nationalgrid

National Electricity Transmission System Performance Report 2012–13

Report to the Gas and Electricity Markets Authority

Contents

National Electricity Transmission System Performance Report

Introduction

The electricity transmission networks in Great Britain are owned by National Grid Electricity Transmission plc (NGET) in England and Wales, Scottish Power Transmission Limited (SPTL) in south and central Scotland and Scottish Hydro Electric Transmission plc (SHE Transmission) in the north of Scotland. These three networks form the Onshore Transmission System. The Offshore Transmission networks are owned by Transmission Capital Partners Limited (TC) and Blue Transmission Limited (BT). The National Electricity Transmission System (NETS) is comprised of the Onshore Transmission System and the Offshore Transmission System.

In addition to its role as the Transmission Owner in England and Wales, NGET became the Great Britain System Operator (GBSO) on 1 April 2005, and subsequently on 24th June 2009, National Electricity Transmission System Operator (NETSO) which includes the Offshore Transmission System.

In accordance with Standard Licence Condition C17 (Transmission System Security, Standard and Quality of Service) of its Transmission Licence, NGET, as NETSO, is required by the Gas and Electricity Markets Authority, to report National Electricity Transmission System performance in terms of availability, system security and the quality of service.

The Onshore and Offshore Transmission Systems broadly comprises circuits operating at 400 kV, 275 kV and 132 kV. The formal definition of the National Electricity Transmission System is contained in the NETS Grid Code and NETS Security and Quality of Supply Standard (NETS SQSS). The fully interconnected transmission system provides a consistently high quality of supply and also allows for the efficient bulk transfer of power from remote generation to demand centres.

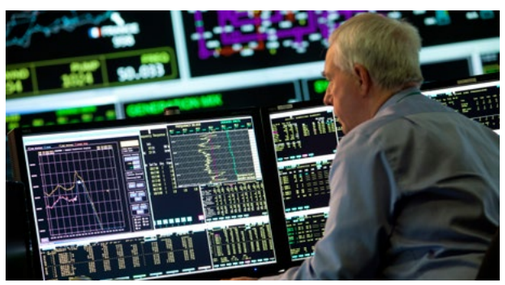
Information relating to Scottish Power Transmission Limited, Scottish Hydro Electric Transmission plc, TC Robin Rigg OFTO Limited, TC Barrow OFTO Limited, TC Gunfleet Sands OFTO Limited, TC Ormonde OFTO Limited and Blue Transmission Limited have been provided by the Transmission Owners in accordance with Licence Condition D3 (Transmission System Security Standard and Quality of Service) of their Transmission Licences.

When considering the performance of the Scottish transmission networks it should be recognised that this can be influenced by both the Scottish Transmission Owners and the NETSO.

The National Electricity Transmission System is connected via interconnectors to transmission systems in France, Northern and Southern Ireland and Netherlands. The Northern Ireland Interconnector is regulated by the Northern Ireland Regulator (NIAUR) and Southern Ireland is regulated by the Commission for Energy Regulation (CER) which both fall outside the scope of this report.

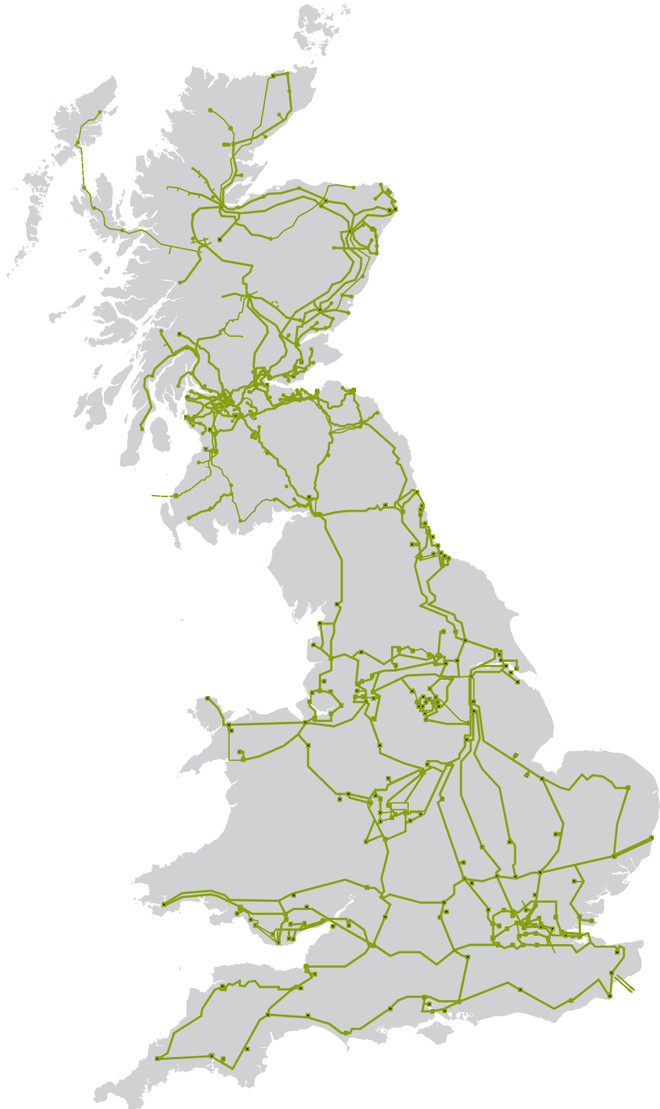
Information relating to the Interconnexion France – Angleterre (IFA) has been provided by National Grid Interconnectors Limited (NGIC) in accordance with Licence Condition D5 (Transmission System Security Standard and Quality of Service) of the NGIC Transmission Licence.

Information relating to the interconnector between England and the Netherlands (BritNed) has been provided by National Grid in conjunction with TenneT due to the joint ownership of the equipment.



Section One

National Electricity Transmission System (GB Network)



Availability

The definitions and criteria for system availability can be found in the Glossary of Terms at the end of this report.

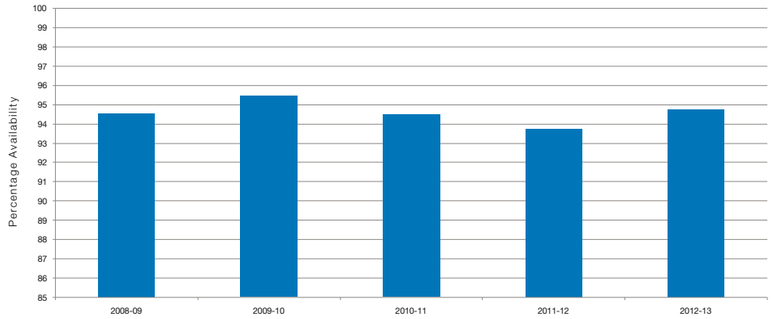
National Electricity Transmission System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability.

Annual System Availability

Annual System Availability of the National Electricity Transmission System for 2012 - 2013 was:

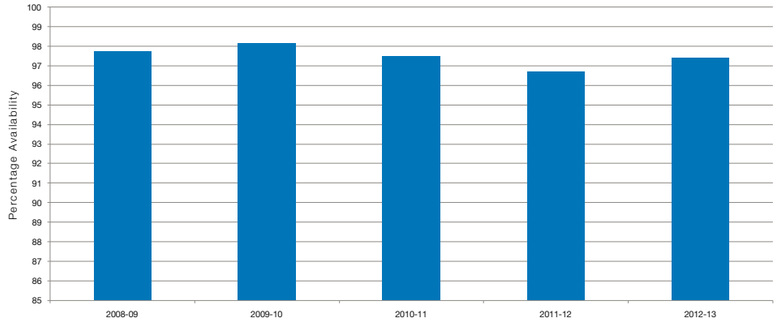
94.75%

% Annual System Availability



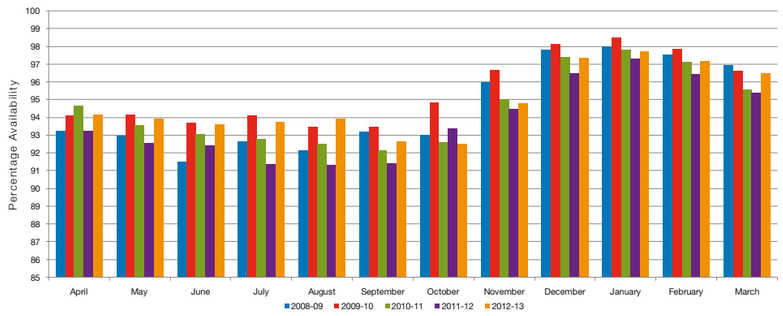
2008-09	2009-10	2010-11	2011-12	2012-13
94.55	95.44	94.47	93.78	94.75

% Winter Peak System Availability



2008-09	2009-10	2010-11	2011-12	2012-13
97.75	98.15	97.45	96.71	97.40

% Monthly System Availability



	2008-09	2009-10	2010-11	2011-12	2012-13
April	93.20	94.07	94.65	93.25	94.12
May	92.94	94.17	93.55	92.51	93.87
June	91.48	93.70	93.04	92.39	93.59
July	92.64	94.07	92.79	91.36	93.72
August	92.14	93.45	92.50	91.30	93.87
September	93.15	93.42	92.12	91.43	92.65
October	92.98	94.85	92.60	93.35	92.49
November	95.93	96.67	94.97	94.45	94.77
December	97.77	98.11	97.40	96.48	97.32
January	97.96	98.48	97.82	97.26	97.68
February	97.51	97.82	97.12	96.38	97.17
March	96.93	96.59	95.55	95.38	96.46

Security

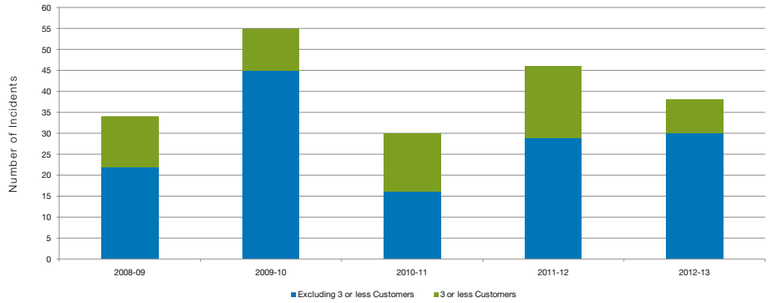
The definitions and criteria for system security can be found in the Glossary of Terms at the end of this report.

System performance is monitored by the Estimated Unsupplied Energy from the National Electricity Transmission System for each incident.

During 2012-13 there were 614 NETS events where transmission circuits were disconnected either automatically or by urgent manual switching. The vast majority of these events had no impact on electricity users with only 38 resulting in loss of supplies to customers.

Number of Loss of Supply Incidents

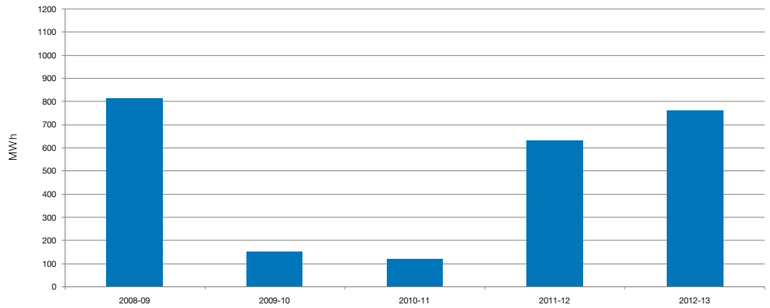
The chart shows the annual comparison of the numbers of Loss of Supply Incidents that occurred within the National Electricity Transmission System.



	2008-09	2009-10	2010-11	2011-12	2012-13
Excluding 3 or less Customers	22	45	16	29	30
3 or less Customers	12	10	14	17	8

Estimated Unsupplied Energy

The chart shows the annual comparison of the Estimated Unsupplied Energy, excluding 3 or less customers, for Loss of Supply Incidents that occur within the National Electricity Transmission System.



	2008-09	2009-10	2010-11	2011-12	2012-13
Excluding 3 or less Customers	814.48	150.55	120.54	628.88	760.53
3 or less Customers	33.80	520.85	863.10	788.70	6.90

Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the National Electricity Transmission System during 2012-13 was:

767.43 MWh

Reliability of Supply

The Overall Reliability of Supply for the National Electricity Transmission System during 2012-13 was:

99.99975%

compared with 99.99954% in 2011-12 and 99.99969% in 2010-11

Quality of Service

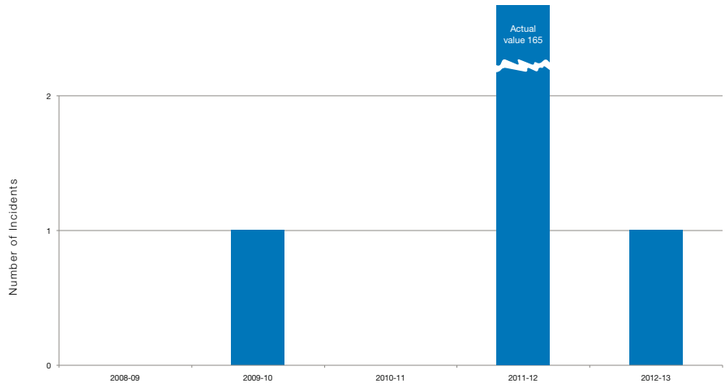
Quality of service is measured with reference to system voltage and frequency. The criteria for reportable Voltage and Frequency Excursions can be found in the Glossary of Terms at the end of this report.

Voltage Excursions

During 2012-13 there was one reportable Voltage Excursion within the National Electricity Transmission System.

Incident Date, Time and Location
12 August 2012, 05:30 hrs at East Claydon 400 kV substation Voltages above the statutory limit of 420 kV were observed for 36 minutes due to low levels of reactive power demand, with the voltage reaching a maximum of 422 kV.

The chart below summarises the reportable voltage excursions that have occurred on the National Electricity Transmission System within England and Wales during 2012-13.

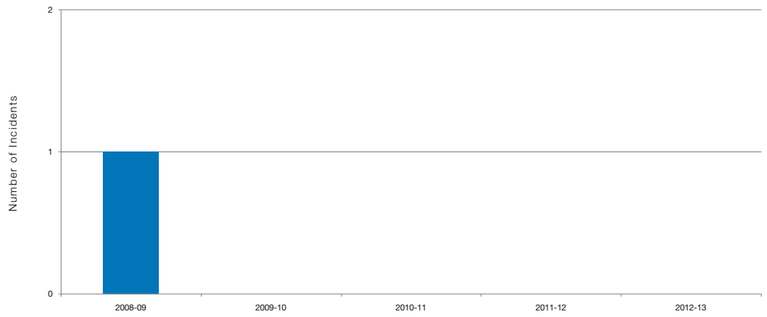


	2008-09	2009-10	2010-11	2011-12	2012-13
Number of NGET Excursions	0	1	0	165	1
Number of SPT Excursions	0	0	0	0	0
Number of SHE Excursions	0	0	0	0	0

Frequency Excursions

During 2012-13 there have been no reportable Frequency Excursions.

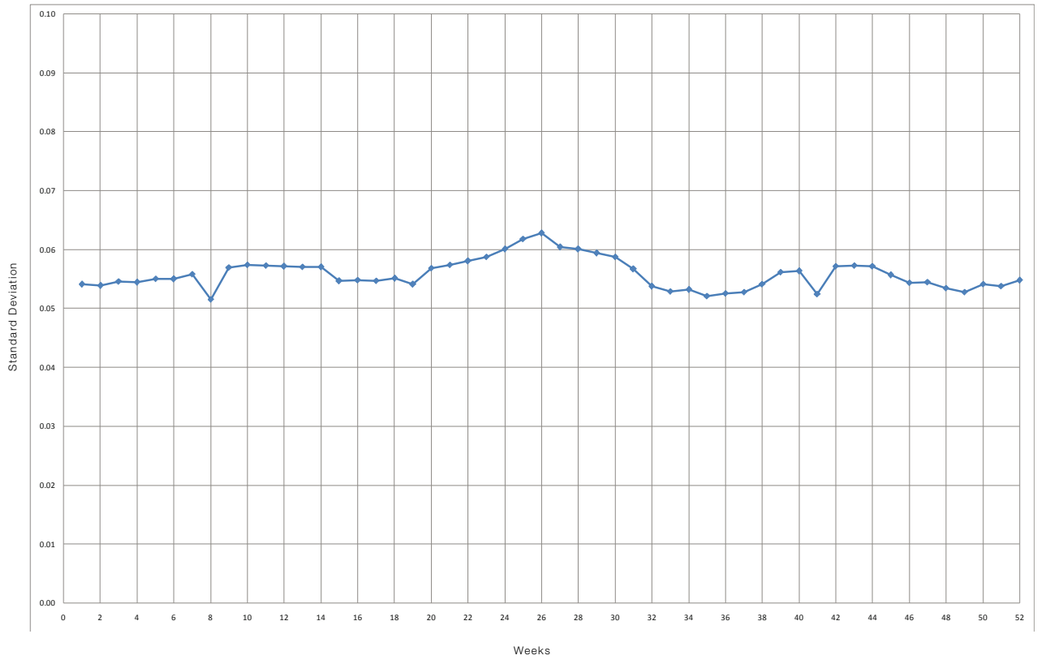
The chart below shows the annual comparison of the reportable Frequency Excursions that occurred within the National Electricity Transmission System.



	2008-09	2009-10	2010-11	2011-12	2012-13
Number of Excursions	1	0	0	0	0

Frequency Standard Deviation

The chart below displays the recorded Frequency Standard Deviation from 50 Hz on a weekly basis for the year 2012-13.



Section Two

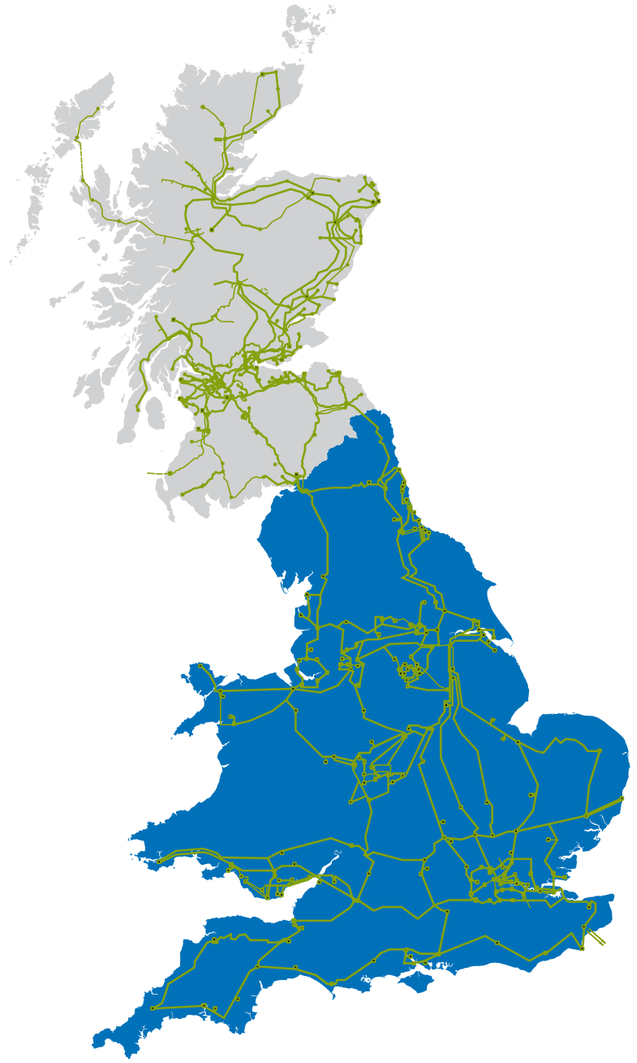
NGET System
(England & Wales Network)

System Description

The NGET Transmission System operates at 400, 275 and 132 kV supplying electricity to consumers in England and Wales. The system covers an area of approximately 151,000 square kilometres, in accordance with the standards laid down in the Transmission Licence. It is connected to the SPTL Transmission System to the north and three HVDC interconnectors to Southern Ireland, France and Holland.

There are 69 large power stations connected to the England and Wales transmission system comprising of Balancing Mechanism Units (BMU's) which supply electricity to 12 distribution networks and a small number of directly connected customers such as steelworks.

The Transmission System consists of 14,114 circuit kilometres of overhead line and 630 circuit kilometres of underground transmission cables interconnecting over 300 substations.

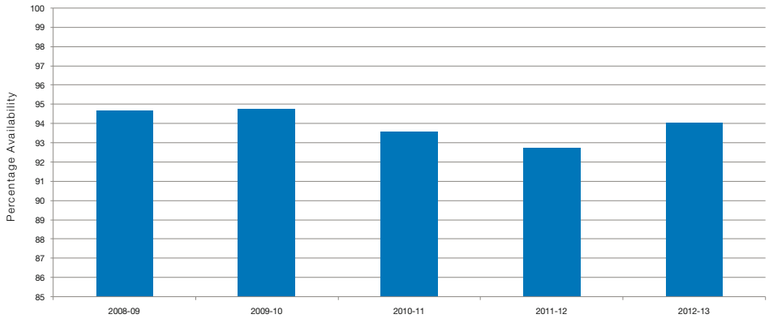


Availability

The definitions and criteria for system availability can be found in the Glossary of Terms at the end of this report.

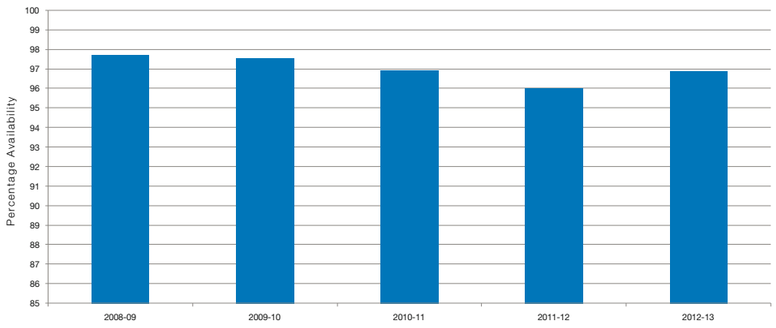
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

% Annual System Availability



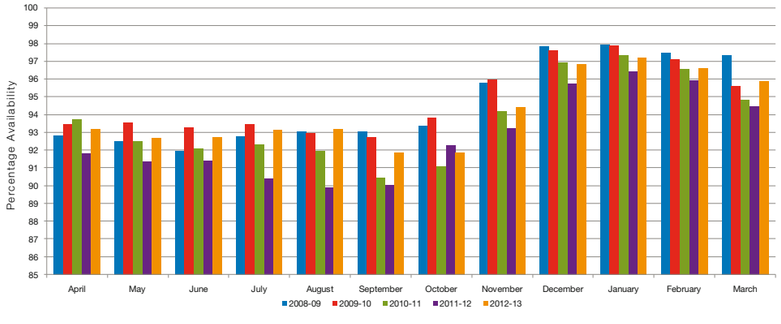
2008-09	2009-10	2010-11	2011-12	2012-13
94.64	94.76	93.60	92.71	94.03

% Winter Peak System Availability



2008-09	2009-10	2010-11	2011-12	2012-13
97.73	97.55	96.95	96.01	96.89

% Monthly System Availability

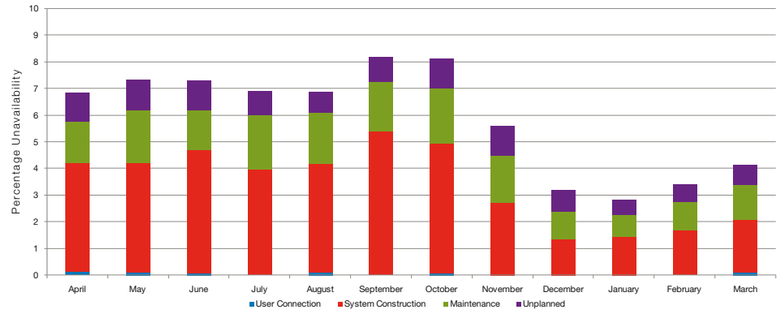


	2008-09	2009-10	2010-11	2011-12	2012-13
April	92.81	93.44	93.74	91.81	93.16
May	92.47	93.55	92.48	91.33	92.68
June	91.94	93.27	92.05	91.42	92.72
July	92.75	93.47	92.28	90.41	93.12
August	93.06	92.95	91.94	89.88	93.15
September	93.05	92.69	90.42	90.03	91.82
October	93.35	93.80	91.08	92.25	91.86
November	95.80	95.95	94.18	93.24	94.42
December	97.83	97.61	96.92	95.71	96.82
January	97.92	97.88	97.36	96.40	97.20
February	97.44	97.11	96.53	95.91	96.60
March	97.29	95.61	94.79	94.44	95.87

Planned and Unplanned System Unavailability

The table and the chart show the monthly variation in Planned and Unplanned System Unavailability.

Unavailability is defined as (100 – Availability) %



	User Connection	System Construction	Maintenance	Unplanned	Total
April	0.14	4.05	1.57	1.07	6.84
May	0.11	4.10	1.97	1.14	7.33
June	0.08	4.59	1.52	1.09	7.28
July	0.03	3.96	2.02	0.88	6.88
August	0.11	4.06	1.94	0.74	6.85
September	0.03	5.36	1.87	0.93	8.18
October	0.06	4.87	2.09	1.11	8.14
November	0.00	2.74	1.75	1.10	5.58
December	0.00	1.36	1.02	0.81	3.19
January	0.00	1.44	0.81	0.55	2.80
February	0.00	1.69	1.05	0.65	3.40
March	0.09	1.99	1.32	0.73	4.13

Security

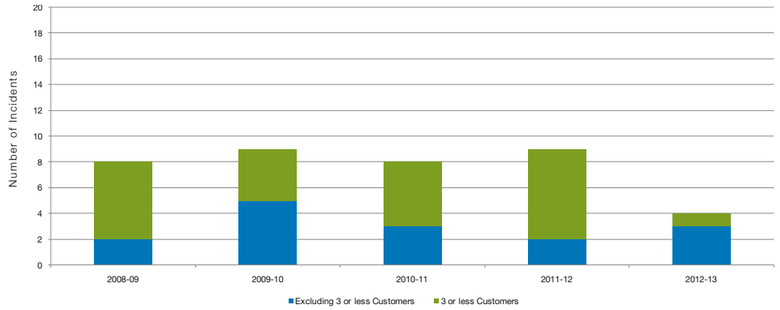
The definitions and criteria for system security can be found in the Glossary of Terms at the end of this report.

System performance is monitored by the Estimated Unsupplied Energy from the NGET Transmission System for each incident.

During 2012-13 there were 351 NGET system events where transmission circuits were disconnected either automatically or by urgent manual switching. The vast majority of these events had no impact on electricity users with only 3 resulting in loss of supplies to customers, one of which impacted upon 2 types of customer.

Number of Loss of Supply Incidents

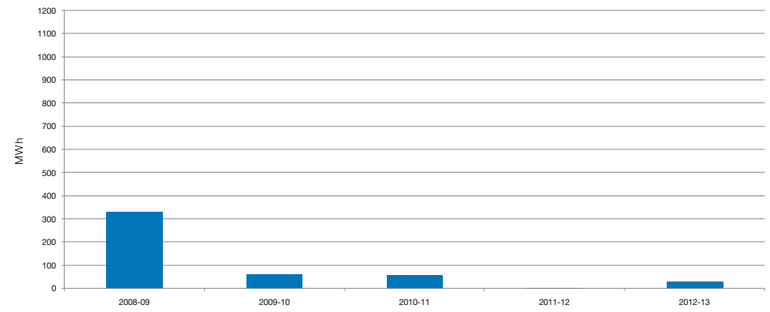
The chart shows the annual comparison of the numbers of Loss of Supply Incidents that occurred within the NGET Transmission System.



	2008-09	2009-10	2010-11	2011-12	2012-13
Excluding 3 or less Customers	2	5	3	2	3
3 or less Customers	6	4	5	7	1

Estimated Unsupplied Energy

The chart shows the annual comparison of the Estimated Unsupplied Energy, excluding 3 or less customers, for Loss of Supply Incidents that occur within the NGET Transmission System.



	2008-09	2009-10	2010-11	2011-12	2012-13
Excluding 3 or less Customers	329.50	61.00	59.50	2.50	31.50
3 or less Customers	6.00	426.00	3.00	788.50	1.50

Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the NGET Transmission System during 2012-13 was:

33 MWh

Reliability of Supply

The Overall Reliability of Supply for the NGET Transmission System during 2012-13 was:

99.99999%

compared with 99.99972% in 2011-12 and 99.99998% in 2010-11.

Loss of Supply Incident Details

NGET Loss of Supply Incidents excluding ‘3 or less customers’ sites

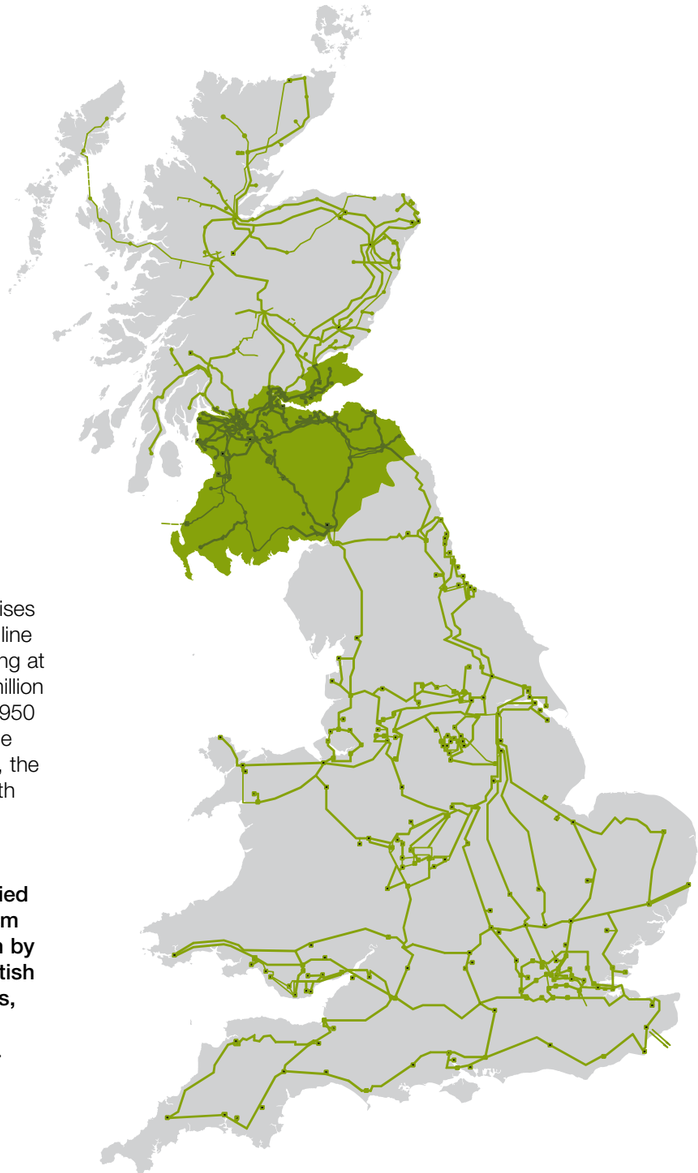
Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
6 October 2012, 11:16 hrs Fourstones 275 kV substation A protection alarm caused the trip of supergrid transformer 1, resulting in a loss of supply for 10-minutes.	**4.2**	**10**	**1**
11 December 2012, 07:00 hrs at Willenhall 275 kV substation A protection mal operation caused the trip of supergrid transformer 2, resulting in a loss of supply for 19-minutes.	**92.25**	**19**	**21.5**
13 February 2013, 19:24 hrs at Poppleton 33 kV substation Multiple trips of the Monk – Fryston – Poppleton circuits during adverse weather conditions caused a loss of supply for 12-minutes.	**44.6**	**12**	**9**
		Total	**31.5 MWh**

NGET Loss of Supply Incidents affecting ‘3 or less customers’ sites

Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
13 February 2013, 19:24 hrs at Poppleton 33 kV substation Multiple trips of the Monk – Fryston – Poppleton circuits during adverse weather conditions causing a loss of supply to the dedicated Network Rail York Feeder to the 25 kV substation for 29-minutes.	**3**	**29**	**1.5**
		Total	**1.5 MWh**

Section Three

SPTL System



System Description

The SPTL Transmission System comprises of 4,020 circuit kilometres of overhead line and cable and 134 substations operating at 400, 275 and 132 kV supplying 1.99 million customers and covering an area of 22,950 square kilometres. It is connected to the SHE Transmission System to the north, the NGET Transmission System to the south and the Northern Ireland Transmission System via an HVDC interconnector.

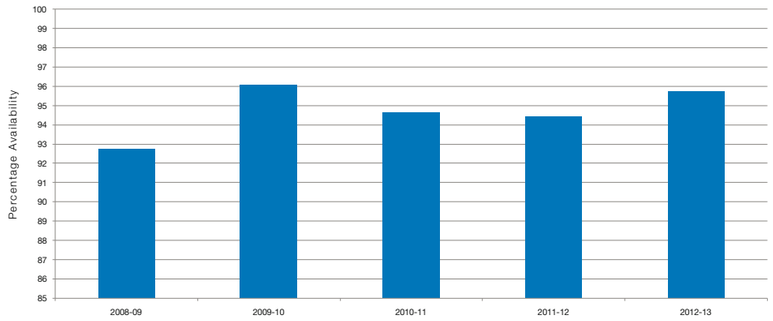
There are 17 major customers supplied directly from the Transmission System with the bulk of the load being taken by the Distribution Network within Scottish Power. Eighteen large power stations, totalling over 7.7 GW of generation capacity, are connected to the SPTL Transmission System.

Availability

The definitions and criteria for system availability can be found in the Glossary of Terms at the end of this report.

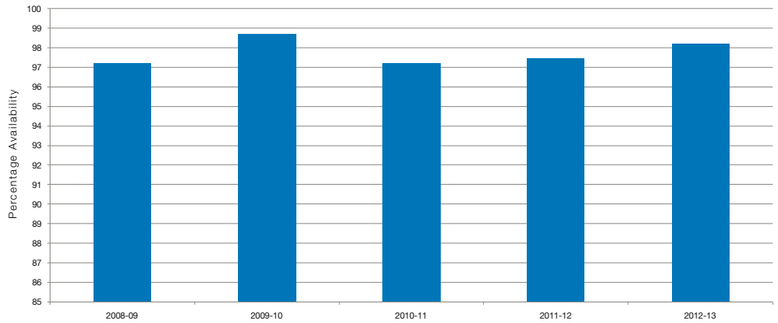
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

% Annual System Availability



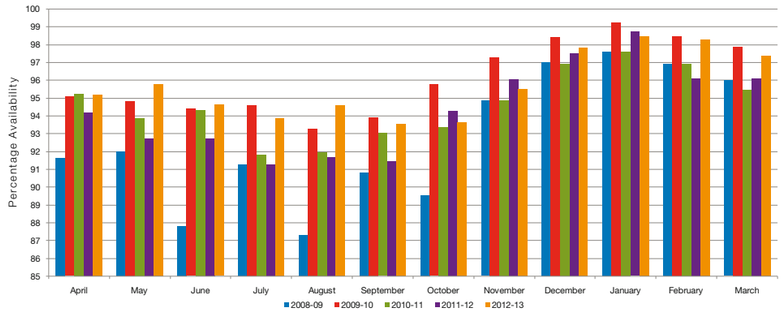
2008-09	2009-10	2010-11	2011-12	2012-13
92.74	96.09	94.62	94.41	95.72

% Winter Peak System Availability



2008-09	2009-10	2010-11	2011-12	2012-13
97.19	98.71	97.17	97.46	98.19

% Monthly System Availability

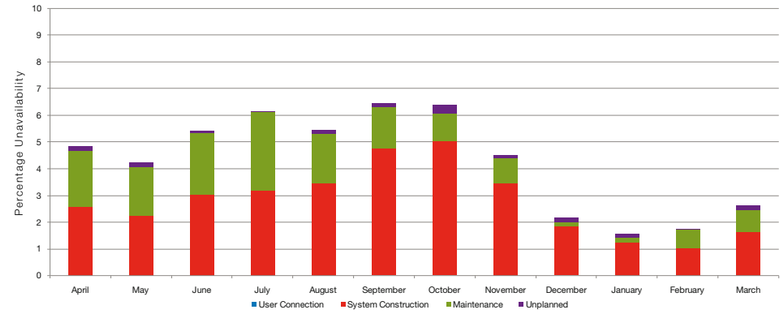


	2008-09	2009-10	2010-11	2011-12	2012-13
April	91.60	95.07	95.22	94.19	95.17
May	92.01	94.80	93.87	92.70	95.80
June	87.83	94.38	94.31	92.72	94.61
July	91.28	94.57	91.82	91.27	93.85
August	87.28	93.29	91.97	91.69	94.57
September	90.83	93.90	93.02	91.48	93.56
October	89.52	95.75	93.37	94.26	93.62
November	94.85	97.29	94.87	96.07	95.49
December	97.00	98.42	96.94	97.51	97.83
January	97.61	99.23	97.63	98.70	98.46
February	96.93	98.45	96.94	96.08	98.28
March	95.98	97.88	95.46	96.11	97.39

Planned and Unplanned System Unavailability

The table and the chart show the monthly variation in Planned and Unplanned System Unavailability.

Unavailability is defined as (100 – Availability) %



	User Connection	System Construction	Maintenance	Unplanned	Total
April	0.00	2.56	2.10	0.17	4.83
May	0.00	2.23	1.82	0.15	4.20
June	0.00	3.02	2.30	0.07	5.39
July	0.00	3.18	2.94	0.03	6.15
August	0.00	3.48	1.81	0.14	5.43
September	0.00	4.76	1.55	0.13	6.44
October	0.00	5.04	1.01	0.33	6.38
November	0.00	3.46	0.94	0.11	4.51
December	0.00	1.86	0.12	0.19	2.17
January	0.00	1.23	0.19	0.12	1.54
February	0.00	1.03	0.67	0.02	1.72
March	0.00	1.63	0.82	0.16	2.61

Security

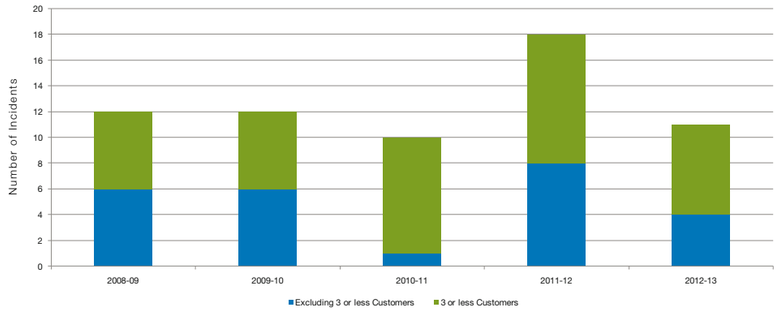
The definitions and criteria for system security can be found in the Glossary of Terms at the end of this report.

System performance is monitored by the estimated unsupplied energy from the SPTL Transmission System for each incident.

During 2012-13 there were 130 SPTL system events where transmission circuits were disconnected either automatically or by urgent manual switching. The vast majority of these events had no impact on electricity users with only 11 resulting in loss of supply to customers.

Number of Loss of Supply Incidents

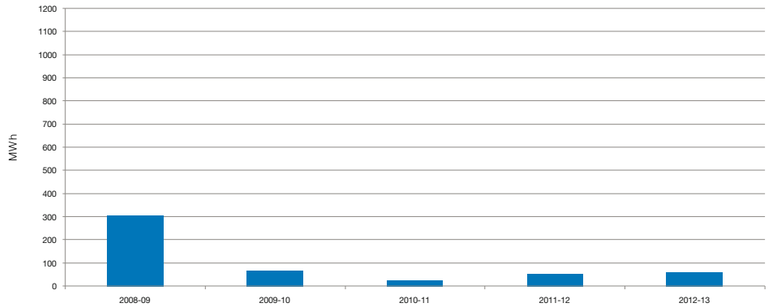
The chart shows the annual comparison of the numbers of Loss of Supply Incidents that occurred within the SPTL Transmission System.



	2008-09	2009-10	2010-11	2011-12	2012-13
Excluding 3 or less Customers	6	6	1	8	4
3 or less Customers	6	6	9	10	7

Estimated Unsupplied Energy

The chart shows the annual comparison of the Estimated Unsupplied Energy, excluding 3 or less customers, for Loss of Supply Incidents that occur within the SPTL Transmission System.



	2008-09	2009-10	2010-11	2011-12	2012-13
Excluding 3 or less Customers	306.40	67.85	25.70	52.50	62.80
3 or less Customers	27.80	94.85	860.10	0.20	5.40

Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SPTL Transmission System during 2012-13 was:

68.2 MWh

Reliability of Supply

The Overall Reliability of Supply for the SPTL Transmission System during 2012-13 was:

99.99968%

compared with 99.99975% in 2011-12 and 99.99600% in 2010-11.

Loss of Supply Incident Details

SPTL Loss of Supply Incidents excluding '3 or less customers' sites

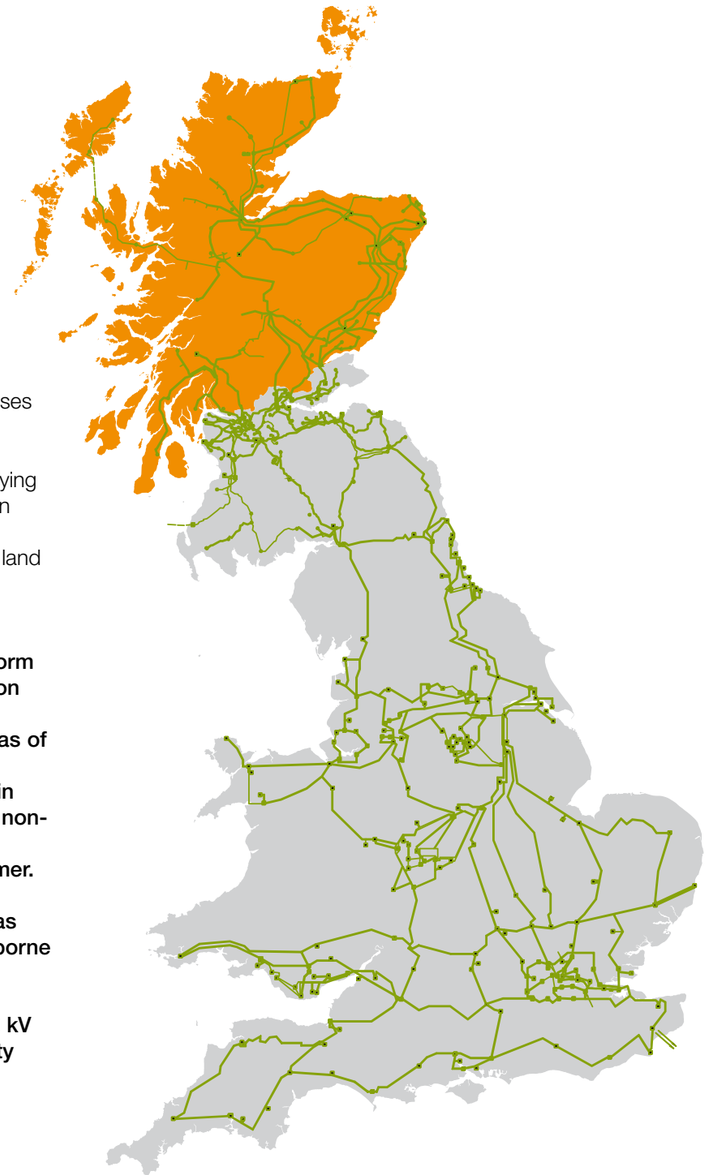
Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
25 May 2012, 11:14 hrs at Bathgate GSP Water ingress into the terminal box of the pressure relief device on Bathgate Grid T2B caused the Bonnybridge - Bathgate - Drumcross No.2 circuit to trip while Bathgate Grid T1A was out of service for maintenance work. The transformer was automatically isolated and the remainder of the circuit returned to service. This resulted in supplies to 26,457 customers being lost for 1-minute.	31.2	1	0.5
28 June 2012, 12:43 hrs at Gorgie and Telford Road GSPs Water ingress into the terminal box of the pressure relief device on Telford Road Grid T2 caused the Currie - Gorgie - Telford Road No.2 circuit to trip while the Currie - Gorgie - Telford Road No.1 circuit was out of service for construction work at Telford Road. This resulted in supplies being lost to 41,507 customers for an average of 23.2-minutes.	68.1	23	38.5
29 June 2012, 04:56 hrs at Telford Road GSP A protection failure at Telford Road caused the Currie - Gorgie - Telford Road No.2 circuit to trip while Telford Road Grid T1 was out of service for construction work. This resulted in supplies being lost to 23,483 customers for an average of 39.9-minutes.	21.1	40	14.2
15 August 2012, 06:47 hrs at Govan and Haggs Road GSPs A 33 kV cable fault on the low voltage side of Haggs Road Grid T1 caused the Neilston - Paisley - Govan - Haggs Road circuit to trip while the Braehead Park - Govan - Haggs Road circuit was out of service for construction work at Govan. This resulted in supplies being lost to 48,404 customers for an average of 13.4-minutes.	45.5	13	9.6
		Total	**62.8 MWh**

SPTL Loss of Supply Incidents affecting '3 or less customers' sites

Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
23 April 2012, 17:16 hrs at Whitelee 275 kV Substation A protection operation, which occurred during testing, caused supplies to be lost to 1 customer for 2-days and 5-hours.	0	3206	0
6 May 2012, 01:09 hrs at Maybole GSP A faulty protection relay at Coylton 132 kV substation caused an inter-trip signal to be sent to Maybole 132 kV substation, which caused circuit breaker 320 to trip. This resulted in supplies being lost to 1 customer for 35-minutes.	0	35	0
8 May 2012, 18:00 hrs at South Beach 25 kV Substation An overload was caused by abnormal running arrangements on the customer's network, causing the feeder circuit breaker to trip. This resulted in supplies being lost to 1 customer for 3-minutes.	0.5	3	0
9 May 2012, 07:44 hrs at South Beach 25 kV Substation An overload was caused by abnormal running arrangements on the customer's network, causing the feeder circuit breaker to trip. This resulted in supplies being lost to one customer for 14-minutes.	0.5	14	0.1
31 August 2012, 15:46 hrs at Whitelee 275 kV Substation All transformers at Whitelee 275 kV Substation were de-energised to allow transformer SGT3 to be switched out of service following a buchholtz gas alarm. This resulted in the loss of supplies to 1 customer for 46-minutes.	0	46	0
20 November 2012, 17:46 hrs at Whitelee Extension Substation All transformers at Whitelee Extension 275 kV Substation tripped when commissioning protection settings were exceeded. This resulted in the loss of supplies to 1 customer for 2-hours and 4-minutes.	0	124	0
15 January 2013, 23:22 hrs at Port Glasgow 25 kV Substation A cable fault caused the Devol Moor - Port Glasgow No.2 circuit to trip while the Devol Moor - Port Glasgow No.1 circuit was out of service for construction work. This resulted in supplies being lost to 1 customer for 10-hours and 36-minutes.	0.5	636	5.3
		Total	**5.4 MWh**

Section Four

SHE Transmission System



System Description

The SHE Transmission System comprises of 102 substations and 5,418 circuit kilometres of overhead line and cable operating at 275 kV and 132 kV supplying 0.75 million customers and covering an area of approximately 55,000 square kilometres or 24% of the Great Britain land mass. It is connected to the SPTL Transmission System to the south.

80% of these transmission assets form the main interconnected transmission system whilst the remaining 20% radially supply the more remote areas of the territory including the outlying islands. Some connections, mainly in the more remote areas, can involve non-standard connection or running arrangements chosen by the customer.

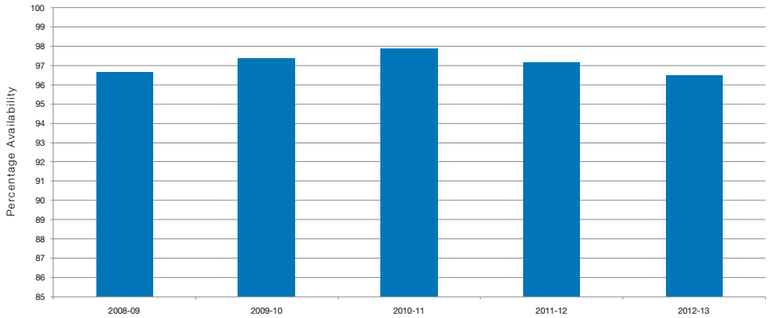
When considering 132 kV systems as transmission voltages it should be borne in mind that amounts of power transmitted at this voltage level are generally lower than at 275 and 400 kV and as such may have lower security standards applied.

Availability

The definitions and criteria for system availability can be found in the Glossary of Terms at the end of this report.

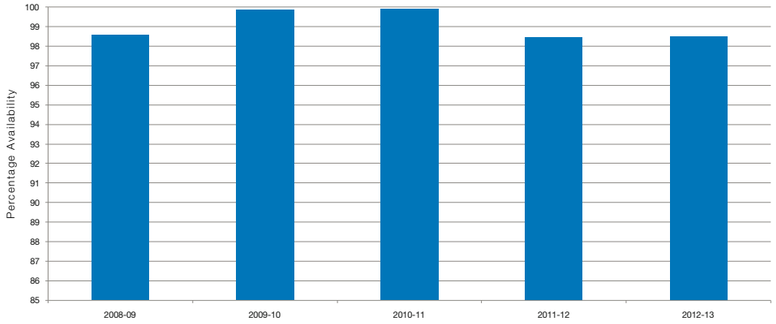
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

% Annual System Availability



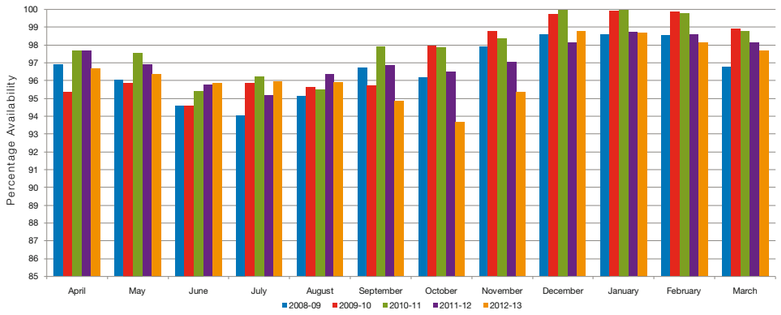
2008-09	2009-10	2010-11	2011-12	2012-13
96.66	97.37	97.89	97.14	96.48

% Winter Peak System Availability



2008-09	2009-10	2010-11	2011-12	2012-13
98.56	99.84	99.90	98.47	98.50

% Monthly System Availability

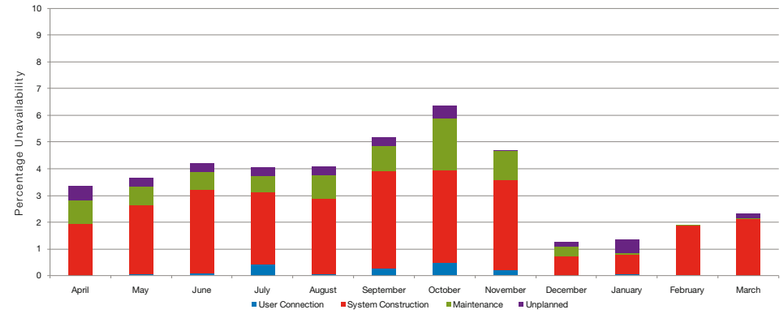


	2008-09	2009-10	2010-11	2011-12	2012-13
April	96.89	95.35	97.64	97.66	96.67
May	96.04	95.86	97.53	96.89	96.36
June	94.57	94.58	95.40	95.76	95.83
July	94.05	95.83	96.19	95.19	95.96
August	95.11	95.64	95.50	96.36	95.91
September	96.68	95.71	97.91	96.87	94.85
October	96.17	97.94	97.85	96.49	93.67
November	97.88	98.75	98.37	97.06	95.32
December	98.55	99.74	99.97	98.12	98.74
January	98.62	99.90	99.95	98.73	98.66
February	98.52	99.87	99.76	98.59	98.10
March	96.79	98.92	98.76	98.09	97.68

Planned and Unplanned System Unavailability

The table and the chart show the monthly variation in Planned and Unplanned System Unavailability.

Unavailability is defined as (100 – Availability) %



	User Connection	System Construction	Maintenance	Unplanned	Total
April	0.00	1.92	0.90	0.52	3.33
May	0.03	2.60	0.71	0.30	3.64
June	0.08	3.12	0.67	0.31	4.17
July	0.41	2.70	0.63	0.30	4.04
August	0.07	2.79	0.90	0.32	4.09
September	0.26	3.65	0.95	0.30	5.15
October	0.49	3.45	1.95	0.44	6.33
November	0.20	3.38	1.10	0.01	4.68
December	0.00	0.71	0.39	0.16	1.26
January	0.06	0.74	0.05	0.49	1.34
February	0.01	1.87	0.03	0.00	1.90
March	0.00	2.10	0.05	0.16	2.32

Security

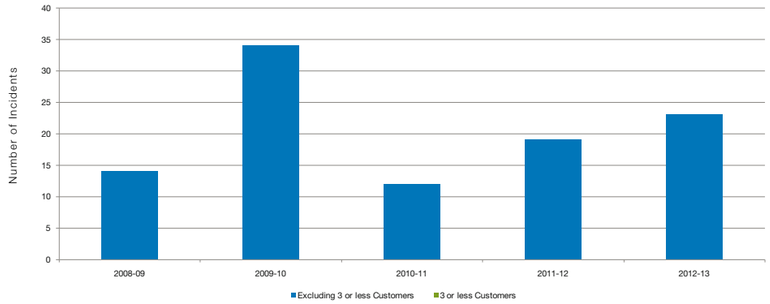
The definitions and criteria for system security can be found in the Glossary of Terms at the end of this report.

System performance is monitored by the Estimated Unsupplied Energy from the SHE Transmission System for each incident.

During 2012-13 there were 133 SHE Transmission system events where transmission circuits were disconnected either automatically or by urgent manual switching. The vast majority of these events had no impact on electricity users with only 23 resulting in loss of supplies to customers.

Number of Loss of Supply Incidents

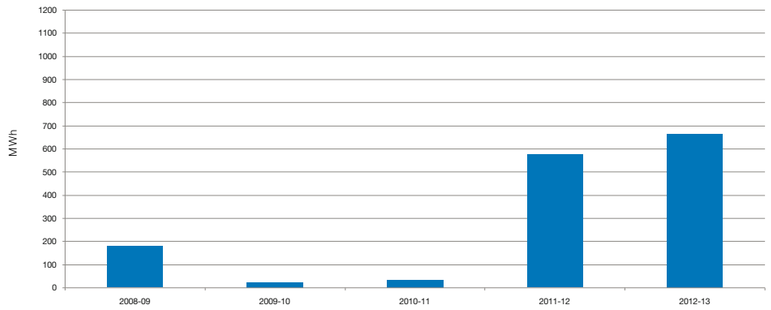
The chart shows the annual comparison of the numbers of Loss of Supply Incidents that occurred within the SHE Transmission System.



	2008-09	2009-10	2010-11	2011-12	2012-13
Excluding 3 or less Customers	14	34	12	19	23
3 or less Customers	0	0	0	0	0

Estimated Unsupplied Energy

The chart shows the annual comparison of the Estimated Unsupplied Energy, excluding 3 or less customers, for Loss of Supply Incidents that occur within the SHE Transmission System.



	2008-09	2009-10	2010-11	2011-12	2012-13
Excluding 3 or less Customers	178.58	21.70	35.34	573.88	666.23
3 or less Customers	0.00	0.00	0.00	0.00	0.00

Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SHE Transmission System during 2012-13 was:

666.23 MWh

Reliability of Supply

The Overall Reliability of Supply for the SHE Transmission System during 2012-13 was:

99.99123%

compared with 99.99228% in 2011-12 and 99.99956% in 2010-11.

Loss of Supply Incident Details

SHE Transmission Loss of Supply Incidents excluding '3 or less customers' sites

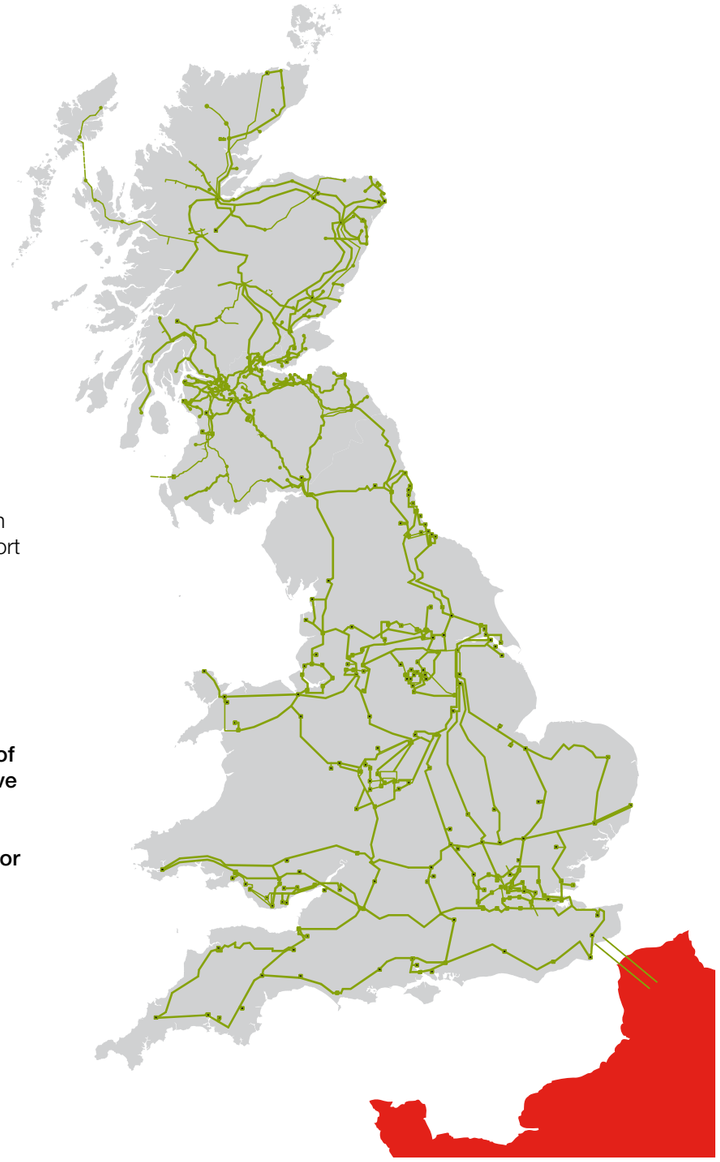
Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
21 April 2012, 20:07 hrs at Inveraray 132 kV Substation Inveraray - Port Ann - Carradale 132 kV double circuit tripped due to an unknown transient fault. Demand was restored in stages.	21	78	27.19
17 May 2012, 08:11 hrs at Charleston 132 kV Substation Charleston - Burghmuir 132 kV circuit tripped and auto-reclosed due to an unknown transient fault.	33	0.4	0.22
23 May 2012, 09:28 hrs at Shin 132 kV Substation Shin - Brora - Dunbeath - Mybster - Thurso - Dounreay 132 kV circuit tripped due to an unknown transient fault. Demand was restored in stages.	6	0.4	0.04
12 June 2012, 12:22 hrs at Quoich 132 kV Substation Grid Transformer No.1 circuit tripped due to a cable fault. Demand was restored in stages.	0.1	96	0.13
15 June 2012, 13:26 hrs at Fiddes 132 kV Substation Grid Transformer No.1 circuit tripped during commissioning.	11	12.6	2.31
24 June 2012, 11:25 hrs at Sloy 132 kV Substation Sloy - Windyhill - Dunoon East 132 kV circuit tripped and auto-reclosed due to an unknown transient fault whilst Dunoon Grid Transformer No.1 was out of service.	10	0.4	0.06
28 June 2012, 16:27 hrs at Inveraray 132 kV Substation Inveraray - Port Ann - Carradale 132 kV double circuit tripped and auto-reclosed during lightning activity.	25	0.3	0.14
1 July 2012, 05:22 hrs at Sloy 132 kV Substation Sloy - Windyhill - Dunoon East 132 kV circuit tripped and auto-reclosed due to an unknown transient fault whilst Dunoon Grid Transformer No.1 was out of service.	4.5	0.4	0.03
24 July 2012, 14:43 hrs at Harris 132 kV Substation Harris - Stornoway 132 kV circuit tripped due to loss of DNO infeed. Demand was restored in stages.	6.2	47	4.82
4 August 2012, 21:33 hrs at Sloy 132 kV Substation Sloy - Windyhill - Dunoon East 132 kV circuit tripped and auto-reclosed due to an unknown transient fault whilst Dunoon Grid Transformer No.1 was out of service.	11	0.4	0.07
14 August 2012, 16:51 hrs at Shin 132 kV Substation Shin - Brora - Dunbeath - Mybster - Thurso - Dounreay 132 kV circuit tripped and auto-reclosed due to an unknown transient fault.	41	0.3	0.2
31 August 2012, 09:15 hrs at Inveraray 132 kV Substation Inveraray - Port Ann - Carradale 132 kV double circuit tripped and auto-reclosed due to an unknown transient fault.	16	1.2	0.33
31 August 2012, 18:36 hrs at Inveraray 132 kV Substation Inveraray - Port Ann - Carradale 132 kV double circuit tripped and auto-reclosed due to an unknown transient fault.	17	36	10.18
7 September 2012, 07:16 hrs at Shin 132 kV Substation Shin - Brora - Dunbeath - Mybster - Thurso - Dounreay 132 kV circuit tripped due to an unknown transient fault. Demand was restored in stages.	16	17	9.81
17 November 2012, 21:56 hrs at Beauly 275 kV Substation Beauly - Strathbrora - Gordonbush - Dounreay 275 kV circuit tripped. Demand was restored in stages.	58	11	10.67
29 December 2012, 03:07 hrs at Broadford 132 kV Substation Broadford - Edinbane - Dunvegan - Ardmore 132 kV circuit tripped during storm conditions. Demand was restored in stages.	27	105	47.46
29 December 2012, 22:32 hrs at Fort Augustus 132 kV Substation Fort Augustus - Broadford - Edinbane - Dunvegan - Ardmore 132 kV circuit tripped after a lightning strike. Demand was restored in stages.	36	106	63.68
27 January 2013, 18:02 hrs at Broadford 132 kV Substation Broadford - Edinbane - Dunvegan - Ardmore 132 kV circuit tripped and auto-reclosed during lightning activity.	29	0.5	0.25
29 January 2013, 19:17 hrs at Fort Augustus 132 kV Substation Fort Augustus - Broadford - Edinbane - Dunvegan - Ardmore 132 kV circuit tripped and auto-reclosed during storm conditions.	49	0.5	0.41
4 February 2013, 13:01 hrs at Inveraray 132 kV Substation Inveraray - Port Ann - Carradale 132 kV double circuit tripped and auto-reclosed during lightning activity.	37	0.3	0.21
22 March 2013, 14:40 hrs at Inveraray 132 kV Substation Inveraray - Port Ann - Carradale 132 kV double circuit tripped and auto-reclosed then tripped during a tower collapse in blizzard conditions. Demand was restored in stages by the DNO network.	20.2	1450	488
22 March 2013, 23:01 hrs at Fort William 132 kV Substation Fort William - Kinlochleven 132 kV circuit tripped and auto-reclosed in blizzard conditions.	1	0.6	0.01
30 March 2013, 20:38 hrs at Sloy 132 kV Substation Sloy GT1 132 kV circuit tripped due to an insulator failure.	0.6	0.9	0.01
		Total	**666.23 MWh**

SHE Transmission Loss of Supply Incidents affecting '3 or less customers' sites

Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
		None	**None**

Section Five Interconnectors

England - France Interconnector



System Description

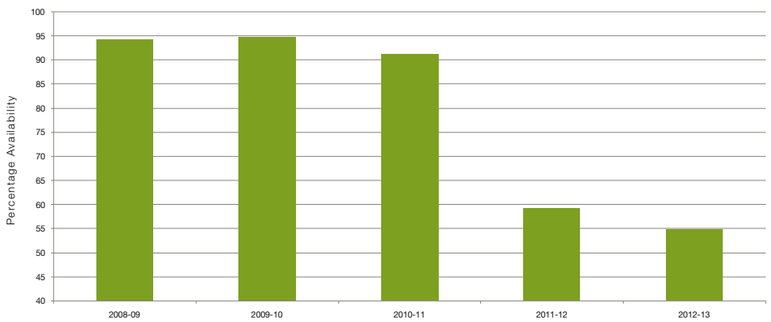
The National Grid transmission system between the English and French transmission systems is jointly owned by National Grid Interconnectors Limited (NGIC) and Réseau de Transport d'Electricité (RTE) the French transmission system owner. The information in this report has been provided by NGIC, the Interconnector Licence holder.

Outages are co-ordinated, as far as practical, between NGIC and RTE to allow work to be undertaken by both parties during an outage. Availability reductions are attributed on the basis of work being carried out by the respective parties.

The total capability of the Interconnector is 2000 MW. This is made up of four 'circuits', each of 500 MW. There is no redundancy of the major components making up each circuit, hence all outages have an effect on real time capability.

Annual Availability

The chart below shows the annual comparison of availability of the England – France Interconnector.

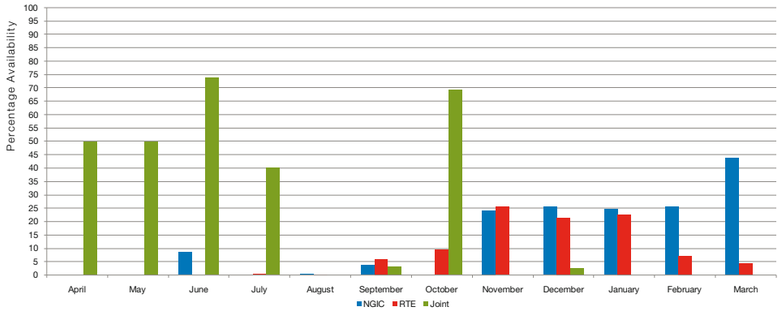


2008-09	2009-10	2010-11	2011-12	2012-13
94.30	94.80	91.25	59.09	54.90

Note: The low availability in 20112/13 was due to the following: From April to July, completion of the capital investment program in replacement valve equipment. An interconnector fault in late September required significant joint RTE/NGIC investigation and repair work in October but left an ongoing long term repair in the UK. From October to February there were equipment problems in France further limiting the capability.

Monthly Unavailability

% England - France Interconnector Monthly Unavailability



	NGIC	RTE	Joint
April	0.00	0.00	50.00
May	0.00	0.00	50.00
June	8.31	0.00	73.63
July	0.00	0.44	40.00
August	0.31	0.02	0.00
September	3.65	5.79	3.08
October	0.00	9.34	69.15
November	24.17	25.27	0.00
December	25.27	21.24	2.52
January	24.56	22.71	0.00
February	25.37	7.29	0.00
March	43.92	4.40	0.00
Average	12.90	8.05	24.15

Annual System Availability

Annual Availability of
England – France Interconnector for
2012-2013 was:

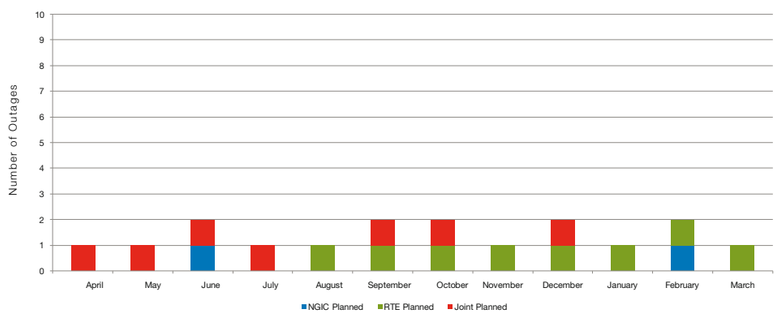
54.90%

Outages 2012-13 (April - March)

Notes: The charts below refer to Planned and Unplanned Outages. In this context Planned are notified prior to Day Ahead. Unplanned are notified at Day Ahead or within Contract Day.

The project to replace the thyristor valves was completed during the 2012/13 period and therefore the availability data is not separately reviewed.

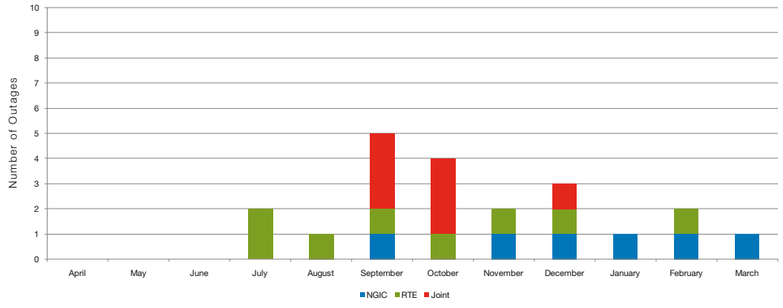
Chart 1 below shows the Interconnector Planned Outages on a per month basis.



NGIC	2
RTE	8
Joint	7
Total	17

Chart 1

Chart 2 below shows the Interconnector Unplanned Outages on a per month basis.

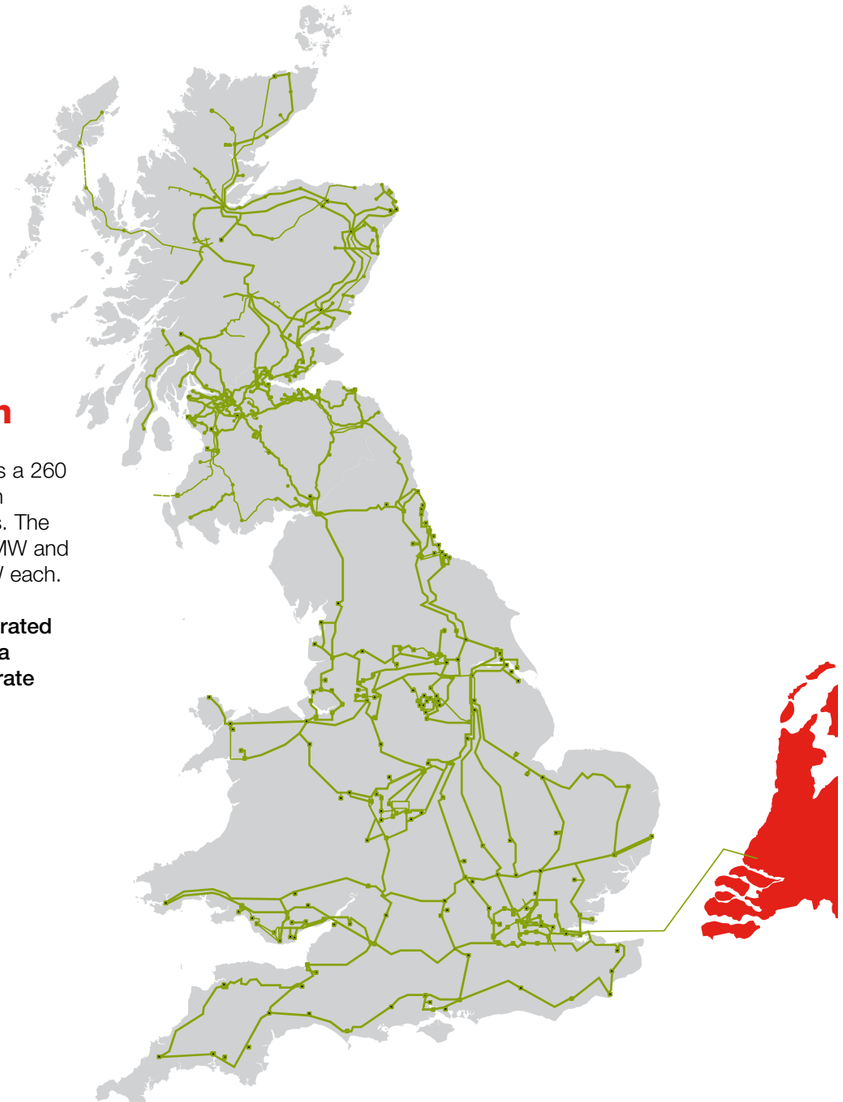


NGIC	6
RTE	8
Joint	7
Total	21

Chart 2

Interconnectors

England - Netherlands Interconnector



System Description

The NGET transmission system has a 260 km long interconnection with Dutch operator TenneT in the Netherlands. The total capability of BritNed is 1000 MW and is made up of two ‘poles’, 500 MW each.

BritNed is jointly owned and operated by National Grid and TenneT, as a commercial interconnector separate from their regulated activities.

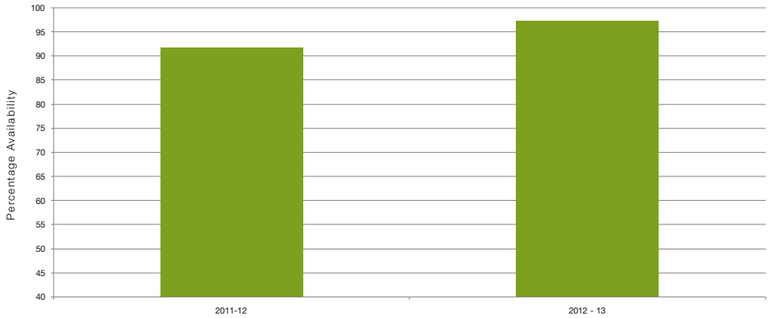
Annual Availability

The chart below shows the annual comparison of availability of the England – Netherlands Interconnector.

Annual System Availability

Annual Availability of England – Netherlands Interconnector for 2012-2013 was:

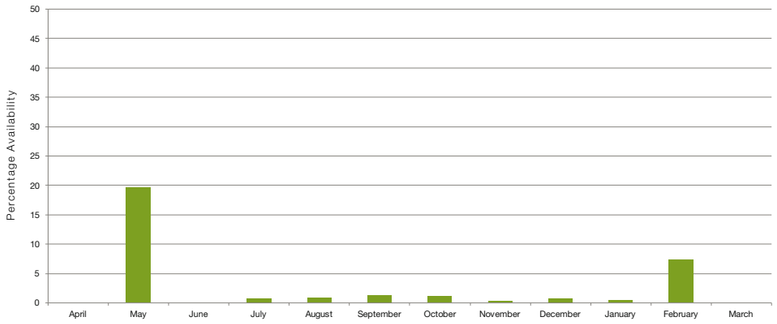
97.32%



2011-12	2012 - 13
91.82	97.32

Monthly Unavailability

% England - Netherlands Interconnector Monthly Unavailability



	BritNed
April	0.00
May	19.62
June	0.00
July	0.74
August	0.80
September	1.30
October	1.04
November	0.27
December	0.74
January	0.35
February	7.29
March	0.00
Average	2.68

Outages 2012-13 (April - March)

The chart refers to Planned and Unplanned Outages. In this context Planned are notified prior to Day Ahead and Unplanned are notified at Day Ahead or within the Contract Day.

Chart 1 below shows the Interconnector Planned and Unplanned Outages on a per month basis.

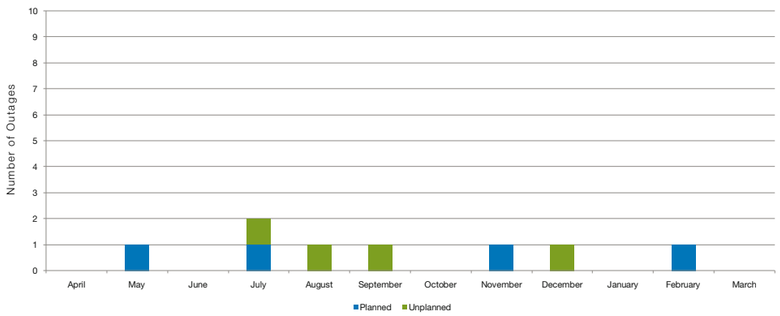


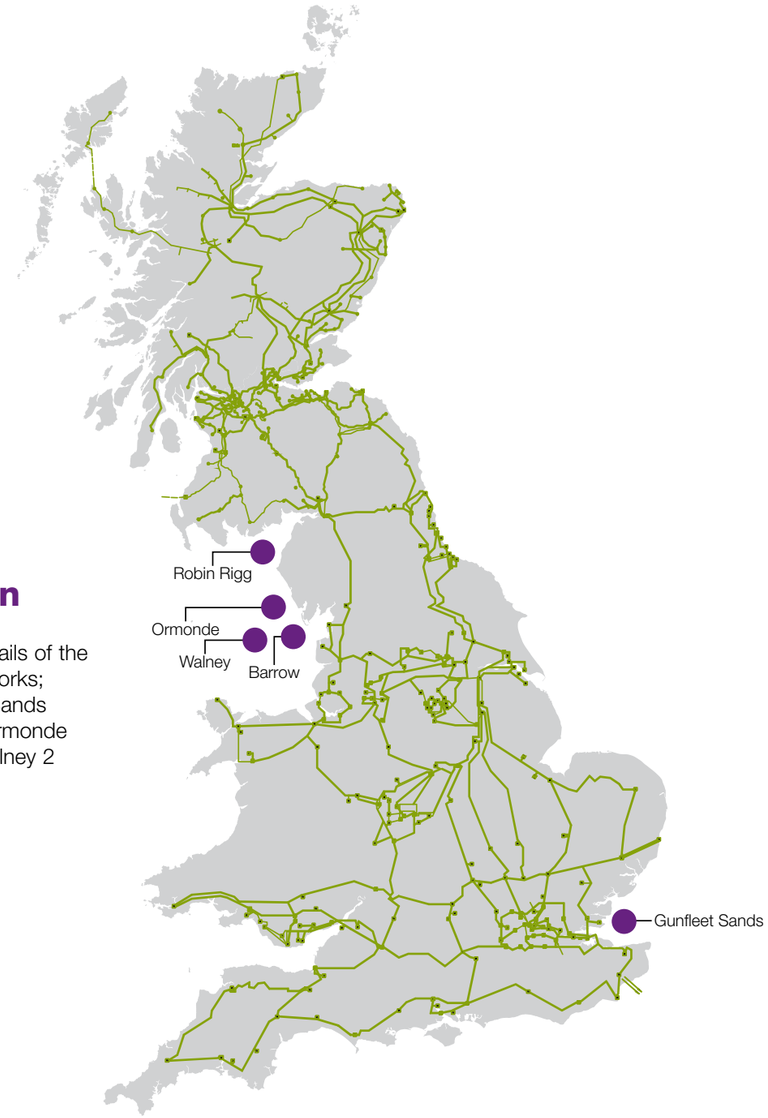
Chart 1

	Planned	Unplanned
April	0	0
May	1	0
June	0	0
July	1	1
August	0	1
September	0	1
October	0	0
November	1	0
December	0	1
January	0	0
February	1	0
March	0	0
Total	4	4

Where availability is shown as less than 100% but there is no corresponding planned or unplanned outage recorded, this is as a result of reduced flow capacity rather than a full station outage.

Section Six

Offshore Systems



System Description

The following section contains details of the currently connected offshore networks; Robin Rigg OFTO (TC), Gunfleet Sands OFTO (TC), Barrow OFTO (TC), Ormonde OFTO (TC) and Walney 1 and Walney 2 (Blue Transmission).

Offshore Transmissions Networks

	Go Live	Number of Circuits	Circuit Length KM	Generating Capacity MW	Connection Voltage	Interfacing Party
TC Robin Rigg	02/03/2011	2	14.4	2 x 92	132 kV	DNO
TC Gunfleet Sands	19/07/2011	1	12.76	99 + 64.9	132 kV	DNO
TC Barrow	27/09/2011	1	30.1	90	132 kV	DNO
TC Ormonde	10/07/2012	1	44.3	150	132 kV	DNO
BT Walney 1	31/10/2011	1	48.2	183.6	132 kV	Transmission
BT Walney 2	04/10/2012	1	48.3	183.6	132 kV	DNO

Availability

The definitions and criteria for system availability can be found in the Glossary of Terms at the end of this report.

System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

% Annual System Availability

	2011 - 12	2012 - 13
TC Robin Rigg	99.88	99.89
TC Gunfleet Sands	100	99.88
TC Barrow	100	100
TC Ormonde	N/A	100
BT Walney 1	100	97.47
BT Walney 2	N/A	100

% Winter Peak System Availability

	2011 - 12	2012 - 13
TC Robin Rigg	100	100
TC Gunfleet Sands	100	100
TC Barrow	100	100
TC Ormonde	N/A	100
BT Walney 1	100	100
BT Walney 2	N/A	100

% Monthly System Availability

	April	May	June	July	August	September	October	November	December	January	February	March
TC Robin Rigg	100	100	100	94.48	100	100	100	100	100	100	100	100
TC Gunfleet Sands	100	100	100	98.55	100	100	100	100	100	100	100	100
TC Barrow	100	100	100	100	100	100	100	100	100	100	100	100
TC Ormonde	N/A	N/A	N/A	100	100	100	100	100	100	100	100	100
BT Walney 1	100	97.79	78.10	97.97	98.74	100	100	95.86	100	100	100	100
BT Walney 2	N/A	N/A	N/A	N/A	N/A	N/A	100	100	100	100	100	100

Monthly Planned and Unplanned Unavailability

The table shows the monthly variation in Planned and Unplanned System Unavailability for the Offshore Transmission Networks.

The unavailability has been classified by network responsibility i.e. OFTO or a result of distribution network faults (DNO).

		April	May	June	July	August	September	October	November	December	January	February	March
TC Robin Rigg	OFTO planned	0	0	0	1.52	0	0	0	0	0	0	0	0
	DNO/ Generator planned	5.67	0	1.48	0	0	2.16	0	0	0	0	0	0
	OFTO unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	DNO / Generator unplanned	0	0	0	0	0	0	0	0	0	0	0	0
TC Gunfleet Sands	OFTO planned	0	0	0	1.45	0	0	0	0	0	0	0	0
	DNO / Generator planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	DNO / Generator unplanned	0	0	0	0	0	0	0.97	0	0	0	0	0
TC Barrow	OFTO planned	0	0	0	0	0	0	0	0	0	0	0	0
	DNO/ Generator planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	DNO / Generator unplanned	0	0	0	0	0	0	0	0	0	0	5.19	0
TC Ormonde	OFTO planned	N/A	N/A	N/A	0	0	0	0	0	0	0	0	0
	DNO/ Generator planned	N/A	N/A	N/A	7.81	0	2.22	0	0	0	0.48	0.15	0
	OFTO unplanned	N/A	N/A	N/A	0	0	0	0	0	0	0	0	0
	DNO / Generator unplanned	N/A	N/A	N/A	0	0	0	0	0	0	0	0	0
BT Walney 1	OFTO planned	0	2.21	21.9	2.03	1.26	0	0	0	0	0	0	0
	DNO/ Generator planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO unplanned	0	0	0	0	0	0	0	4.14	0	0	0	0
	DNO / Generator unplanned	0	0	0	0	0	0	0	0	0	0	0	0
BT Walney 2	OFTO planned	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	0
	DNO/ Generator planned	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	0
	OFTO unplanned	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	0
	DNO / Generator unplanned	N/A	N/A	N/A	N/A	N/A	N/A	0	0	0	0	0	0

Outage Details

Offshore system outages are calculated using MW of offshore transmission capacity unavailable not generation lost.

Note: Outages which were taken due to the Generator or DNO, have not been included within the Annual System Availability, Winter Peak System Availability or Monthly System Availability.

TC Robin Rigg Outages

Outage Date & Time	Reason	Days & Hours	MW
18 April 2012, 09:21 Planned outage for work on offshore transformers.	GEN	1 day 8 hours	2935
23 April 2012, 08:45 Planned outage for work on offshore transformers.	GEN	2 days 4.5 hours	4825
6 June 2012, 07:54 Planned outage for overhead line maintenance.	DNO	7 hours	653
7 June 2012, 08:39 Planned outage for overhead line maintenance.	DNO	5 hours	466
11 June 2012, 08:05 Planned outage for overhead line maintenance.	DNO	4 hours	365
12 June 2012, 09:34 Planned outage for overhead line maintenance.	DNO	6 hours	543
10 July 2012, 07:18 Planned outage for OFTO maintenance.	OFTO	11 hours	1050
10 July 2012, 08:32 Planned outage for OFTO maintenance.	OFTO	11 hours	1024
26 September 2012, 10:05 Planned outage for maintenance offshore.	GEN	1 day 8 hours	2955
		Total	**12742 MWh**

TC Gunfleet Sands Outages

Outage Date & Time	Reason	Days & Hours	MW
11 July 2012, 10:23 Planned outage for maintenance.	OFTO	11 hours	1767
14 October 2012, 22:20 Unplanned outage due to generator over generating during a DNO outage resulting in an operation of the DNO's overload protection scheme.	DNO	7 hours	1180
		Total	**2947 MWh**

TC Barrow Outages

Outage Date & Time	Reason	Days & Hours	MW
7 February 2013, 03:52 Unplanned outage due to a protection maloperation on the generator's earthing transformer co-incident with a fault on the offshore 33 kV system, resulting in a back trip into the OFTO export circuit.	GEN	13 hours	3331
8 February 2013, 18:00 Unplanned outage due to a protection maloperation on the generator's earthing transformer co-incident with restoration of the offshore 33 kV system, resulting in a back trip into the OFTO export circuit.	GEN	0.5 hour	36
		Total	**3368 MWh**

TC Ormonde Outages

Outage Date & Time	Reason	Days & Hours	MW
31 July 2012, 10:07 Planned outage for protection and commissioning work associated with Harmonic Filter construction.	GEN	2 days 10 hours	8717
20 September 2012, 11:57 Planned outage to install busbars associated with Harmonic Filter construction	GEN	5.5 hours	830
25 September 2012, 11:56 Planned outage for commissioning work associated with Harmonic Filter construction.	GEN	11 hours	1648
10 January 2013, 00:38 Planned outage for disconnector and earth switch checks associated with Harmonic Filter construction.	GEN	3.5 hours	533
28 February 2013, 11:31 Planned outage for protection work associated with Harmonic Filter construction.	GEN	1 hour	167
		Total	**11895 MWh**

BT Walney 1 Outages

Outage Date & Time	Reason	Days & Hours	MW
29 May 2012, 09:54 Planned outage to fix a snagging issue and fit surge arrestors to offshore transformers. Snagging issues pertain to problems known prior to transfer from the Developer to the OFTO	OFTO	2 days 14 hours	2546
1 June 2012, 12:00 Planned outage to fix a snagging issue and fit surge arrestors to offshore transformers. Snagging issues pertain to problems known prior to transfer from the Developer to the OFTO	OFTO	11 days 9 hours	11184
17 June 2012, 12:40 Planned outage to fix a snagging issue and fit surge arrestors to offshore transformers. Snagging issues pertain to problems known prior to transfer from the Developer to the OFTO	OFTO	13 days 11 hours	13256
1 July 2012, 12:00 Planned outage to fix a snagging issue and fit surge arrestors to offshore transformers. Snagging issue pertain to problems known prior to transfer from the Developer to the OFTO	OFTO	2 days 9 hours	2339
1 August 2012, 08:13 Planned outage to fix a snagging issue on an onshore circuit breaker.	OFTO	9 hours	1449
2 November 2012, 08:06 Unplanned outage due to a lightning strike on a connected electrical system that tripped protection equipment	OFTO	1 day 6 hours	5009
		Total	**35783 MWh**

BT Walney 2 Outages – N/A

Security

The definitions and criteria for system security can be found in the Glossary of Terms at the end of this report.

System performance is monitored by the estimated unsupplied energy from the Offshore Transmission Systems for each incident.

During 2012-13 there were 0 Offshore Transmission system events where transmission circuits were disconnected either automatically or by urgent manual switching.

Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the Offshore Transmission Systems during 2012-13 was:

0 MWh

There were no Estimated Unsupplied Energy, Loss of Supply Incidents that occurred within the Offshore Transmission Systems.

Number of Loss of Supply Incidents

There were no of Loss of Supply Incidents that occurred within the Offshore Transmission Systems.

Glossary of Terms

This glossary provides explanations and definitions for common terms used throughout this report.

System Availability
System availability is reduced whenever a circuit is taken out of operation for either planned purposes or as a result of a fault.

Planned outages are required for system construction and new user connections in addition to the maintenance necessary to retain a high level of system reliability to ensure that licence standards of security are met.

System Availability is calculated by the formula:

$$\left(\frac{\text{The sum for all circuits of hours available}}{\text{(No. of circuits) x (No. of hours in period)}}\right) \text{X} 100\%$$

A circuit is defined as equipment on the transmission system, e.g. overhead line, transformer or cable which either connects two bussing points or connects two or more circuit breakers/ disconnectors, excluding busbars.

Winter Peak System Availability is defined as the average System Availability over the three months of December, January and February.

System Unavailability
System Unavailability is calculated by the formula:

(100 - Availability) %

Unavailability falls into 4 categories, 3 of which are planned and the other is unplanned:

Maintenance Outages are planned outages required for maintenance;

System Construction Outages are planned outages required to construct or modify assets which are not provided for the exclusive benefit of specific users;

User Connection Outages are planned outages required to construct or modify assets which are provided to facilitate connection for the exclusive benefit of specific system users; and

Unplanned Unavailability is due to outages occurring as a result of plant or equipment failure, i.e. outages required and taken at less than 24 hours' notice.

Offshore System Availability
OFTO availability is calculated using the formula:

$$\left(\frac{\text{Total MWh system is capable of delivering - MWh unavailable}}{\text{Total MWh system is capable of delivering}}\right) \text{X} 100\%$$

NETS Grid Code and NETS Security and Quality of Supply Standard
The NETS Grid Code and NETS Security and Quality of Supply Standard (NETS SQSS) define the required security level to which the system is planned. The required security level at a substation increases with the amount of demand connected to the substation and so the planned level of demand security is normally higher for 400 kV and 275 kV transmission voltages than for 132 kV. Additionally, the 132 kV network is, in parts, less interconnected than the higher voltage systems and so losses of 132 kV transmission circuits (for instance due to weather related transient faults) are more likely to lead to temporary losses of supply.

Loss of Supply Incidents
A loss of supply incident is defined as any incident on the transmission system that results in an actual unsupplied energy incident to a customer or customers including pumped storage units operating in pump mode.

All transmission system incidents that resulted in a loss of supplies are reported individually giving information about the cause of the incident, its location, duration and an estimate of unsupplied energy.

Loss of Supply Incidents at '3 or less customers' Sites
The '3 or less customers' category covers locations where major industrial customers are directly connected to the transmission system. The customer could be a steelworks, refinery or other large industrial processing site. Connection arrangements are chosen by the customer and often have a level of design and operational security below that normally required to satisfy the NETS SQSS. This may be reflected in a reduced cost of the connection. In some cases, customers have also chosen to secure their supplies using their own generation to compensate for this reduced level of transmission system security. Distribution Network Operators and domestic customers do not come within this category.

Overall Reliability of Supply
The Overall Reliability of Supply for a transmission system is calculated using the formula:

$$\left[1-\left(\frac{\text{Estimated Unsupplied Energy}}{\text{Total energy that would have been supplied by the transmission system}}\right)\right] \text{x} 100\%$$

Voltage Excursions
The Electricity Safety, Quality and Continuity Regulations 2002 permit variations of voltage not exceeding 10% above and below the nominal at voltages of 132 kV and above and not exceeding 6% at lower voltages. Any Voltage Excursions in excess of 15 minutes will be reported.

The NETS Grid Code reflects these limits, and imposes a further constraint for the 400 kV system in that voltages can only exceed +5% for a maximum of 15-minutes.

Consumers may expect the voltage to remain within these limits, except under abnormal conditions e.g. a system fault outside of the limits specified in the NETS SQSS.

Normal operational limits are agreed and monitored individually at connection points with customers to ensure that voltage limits are not exceeded following the specified credible fault events described in NETS SQSS.

Frequency Excursions
The Electricity Safety, Quality and Continuity Regulations 2002 permit variations in frequency not exceeding 1% above and below 50 Hz: a range of 49.5 to 50.5 Hz. Any frequency excursions outside these limits for 60 seconds or more will be reported.

The system is normally managed such that frequency is maintained within operational limits of 49.8 and 50.2 Hz.

Frequency may, however, move outside these limits under fault conditions or when abnormal changes to operating conditions occur. Losses of generation between 1000 and 1320 MW are considered abnormal and a maximum frequency change of 0.8 Hz may occur, although operation is managed so that the frequency should return within the lower statutory limit of 49.5 Hz within 60-seconds.

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