK Export	36	36	**27**	0	60
Storage Injection	23	23	**22**	0	60
Total	252	248	**224**	150	380

Table G 2 - Forecast Total Gas Demand for Summer 2011

bcm	Summer total		
	2010 actual	2010 weather corrected	**2011**
NDM	11.5	10.9	**11.0**
DM + Industrial	5.2	5.2	**5.3**
Ireland	3.1	3.1	**2.9**
Total Power	14.9	14.9	**12.1**
GB Total	35.3	34.6	**31.9**
IUK Export	6.5	6.5	**5.0**
Storage Injection	4.2	4.2	**4.0**
Total	46.0	45.4	**40.9**

24. The monthly ranges for total demand are shown in terms of supply in **Figure G 6** on page 19. The high range for NDM broadly reflects the demand difference between a cold spring day in early April compared to mid summer.

25. The power generation figures have been updated to reflect the experience of summer 2010 and forward prices which currently favour coal over gas. The recent reduction in availability of approximately 3 GW gas fired power stations has offset the increase in capacity due to the commissioning of new gas power stations at the end of the winter. No coal plants are expected to close this summer as a consequence of the LCPD limits, the first closure is expected in late 2011.

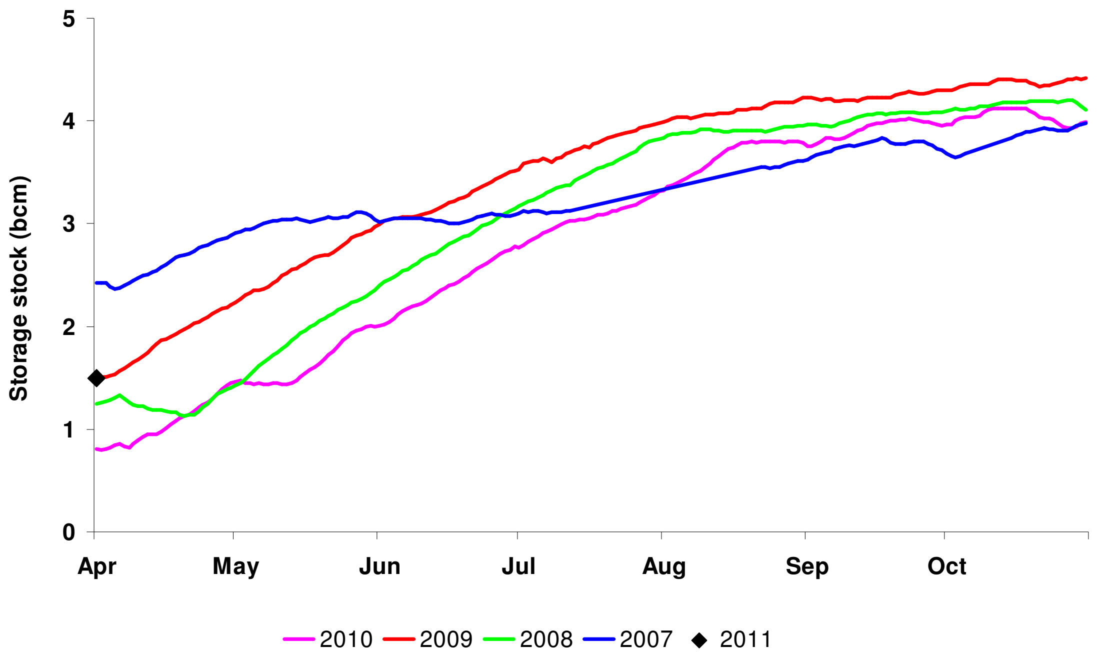
26. Despite commissioning of the Holford storage facility and additional capacity at Aldbrough, overall storage injection is forecast to be marginally lower in summer 2011 compared to summer 2010. This reflects higher storage stocks in March 2011 compared to March 2010.

27. **Figure G 3** shows the refill of storage during the last 4 summers and the storage level as of the start of April 2011. The current price spread between April 2011 and Q1 2012 is approximately 15 p/therm, this is higher than the corresponding differential in 2010 (12 p/therm) but lower than those from 2007 to 2009.

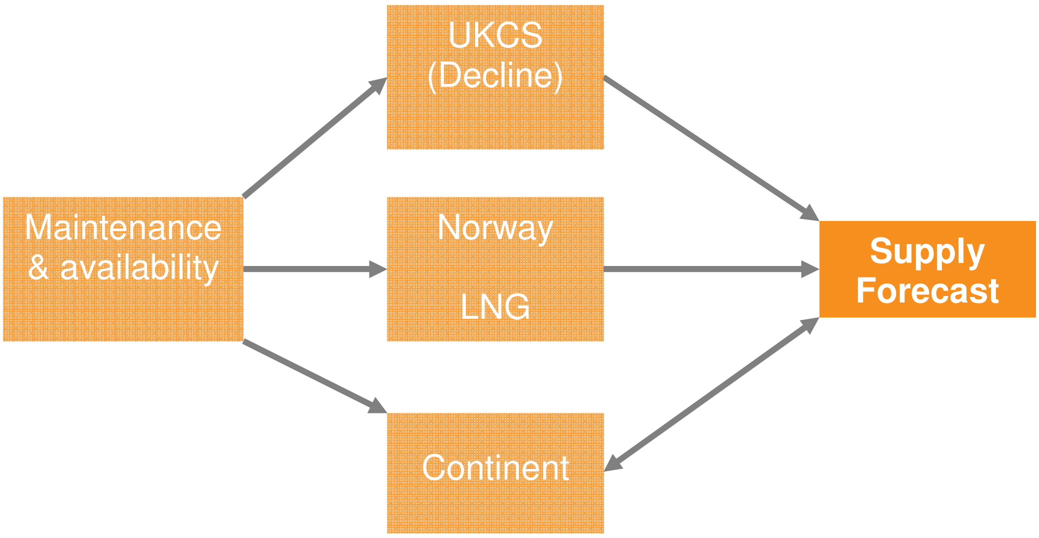
28. IUK exports in summer 2010 were the highest since 2003. For summer 2011 IUK exports are again forecast to be high but lower than in 2010 due to:

- The tightening of the global LNG market due to some diversion of LNG cargoes to Japan as a consequence of the nuclear problems
- The introduction of non physical reverse flow through BBL, thereby potentially mitigating some of the flow patterns from Netherlands to UK, then UK to Belgium and then from Belgium to Netherlands

Figure G 3 - Summer Storage Stocks 2007 – 2010



Supply Forecast



29. **Figure G 4** shows the make up of summer supplies by supply source since 2000 and also the forecast for 2011. The forecast for 2011 is based on recent trends of summer supply with the recent growth in LNG imports part constrained to reflect the tightening global LNG market as a consequence of the nuclear problems in Japan.

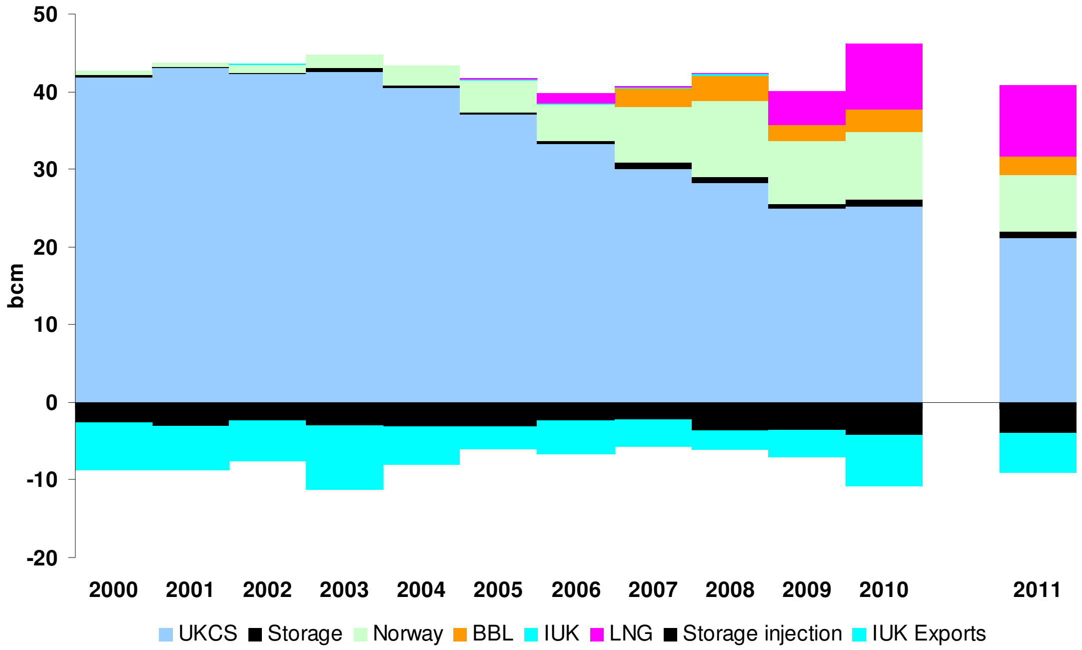
30. Our internal analysis suggests that additional LNG deliveries to Japan could be in the range of 7 -12 bcm/year. These volumes are expected to be made up from a combination of new LNG production (notably Qatar), some reduction in the availability of spot cargoes and maintenance periods that are not extended to the same extent as those reported in summer 2010. In terms of prices, Japan has historically paid a premium for LNG based on oil indexation; current estimates of summer LNG prices for delivery to Japan are 80 p/therm, considerably above the 60 p/therm price in the UK and sub 30 p/therm US gas price.

31. For our forecast of summer UKCS supplies, the impact of the recent UK tax increase is discounted as this is not expected to materially impact fields in production.

32. **Figure G 4** shows:

- Similar levels of summer supply / demand of about 40 bcm throughout the last 10 years
- A gradual shift from UKCS to increasing imports including significant LNG imports post 2009

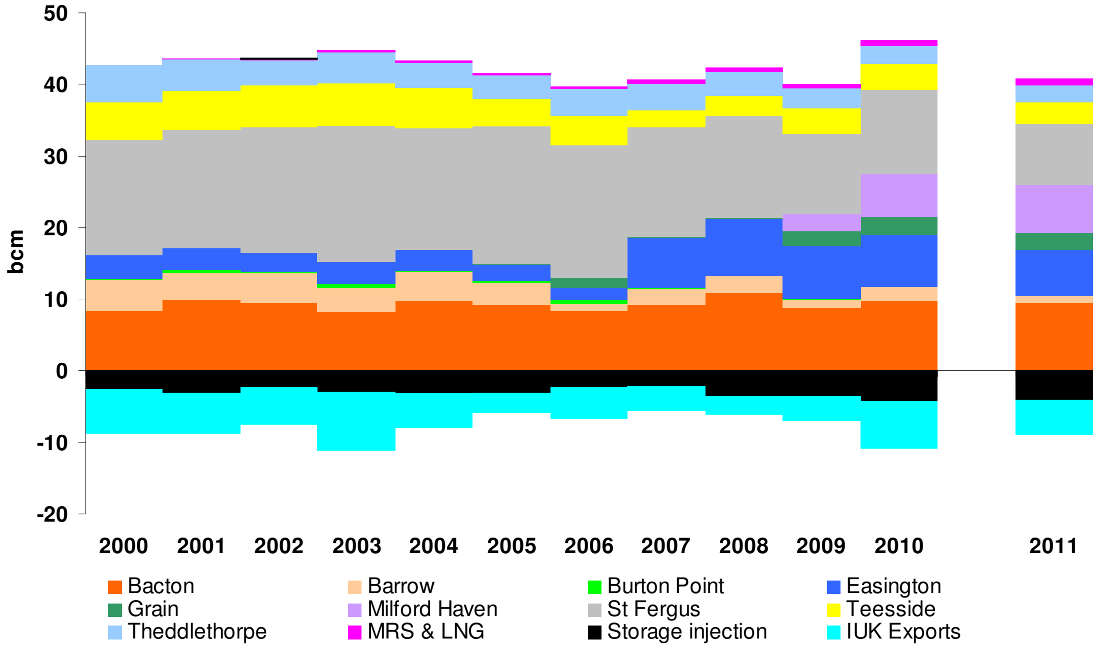
Figure G 4 - Historic and Forecast Summer Gas Supplies by Source



33. **Figure G 5** shows: the same history / forecast by entry terminal. It shows:

- Declining levels of entry at the three northern terminals, namely St Fergus, Teesside and Barrow
- Similar levels of entry at Bacton throughout the last decade
- Increasing levels of entry at Easington, Grain and Milford Haven

Figure G 5 - Historic and Forecast Summer Gas Supplies by Terminal



34. **Table G 2** shows entry flows by supply source for the past 3 summers and the forecast for summer 2011. **Table G 3** shows the same data broken down by entry terminal.

Table G 2 - Historic and Forecast Summer Gas Supplies by Source

(bcm)	UKCS	Norway	LNG	Continent	Storage	Total
2007	30	7	0	2	1	41
2008	28	10	0	4	1	43
2009	25	8	4	2	1	40
2010	25	9	8	3	1	46
Average	27	8	3	3	1	42
2011	**21**	**7**	**9**	**2**	**1**	**41**

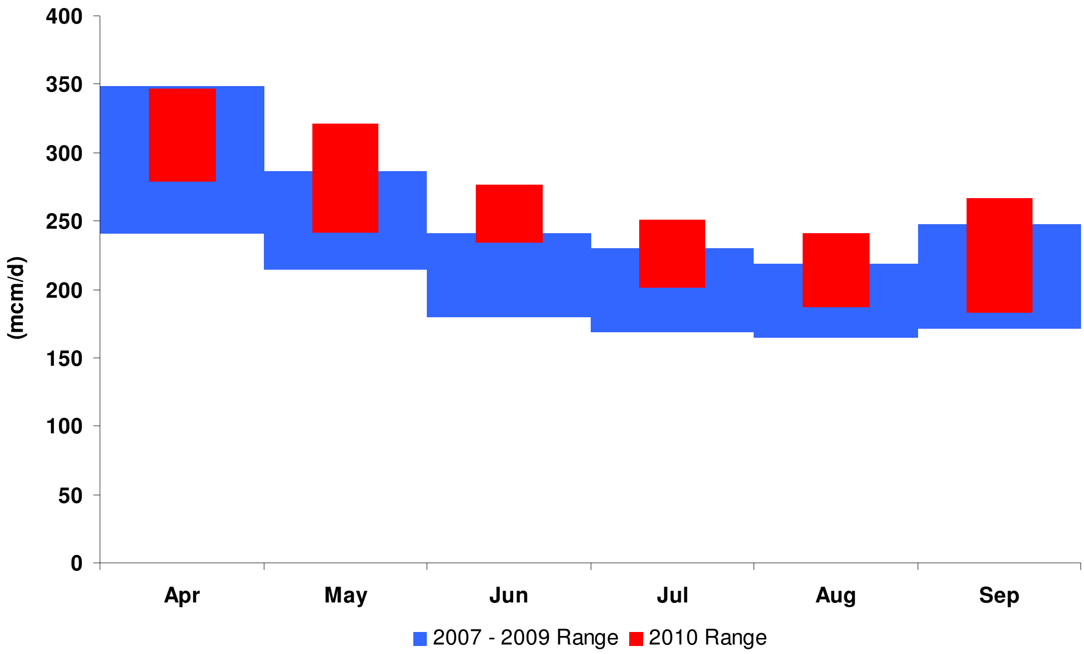
Table G 3 - Historic and Forecast Summer Gas Supplies by Terminal

(bcm)	St F	Tee	The	Eas	Bac	IOG	M H	BuP	Bar	Storage	Total
2007	15	2	4	7	9	0	0	0	2	1	41
2008	14	3	3	8	11	0	0	0	2	1	43
2009	11	4	3	8	9	2	2	0	1	1	40
2010	12	4	3	7	10	2	6	0	2	1	46
Average	13	3	3	7	10	1	2	0	2	1	42
2011	**9**	**3**	**2**	**6**	**10**	**3**	**7**	**0**	**1**	**1**	**41**

35. The increase in LNG deliveries reflects the increase in LNG import capacity, including Teesside GasPort this is now over 50 bcm. During the 2010/11 winter LNG imports were 13 bcm, hence capacity utilisation over the past 12 months is still below 50%.

36. **Figure G 6** shows the supply ranges for the summer months from 2007 to 2009 and also specifically for summer 2010. Theses ranges are nearly identical to those for total demand.

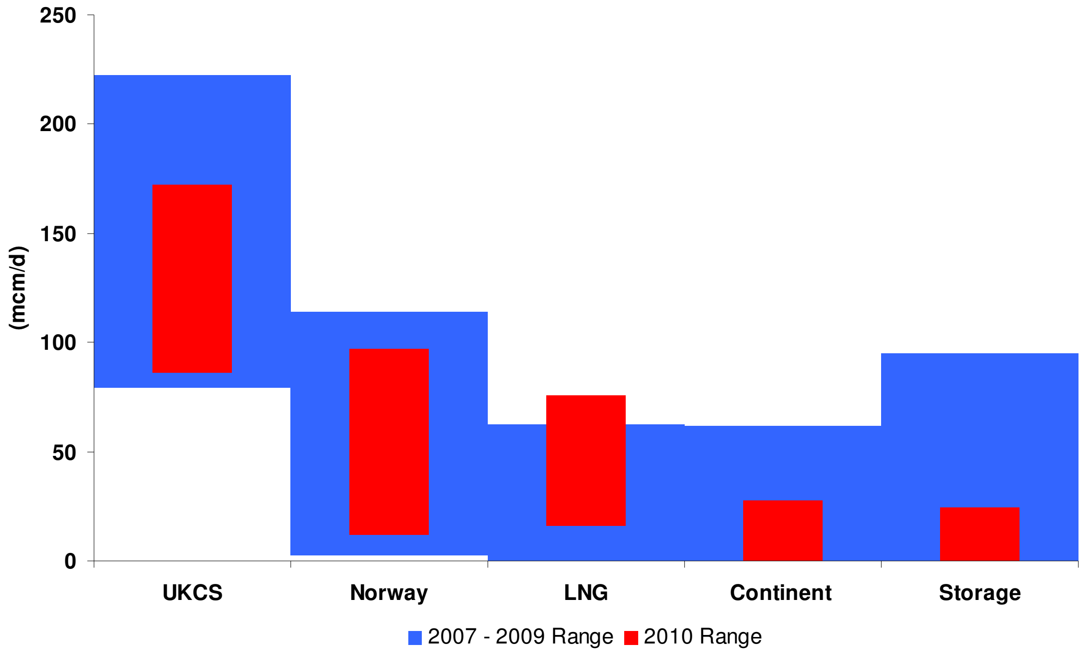
Figure G 6 - Monthly Supply / Demand Range



37. The chart shows relatively high demands for 2010, this was primarily due to high gas demand for power generation and high IUK exports.

38. **Figure G 7** shows the summer supply ranges by supply source from 2007 to 2009 and also specifically for summer 2010. **Figure G 8** shows similar ranges by entry terminal.

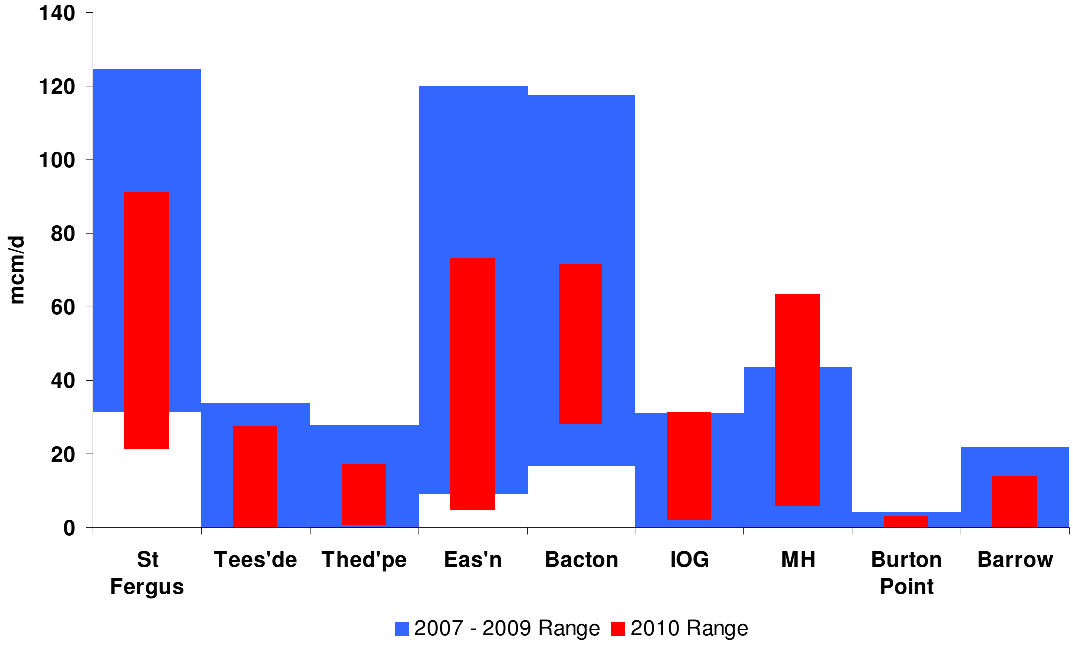
Figure G 7 - Summer Supply Range by Source



39. With the exception of UKCS which is supplied from numerous offshore fields, all other supply sources exhibit at times relatively low flows. These low flows, notably for Norway, LNG and BBL are often due to periods of maintenance.

40. For summer 2011, a similar position is expected though the trend of lower UKCS and higher LNG is expected to continue.

Figure G 8 - Summer Supply Range by Terminal



Summer 2011 NTS Maintenance Programme & Network Expansion

41. To ensure a high level of safety and reliability in operation, it is essential that a system of inspection and maintenance exists for assets associated with the transmission of natural gas. Effective maintenance is essential to minimise the safety and environmental risks caused by failure of pipelines and plant.

42. In accordance with the Primary Gas Transporter Safety Case, maintenance activities shall comply at all times with any statutory or legislative requirements in order to meet legal obligations. These practices are robustly designed and seek to minimise overall operating cost by increasing the useful life of pipelines and plant, reducing the risk of failure and reducing the risk of emergency repairs.

43. The NTS investments delivered last summer for capacity expansion for winter 2010/11 have provided additional capacity as follows:

- 43km of 900mm pipeline from Wormington to Sapperton, providing additional capacity to meet forecast demand growth
- Reinforcement from Easington to Paull providing additional entry capacity on the east coast

44. In terms of construction for winter 2011/12, this summer will see more work on the new compressor station at Felindre and further progression of additional electric units at St Fergus and Kirriemuir as part of the project to reduce compressor emissions.

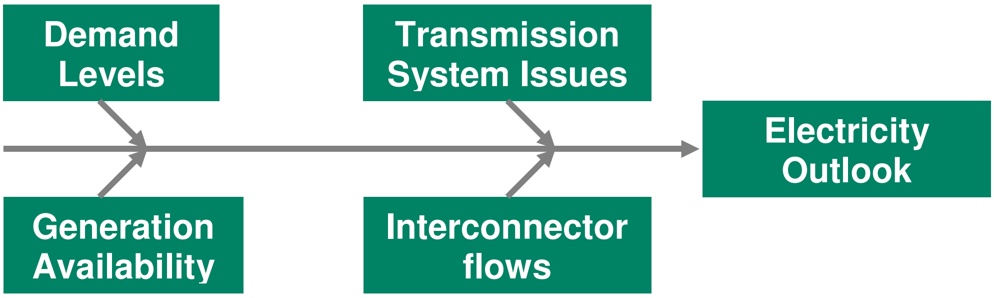
45. In addition, preparatory works have commenced for the construction of the Pressure Reduction Installation at Tirley in Gloucestershire, required as part of the South Wales Expansion Project.

46. Further information on some of these and other expansion projects can be found at http://www.nationalgrid.com/uk/Gas/Pipelines/

47. National Grid's maintenance plan includes the impact of network reinforcement, annual maintenance programme and supply outages. Published documents can be found on the National Grid website at: http://www.nationalgrid.com/uk/Gas/OperationalInfo/maintenance/

48. The documents detail Aggregated System Entry Points (ASEP) capacity for each month, based on Seasonal Normal Demand conditions for the period where scheduled maintenance has most impact on capability. The figure has been generated by National Grid and assumes the particular ASEP is favoured at the expense of other terminals. Where no volume has been given, this indicates that the maintenance scheduled has no adverse effects on the ASEP capability. The document also details maintenance work for each month and affected Exit Points.

Electricity

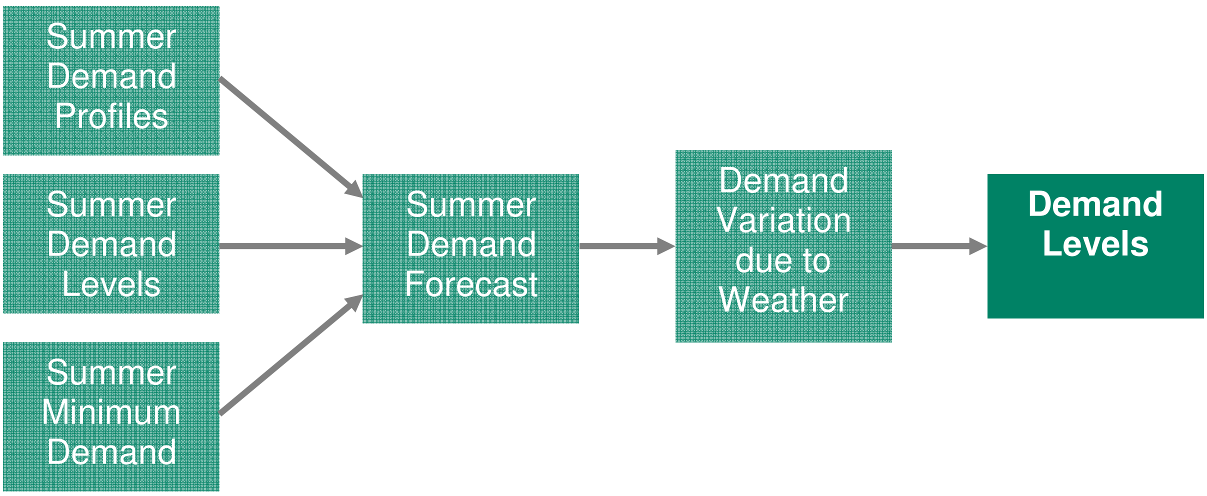


Overview

49. This chapter covers the electricity supply-demand outlook for the forthcoming summer. Demands during the summer are around two thirds the winter demands. There also tends to be a high level of generation unavailability during the summer months due to maintenance and lower prices.

Demand Levels

50. Unless otherwise stated, demand discussed in this report excludes any flows to or from France, Netherlands and Northern Ireland.

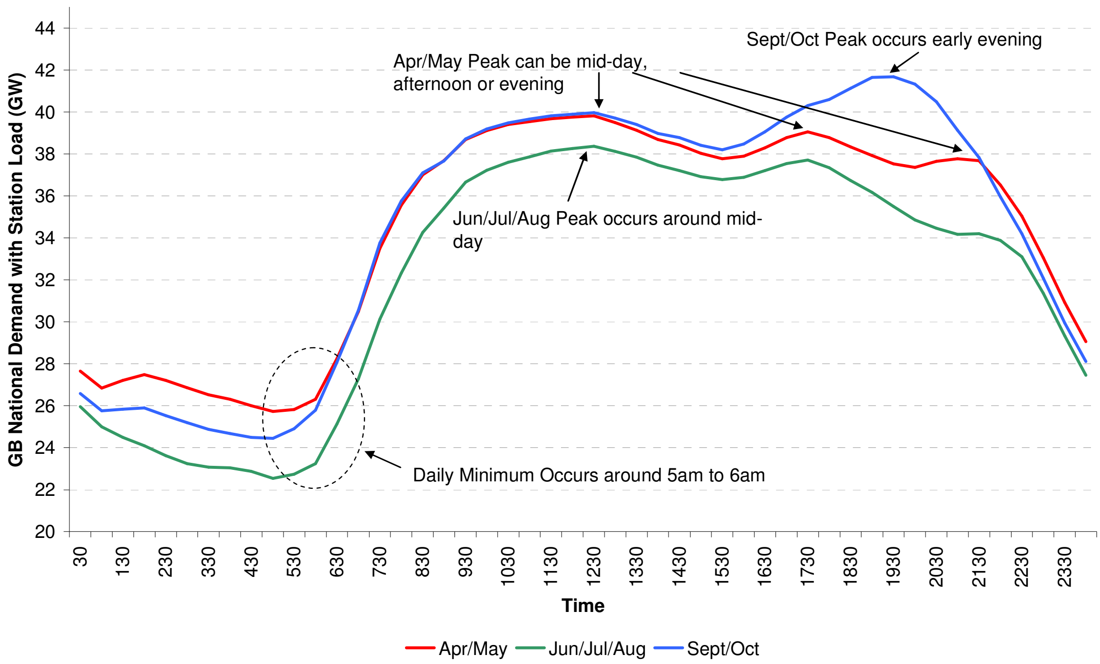


Summer Electricity Demand Profiles

51. **Figure E 1** depicts the average daily demand profile of summer months. The figure shows that the daily peak figure is used through-out the rest of the report does not necessarily occur at the same time of the day throughout the summer.

- During April and May demand is reasonably flat across the working day, but there is a higher chance the demand will peak in the late afternoon, dependent upon weather conditions
- In the high summer (June, July and August) demand is also reasonably flat across the working day (08:00 - 18:00) with a strong tendency to peak at mid-day.
- During September and October the daily peak occurs in the evening due to the earlier lighting effect.
- The daily minimum occurs around 05:00 - 06:00 through out the summer.

Figure E 1 - Half hourly Demand Profiles



Summer Electricity Demand Levels

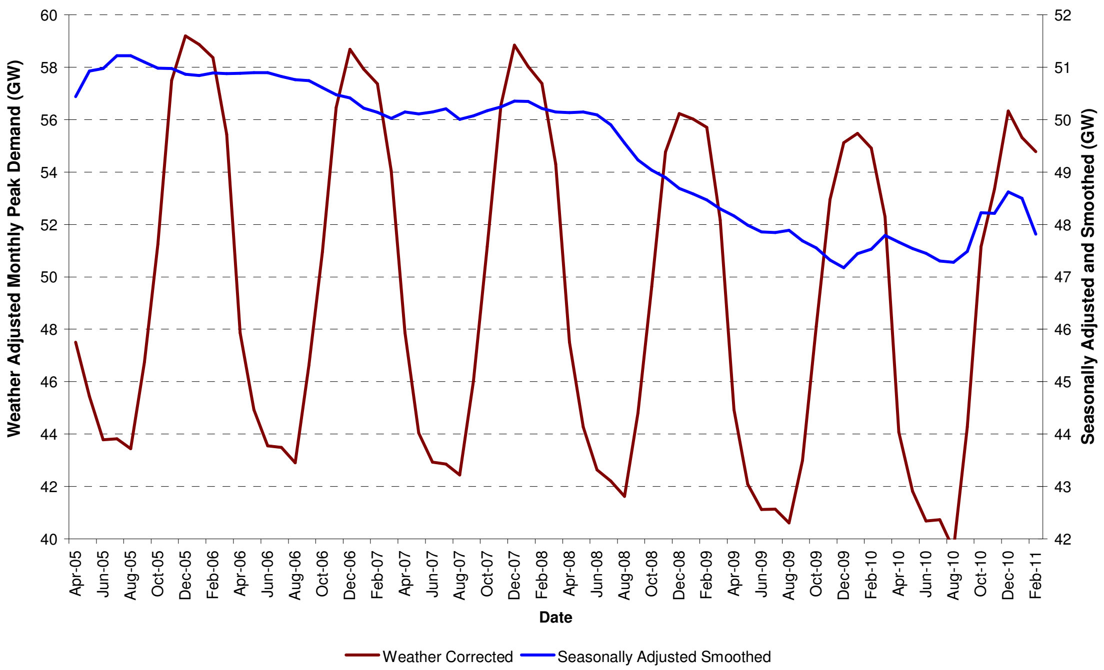
52. **Figure E 2** shows the demand levels corrected for season and for weather (blue line). The extreme nature of the cold weather during the winter period of 2010 has created a peak in the normalised demand.

53. Referring to **Figure E 2**, prior to August 2008 demand levels had remained fairly stable. After June 2008 the effect on the demand levels due to the economic environment can be seen by a decline in demand levels. Following August 2009 the demand levels have remained relatively similar. The economic forecasts from several

different institutions suggest that the average GDP growth rate[3] in 2011 will again be marginally positive. This, however, is not expected to have an effect on the demand levels.

54. Current estimates are for a similar demand level during summer 2011 as the demand levels during summer 2010. The forecast will continue to be updated as part of our normal process and will be published on www.bmreports.com[4].

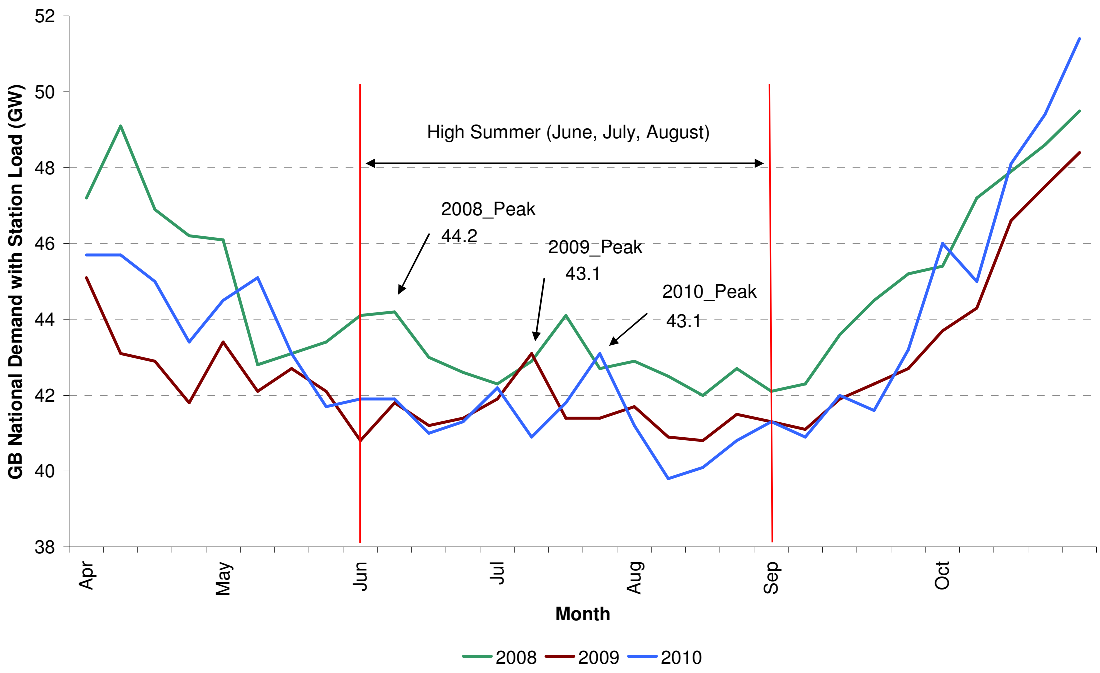
Figure E 2 - Seasonal and Weather Corrected Monthly Peak Demand



55. **Figure E 3** shows the previous 3 years high summer demand peaks. The difference between the 2008 pre-recession peak and the post recession years can be clearly seen.

3 http://www.hm-treasury.gov.uk/forecasts
4 http://www.bmreports.com/bsp/BMRSSystemData.php?pT=WEEKFC

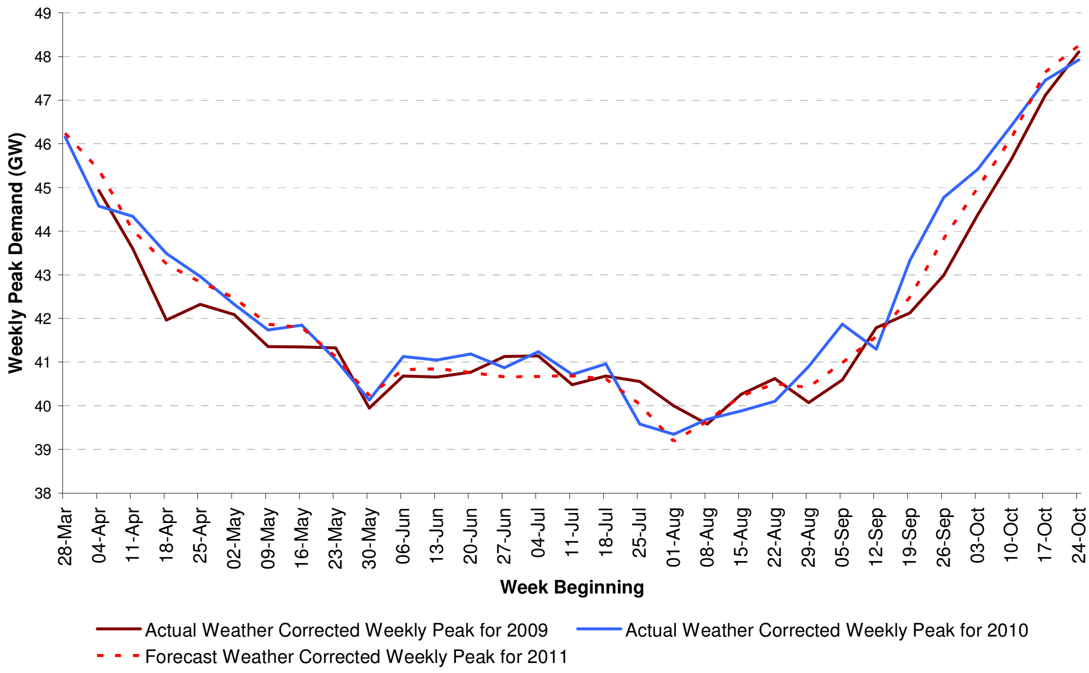
Figure E 3 - Weekly Peak Demand of Last 3 summers



Summer Demand Forecast

56. **Figure E 4** shows the forecast demand levels for 2011. The peak weather corrected summer demand for 2011 is expected to be 40.8 GW against an actual outturn of 41.2 GW for 2010.

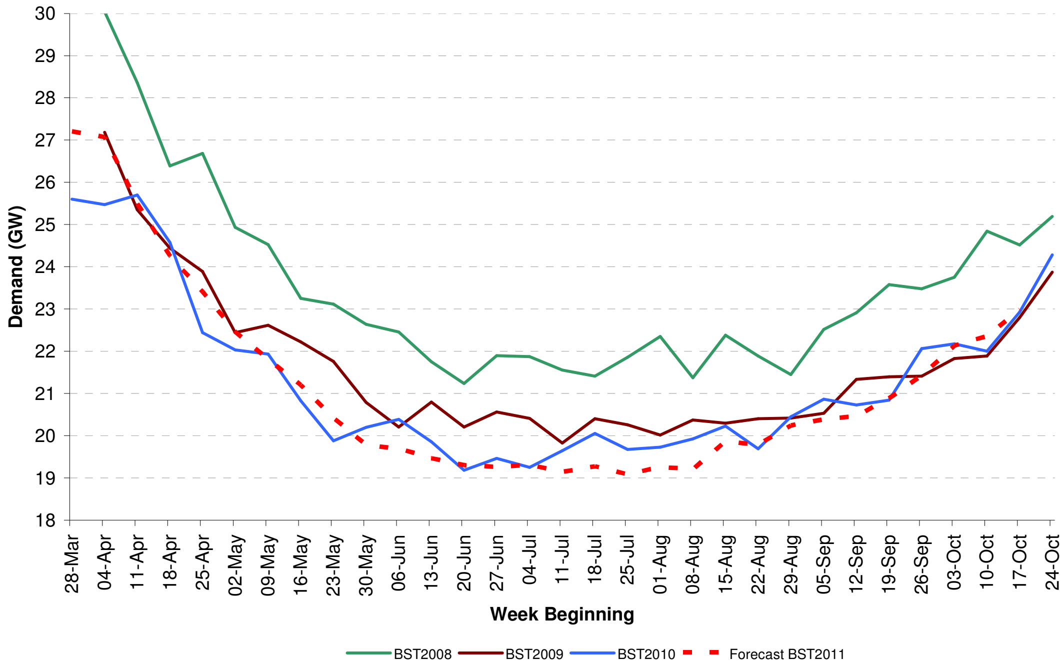
Figure E 4 - Weekly Peak Weather Corrected Demand Forecast for summer 2011



Summer Minimum Demands

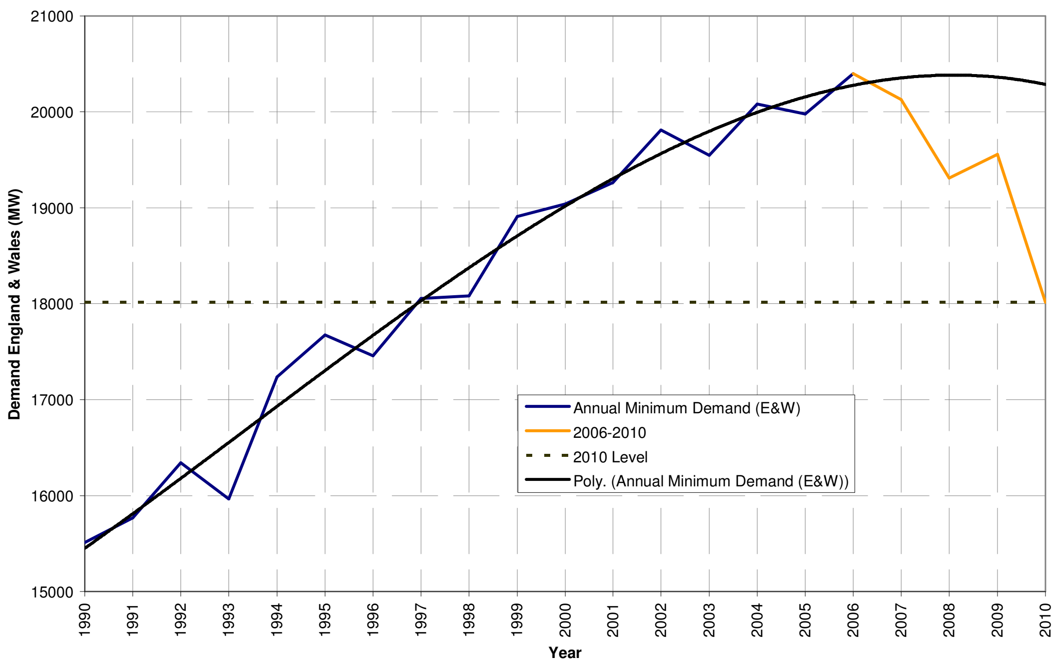
57. The summer minimum demand is expected to occur on a Sunday around 05:00 to 06:00 in mid July as in previous years shown in **Figure E 5**. This figure also shows the forecast minimum demands for the summer 2011. The minimum demand for Summer 2011 is forecast to be 19.0 GW

Figure E 5 - Weekly minimum weather corrected demands



58. There has been a decline in the summer minimum demand since 2006. To be able to show a long trend, only the England and Wales data is show in **Figure E 6**. To put this downward trend into context, the difference in weather corrected winter peak demand between 2008/09 and 2010/11 was less than 300 MW but the difference in the summer minimum across England and Wales was 2000 MW.

Figure E 6 - Weather corrected minimum demands for England and Wales



59. The likely causes of the decrease in summer demand is:

- Increasing amounts of embedded generation that from the transmission system are seen as a reduction in demand
- Continuing effects of the economic environment with summer shut-downs of industrial customers
- Energy efficiency, driven by price sensitivity.

60. The decrease in the summer minimum is a key area of uncertainty that may impact on the operation of the system. There is of course no issue in meeting demand. As the summer demand decreases there is an issue as the volume of inflexible generation increases. The inflexible generation that is expected to run during the summer minimum is considered to be:

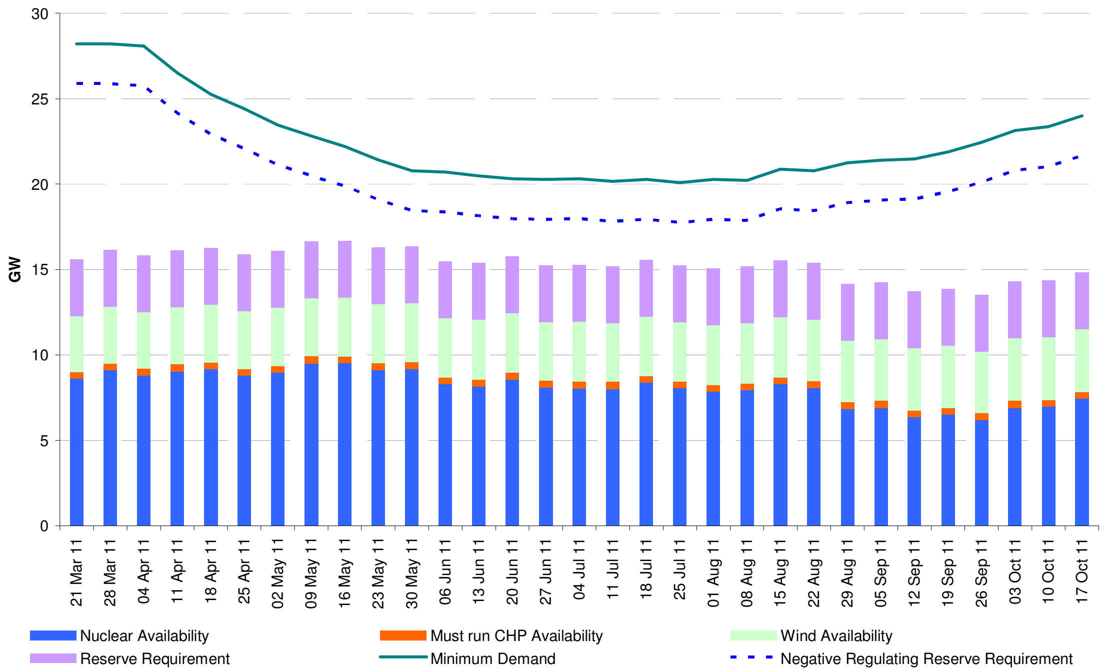
- Nuclear generation due to its current inflexible nature
- A certain volume of Combined Heat and Power (CHP) stations which will use the steam produced for other processes.
- Wind power as output will follow wind conditions.

61. As the minimum demand decreases and the volume of inflexible generation increases the amount of controllable flexible plant that can be synchronised reduces. This flexible plant is required to provide operating reserve:

- The operating reserve requirements are defined by National Grid and are based around, the largest single generation loss and the volume of synchronised wind generation.
- The total volume of flexibility from all units must be enough to meet the operating reserve requirements of the system.
- This volume defines the Reserve Requirement

62. **Figure E 7** shows analysis of the summer minimum, including the inflexible generation and reserve requirement as detailed above.

Figure E 7 - Detailed Summer Minimum Analysis with 0 GW of Interconnector Imports



63. The nuclear generation and must run CHP are likely to be running in such a way that the only action available to reduce the output of a unit is to de-synchronise the unit from the system. Hence, if the minimum demand is less than the sum of:

- Nuclear
- Wind
- Must run CHP
- Reserve Requirement

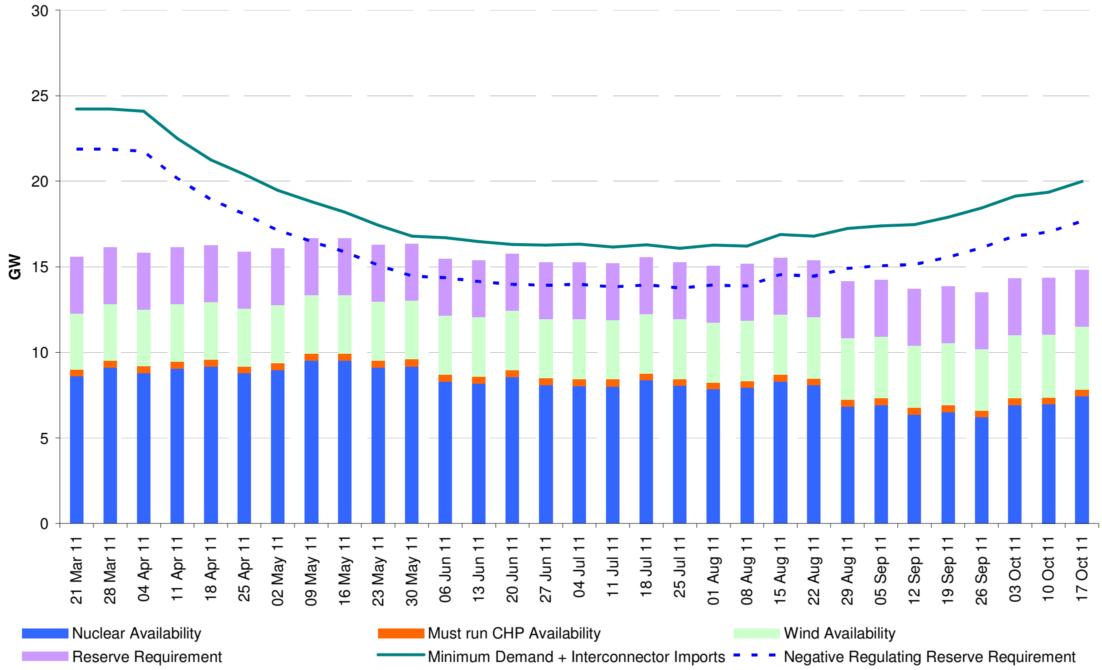
there could be a requirement to reduce the output of the wind generation to allow additional more controllable flexible generation to be synchronised.

64. In **Figure E 7** there is still space below the green, minimum demand line and above the sum of the generation requirements. Hence there would be no requirement to take any action.

65. The reserve requirement discussed previously is to protect against loss of generation plant causing a low frequency event. There is also a requirement to protect against loss of demand causing a high frequency event. This requirement is referred to as negative regulating reserve requirement. It is normally physically held by machines running at a level above their minimum level which can then reduce their output to match any loss of demand. This amount of flexibility also has to be considered and provides the actual limit which must not be exceeded - the dotted blue line.

66. In **Figure E 8** an import of 3GW on the interconnectors is included. During the period June, July and August if the total output from the directly connected 3.3 GW[5] wind units exceeds 40 - 50% output, when combined with 3 GW of imports form the continent, there would be a requirement to take some action. If the market had not already responded, the action would either be in the form of System Operator trades where available to reduce some of the import from the continent or a reduction in wind output to allow more flexibility to be created on other units.

Figure E 8 - Detailed Summer Minimum Analysis with 3GW of Interconnector Imports



[5] Declared availability of Wind Generation in July 2011

67. It should be noted during this analysis that wind availability figures refer to the directly connected wind generation. It is assumed that there is an equal amount of wind generation embedded within the distribution networks. During high wind, the output from both the directly connected generation and the embedded generation would increase, the directly connected generation would be seen as an increase in generation and the embedded generation would cause a reduction in the minimum demand.

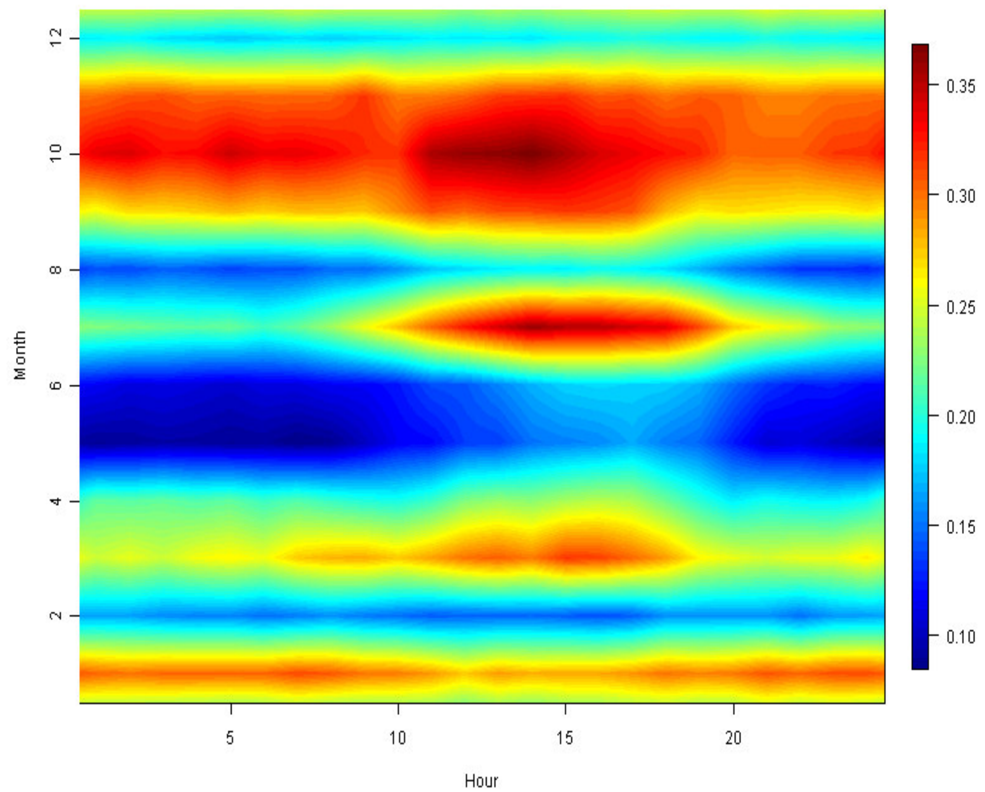
68. **Figure E 9** shows the load factor of wind across 2010. The chart is created from the directly connected wind operational metering, the y-axis is the month and the x-axis is the time of the day. This is a small data set, from mainly on-shore wind located in Scotland, and it is only provided to support the relationship between season and wind load factor. The summary points derived from this data is:

- Average annual load factor for 2010 is ~30%;
- Average winter load factor for 2010 is ~35%; and
- Average summer load factor for 2010 is ~20%.

69. The lowest average load factors occur overnight in the summer period.

70. Looking in detail at the summer minimum period during 2010 the wind load factor did not exceed 25%. Hence the scenario detailed previously requiring action when the load factor exceeds 40-50% would be considered a low probability event this summer.

Figure E 9 - Great Britain Wind Load Factor 2010 Heat Map

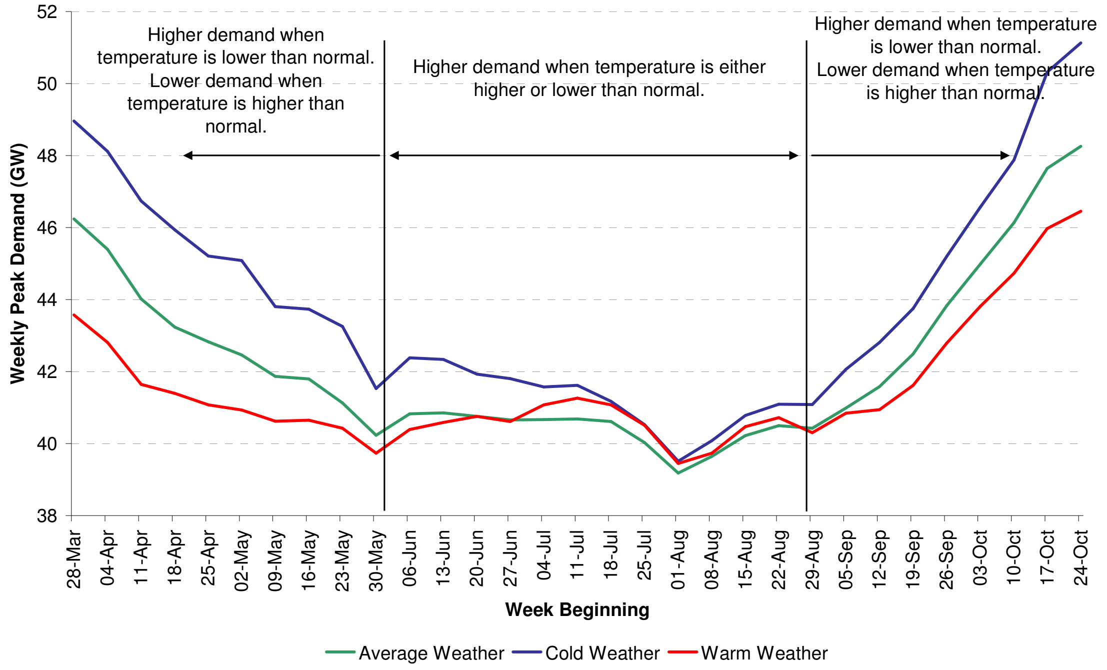


Electricity Demand variation due to weather

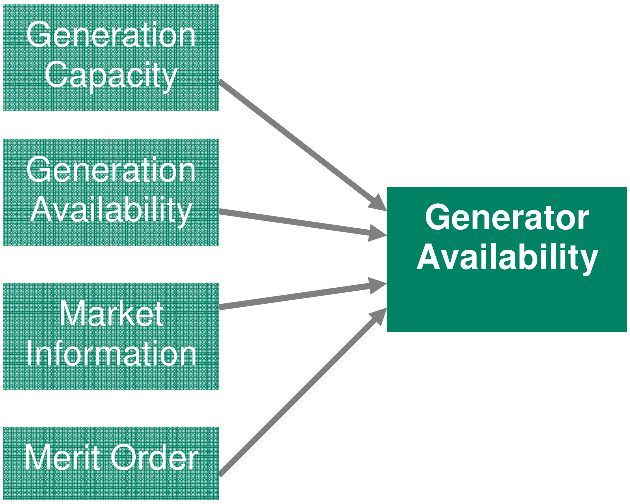
71. Demand response to weather conditions varies during the year and also varies over different years as demand characteristics change. **Figure E 10** depicts the relationship between summer demand and weather, at different times of the summer based on historic demand and weather data.

- Demand is generally higher when the temperatures are abnormally cold. This is normally between April and mid-June, and also from September onwards
- In the high summer, mid-June to mid-August, the temperature is often close to the comfort temperature of 16-17 degrees. Either an increase or decrease in the temperature will cause the demand to increase.

Figure E 10 - Electricity Demand under average, warm and cold conditions



Generator Availability

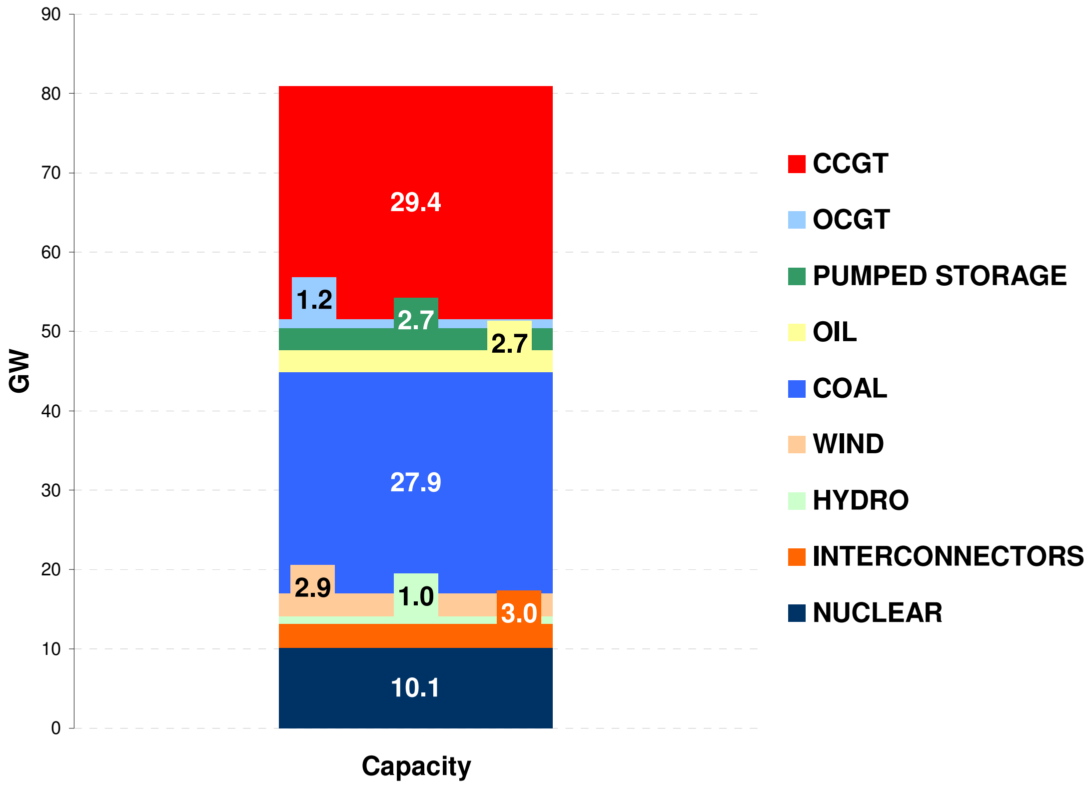


Generation Capacity

72. As shown in **Figure E 11**, there has been a net increase of 2.3 GW in Operational Registered Capacity (ORC) to 80.9 GW since the Winter Outlook Report, including;

- An increase of 3.75 GW is due to Grain (1,200 MW), Staythorpe (1,700 MW) and Severn Power (850 MW) now being commissioned or to be commissioned before the start of the summer.
- There has also been an increase of 0.3 GW due to the addition of new wind farms and an update of some of the existing ones that were in the process of being built.
- The closure of Fife has decreased the ORC by 0.1 GW.
- The reduction of Transmission Entry Capacity (TEC) of Teesside has decreased the ORC by a further 1.8 GW
- Not included in the figure, but potential upside exists in the form of Pembroke which is proposed to start commissioning this summer.

Figure E 11 - Generation Capacity - Summer 2011



Generation Availability

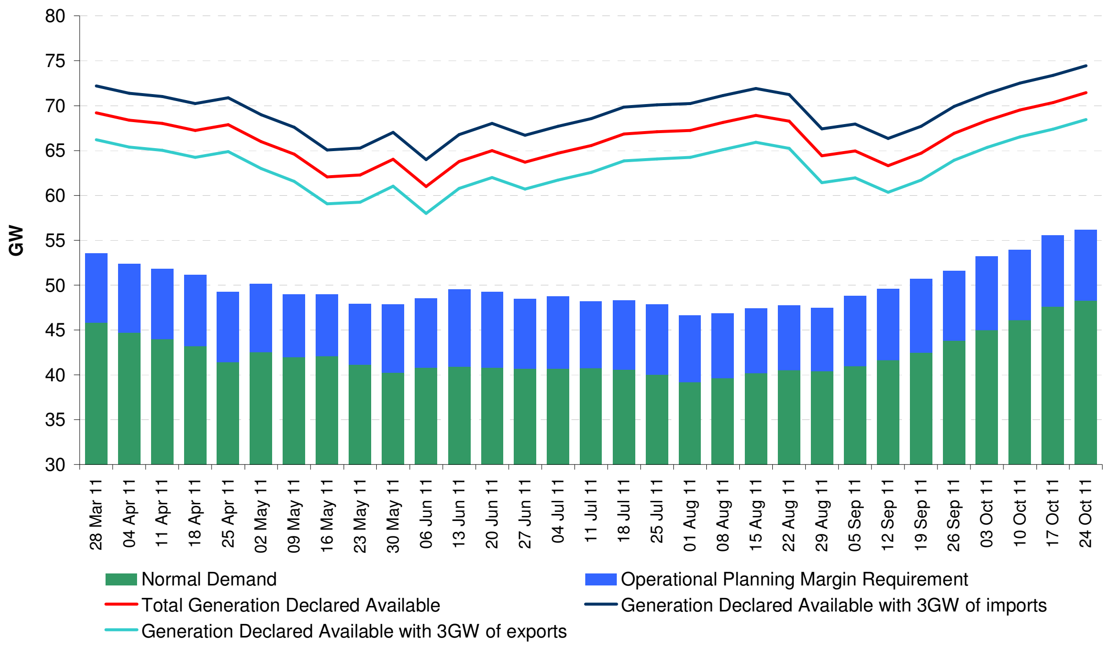
73. As usual over the summer period there will be a significant generation outage programme that will reduce the amount of available generation plant. Generation surplus, which is the excess of generation availability over demand and reserve requirements is published on www.bmreports.com[7].

74. At present there is a comfortable surplus for every week in the summer on the current generation outage programme provided by the generators. Therefore no problems are expected in being able to meet demand over the summer.

[7] http://www.bmreports.com/bsp/BMRSSystemData.php?pT=WEEKFC

75. **Figure E 12** shows the normal demand levels and the generator availability declared to National Grid by Generators under Grid Code Operating Code 2 (OC2). The chart also superimposes interconnector flows to the continent, there is further discussion regarding expected interconnector flows on page 42. The interconnector to Northern Ireland has been excluded from this analysis due to it's relatively small size and as over the summer the flows tend to impact the amount of constrained generation in Scotland rather than the National surpluses.

Figure E 12 - Declared Generation Availability



76. It is necessary to hold varying levels of reserve such that within-day there is adequate reserve to cover for;

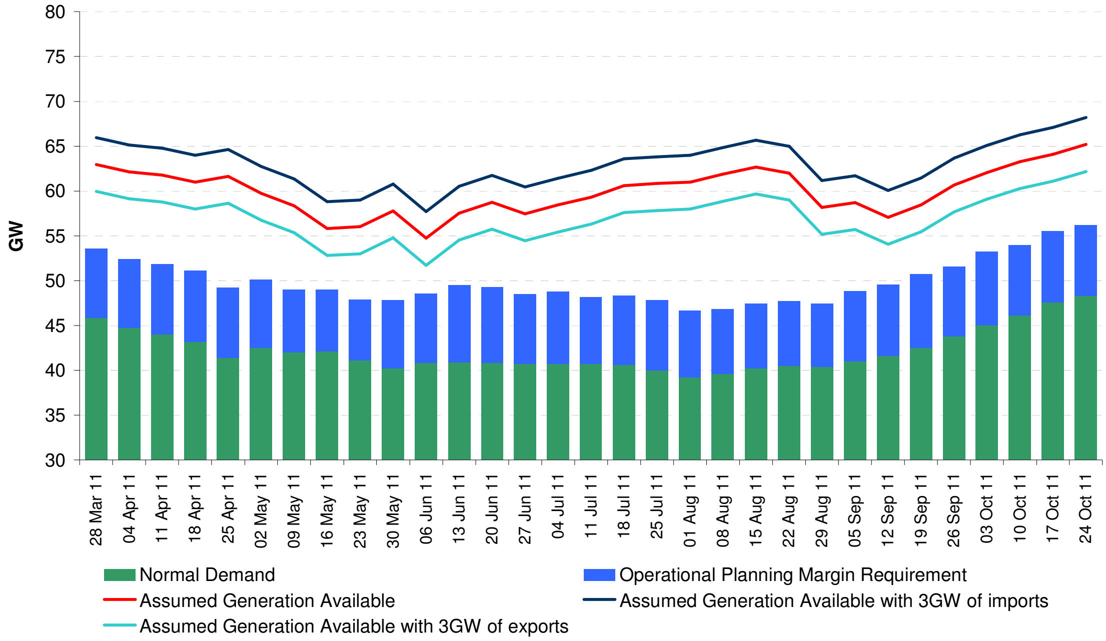
- short-term generator breakdowns,
- demand forecast errors
- and other specific issues, such as
- effects of transmission system constraints or
- generator commissioning.

77. This reserve requirement amounts to a discount of up to 12 GW at the planning stage from generation declared technically available. This allowance is shown in **Figure E 12** as OPMR (Operational Planning Margin Requirement). More detailed breakdowns and an explanation of OPMR categories are on the National Grid website[8]

[8] http://www.nationalgrid.com/uk/Electricity/Data/reserve/bmrs/

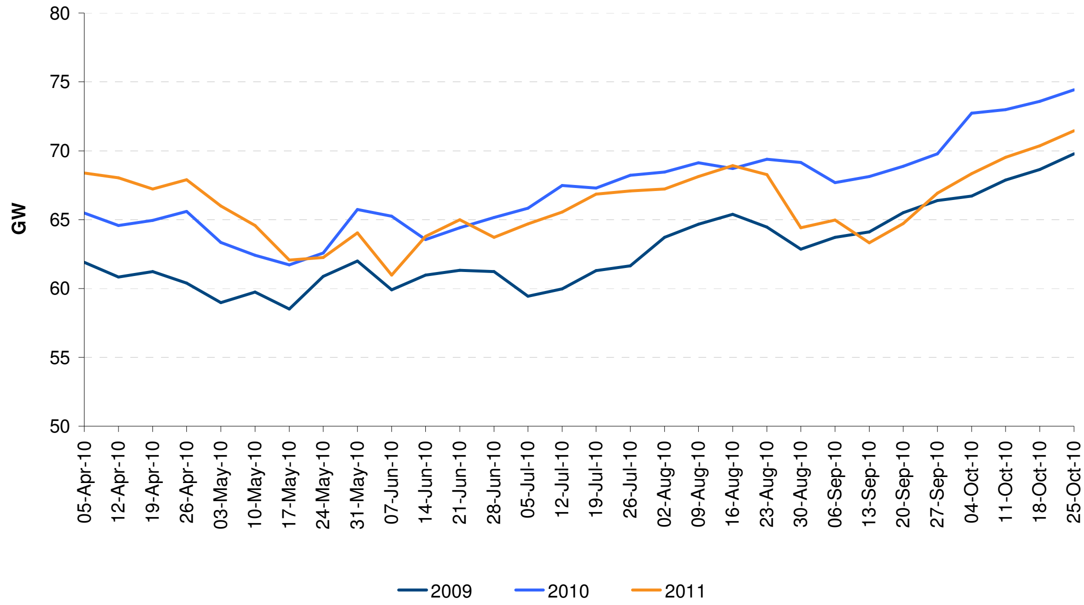
78. Using the historic average breakdown rate from the past three summers (5%) combined with an assumption of 10% wind availability gives the assumed generation availability as show in **Figure E 13**.

Figure E 13 - Assumed Generation Availability



79. The current levels of notified generation availability are similar to summer 2010 as illustrated in **Figure E 14**. The ORC has increased as discussed earlier but there is also further outages during the winter, the largest downward change is due to Centrica having withdrawn four of their CCGTs for the next 12 months and a long outage at Tilbury until November. This downward change amounts to a total of 2.3 GW.

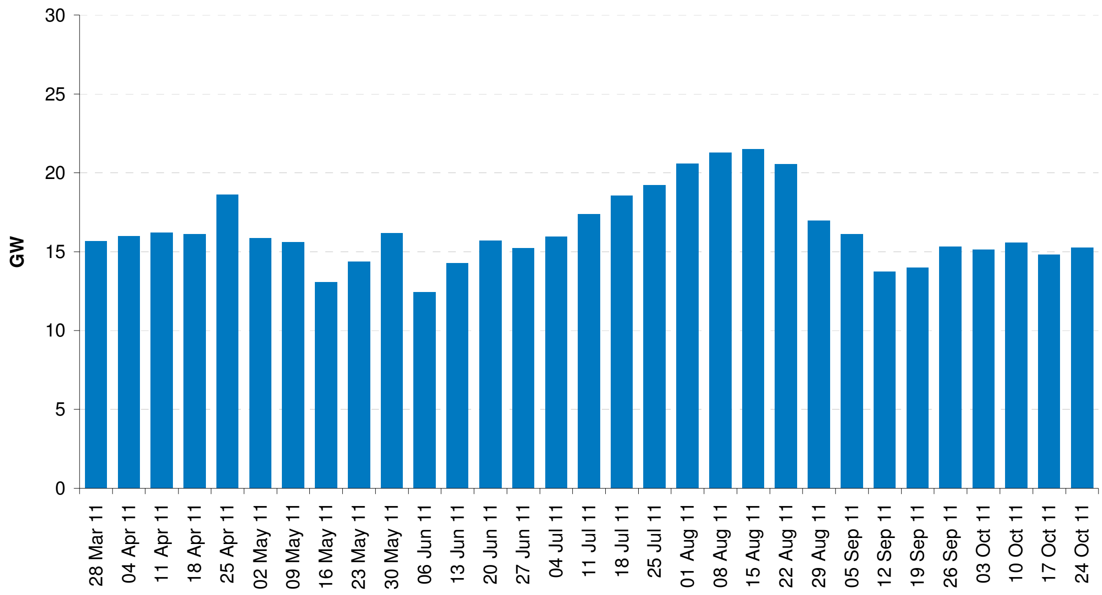
Figure E 14 - Declared Generation Availability including the last 2 summers



80. It is expected that some LCPD (Large Combustion Plant Directive) opted out coal and oil fired generation will again go “summer cold” so that the affected units would only be available with long notice periods. If there was an erosion of the surpluses it is assumed that the generators would be able to respond in time to the appropriate market signals.

81. The current surpluses over the summer, calculated as the excess of available generation over the forecast demand and reserve requirements are show in **Figure E 15**. Surpluses range from 12.5 GW at the beginning of June to 21.5 GW during the middle of August. The surpluses are calculated with the interconnectors at zero. Actual outturn generation availability will be lower than that currently indicated due to new outages being planned, short term breakdowns and plant shortfalls.

Figure E 15 - Generation Surplus



Market Information

82. Modifications to the Balancing Services Code have enabled further transparency by enabling the publishing of additional generation capacity availability information by the Balancing Mechanism Reporting System. The following information is now published on www.bmreports.com ;

- 2-14 days ahead aggregated national Output Usable data by fuel type, daily resolution
- 2-52 weeks ahead aggregated national Output Usable data by fuel type; weekly resolution
- 2-14 days ahead Output Usable by BMU, daily resolution
- 2-52 weeks ahead Output Useable by BMU, weekly resolution

System Warnings

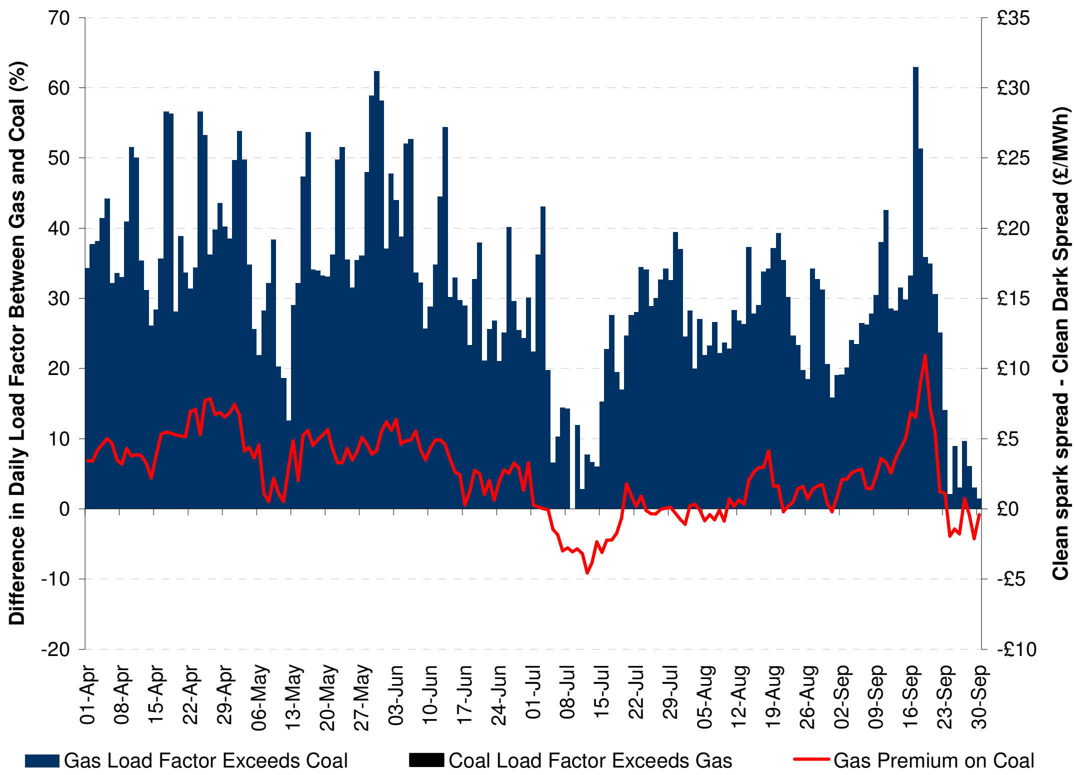
83. System warnings may occur at any time of year. No system warnings were issued during the summer of 2010[9].

84. System warnings during the summer have most often been associated with short term generation unavailability relative to demand, the warnings are a useful tool for market response.

Merit Order

85. As discussed on page 10, there is a strong bias for all of the summer period for coal to be the favoured source of fuel for power generation. Gas exceeded coal for all of last summer even though through July the Gas premium on Coal was negative, the eventual running is most likely linked to plant efficiencies.

Figure E 16 - Summer 2010 Coal and Gas Load Factors and Clean Spreads



[9] Last system warning issued on 15th January 2009

Interconnector Flows

BritNed

86. BritNed[10] is now in full commercial operation, offering 1,000 MW of capacity in either direction. Due to various initiatives the French and Dutch Electricity markets are closely coupled. Due to this market coupling it is expected that BritNed and IFA will flow in the same direction as the low price differential between the Dutch and French markets make it uneconomical to 'wheel' power through the UK.

IFA

87. The valve replacement outage[11] that started during March will continue through to May. A further outage is then planned for August through to October. The valve replacement outages reduce the capability of the IFA from 2,000 MW to 1,000 MW

88. For both BritNed and the IFA flows are expected to be into the UK for most of the time. Flows overnight are expected to be greater than during the day.

Transmission System Issues

89. 2011 sees the continuation of major works associated with the Transmission Investment for Renewable Generation (TIRG) works. This work is to construct or rebuild major sections of the transmission system in Scotland and the North of England, to deliver additional transmission capacity to transport energy from new renewable generation (wind) in Scotland.

90. Additionally, significant outages are required for construction works within the South East and South Wales, primarily to facilitate generation connections.

91. The network outages to undertake the work will reduce the available transmission system capacity between Scotland and England, as well as between the North and South of England, and in the South East.

92. To manage the resulting constraint volumes, we will use a combination of (i) contracts to limit the output of certain power stations; (ii) arming of intertrips to automatically disconnect generation in the event of a transmission fault, (iii) actions on the day in the Balancing Mechanism, and (iv) trades to resolve these constraints efficiently and effectively.

93. These transmission system reinforcements form part of a substantial development of the networks to accommodate new generation and to replace assets to ensure the continued reliable performance of the GB transmission system. Details of planned reinforcements are shown in National Grid's Seven Year Statement[12].

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[10] https://www.britned.com/Pages/default.aspx
[11] Full details of valve outages can be found here. http://www.nationalgrid.com/uk/Interconnectors/France/GeneralInfor/
[12] http://www.nationalgrid.com/uk/Electricity/SYS/