nationalgrid

National Electricity Transmission System Performance Report 2017–2018

Report to the Gas and Electricity Markets Authority

Introduction

This report describes the performance of the National Electricity Transmission System in Great Britain for 2017-18 and fulfils Transmission Licence Standard Condition C17: Transmission System Security Standard and Quality of Service.

The National Electricity Transmission System (NETS) in Great Britain is comprised of both onshore and offshore transmission networks.

The onshore transmission networks are owned by National Grid Electricity Transmission plc (NGET) in England and Wales, SP Transmission plc (SPT) in south and central Scotland and Scottish Hydro Electric Transmission plc (SHE Transmission) in the north of Scotland.

The offshore transmission networks are owned by Transmission Capital (TC), Blue Transmission Investments Ltd (BT), Greater Gabbard OFTO Ltd, GwyntY-Mor OFTO Ltd, Thanet OFTO Ltd, Humber Gateway OFTO Ltd and West of Duddon Sands Transmission plc (WoDS).

In addition to its role as Transmission Owner in England and Wales, NGET is the National Electricity Transmission System Operator (NETSO) which includes the offshore transmission networks. As a result of legal separation for the Electricity System Operator (ESO) in April 2019, this will be the final year that this report is issued by NGET under the existing arrangements. The future arrangements for annual reporting of Transmission System Performance will be agreed separately with Ofgem.

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 on the annual performance of the National Electricity Transmission System in terms of availability, system security and quality of service.

The onshore and offshore transmission system broadly comprises circuits operating at 400, 275 and 132kV. 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 allows for the efficient bulk transfer of power from remote generation to demand centres. Information relating to SP Transmission plc, SHE Transmission plc, TC Robin Rigg OFTO Ltd, TC Barrow OFTO Ltd, TC Gunfleet Sands OFTO Ltd, TC Ormonde OFTO Ltd, TC Lincs OFTO Ltd, TC Westermost Rough OFTO Ltd, BT Walney 1 Ltd, BT Walney 2 Ltd, BT Sheringham Shoal Ltd, BT London Array Ltd, Greater Gabbard OFTO Ltd* , Gwynt-Y-Mor OFTO Ltd*, Thanet OFTO Ltd*, Humber Gateway OFTO Ltd* and West of Duddon Sands Transmission plc 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 the Netherlands. The Northern Ireland interconnector is regulated by the Northern Ireland Regulator (NIAUR) and Southern Ireland interconnector is regulated by the Commission for Energy Regulation (CER) which both fall outside the scope of this report.

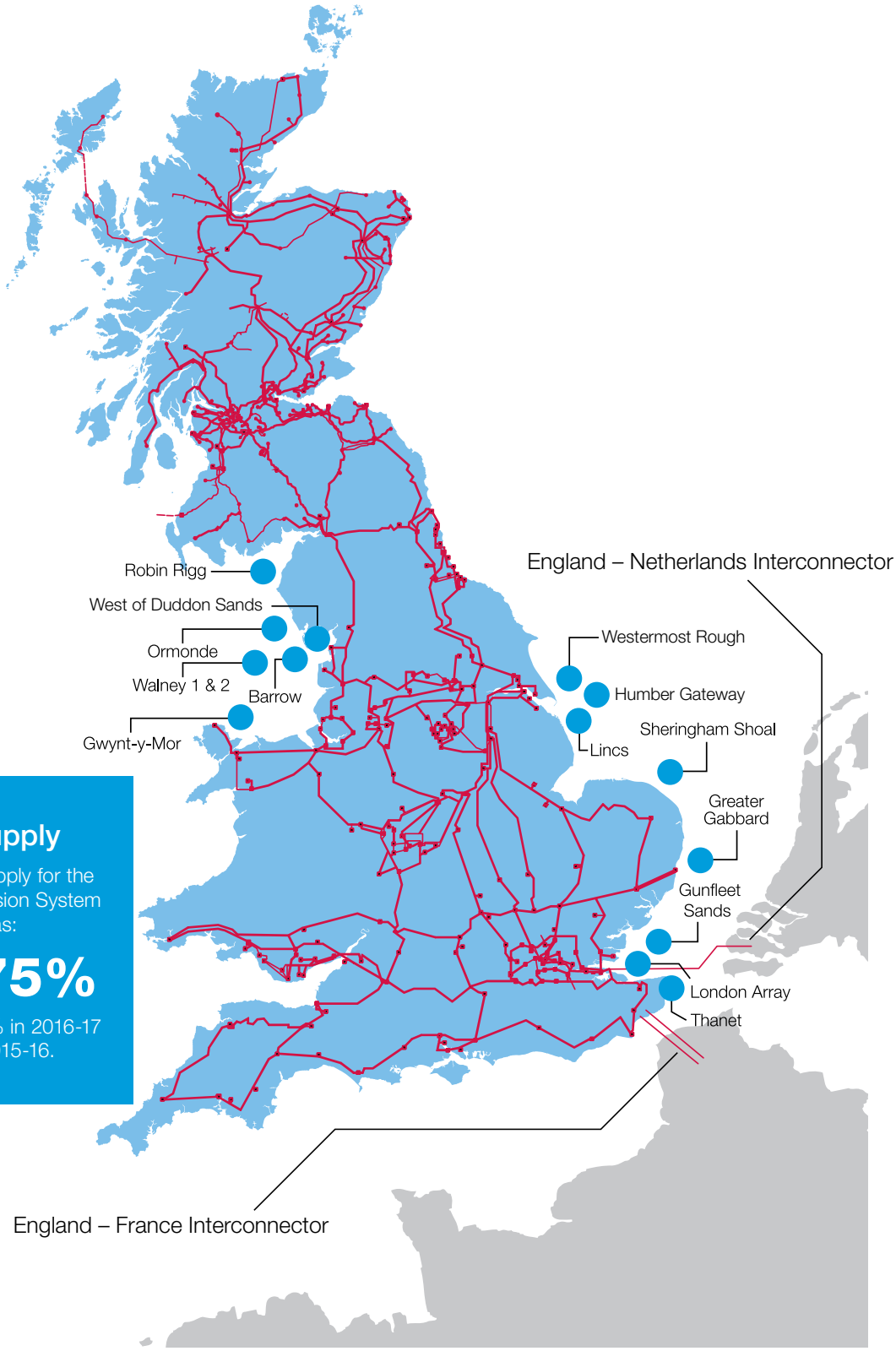
Information relating to the Interconnexion France – Angleterre (IFA) has been provided by National Grid Interconnectors Ltd (NGIC) in accordance with Licence Condition D5 (Transmission System Security Standard and Quality of Service) of the NGIC Transmission Licence.

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

* Greater Gabbard OFTO Ltd, Gwynt-Y-Mor OFTO Ltd, Thanet OFTO Ltd and Humber Gateway OFTO Ltd are operated by Balfour Beatty Power Transmission & Distribution (BB) on behalf of the respective owners.

01

National Electricity Transmission System (GB Network)



Reliability of Supply

The Overall Reliability of Supply for the National Electricity Transmission System during 2017-18 was:

99.999975%

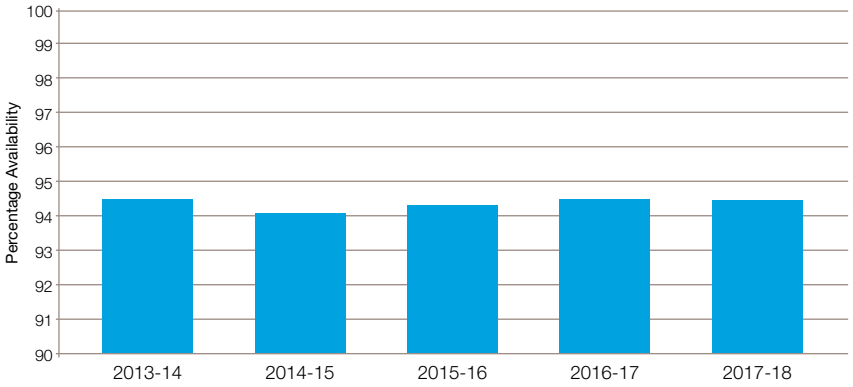
compared with 99.999962% in 2016-17 and 99.999993% in 2015-16.

Availability

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

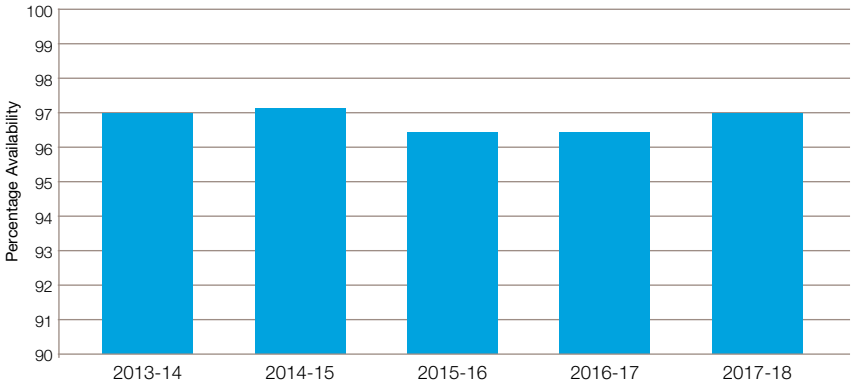
National Electricity Transmission System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability.

% Annual System Availability



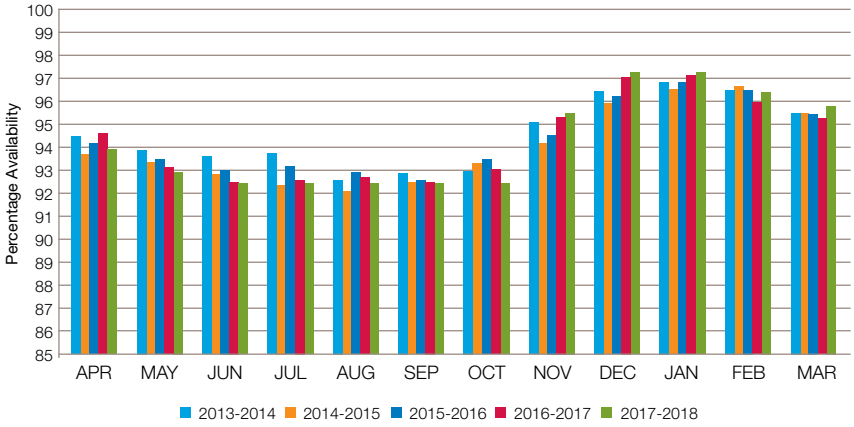
2013-14	2014-15	2015-16	2016-17	2017-18
94.50	94.09	94.36	94.31	94.44

GB % Winter Peak System Availability



2013-14	2014-15	2015-16	2016-17	2017-18
96.98	97.15	96.46	96.71	96.92

GB % Monthly System Availability



	2013-14	2014-15	2015-16	2016-17	2017-18
Apr	94.43	93.69	94.17	94.61	93.77
May	93.88	93.24	93.51	93.12	92.78
Jun	93.61	92.87	93.03	92.52	92.35
Jul	93.73	92.44	93.15	92.61	93.27
Aug	92.67	92.06	92.90	92.70	93.16
Sep	92.87	92.51	92.56	92.47	92.83
Oct	92.98	93.26	93.47	93.02	93.35
Nov	95.03	94.14	94.63	95.34	95.55
Dec	96.45	95.95	96.22	97.03	97.23
Jan	96.77	96.51	96.80	97.08	97.14
Feb	96.43	96.68	96.44	95.97	96.37
Mar	95.58	95.57	95.51	95.31	95.82

Annual System Availability

Annual System Availability of the National Electricity Transmission System for 2017 - 2018 was

94.44%

Security

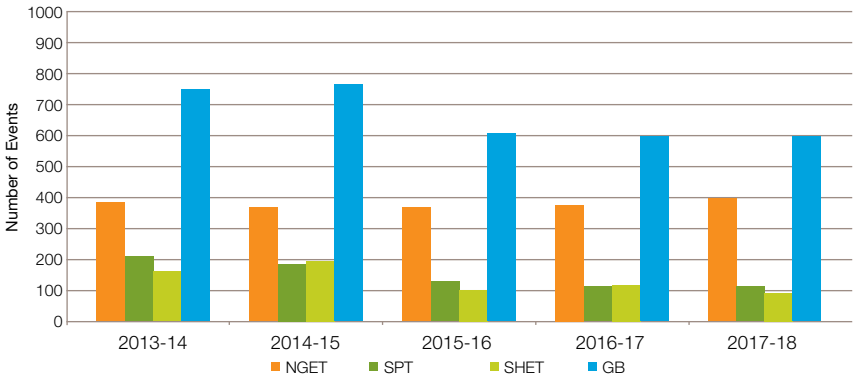
The definitions and criteria for system security can be found in the Glossary of Terms at the end of this report.

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

During 2017-18 there were 607 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 21 resulting in loss of supplies to customers.

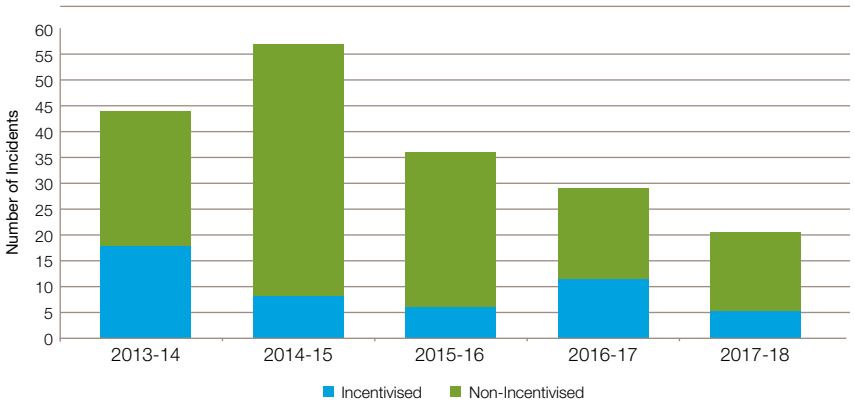
	2013-14	2014-15	2015-16	2016-17	2017-18
NGET	384	371	374	379	398
SPT	204	190	126	108	124
SHET	160	199	104	109	85
GB	748	760	604	596	607

GB System events



Number of Loss of Supply Incidents

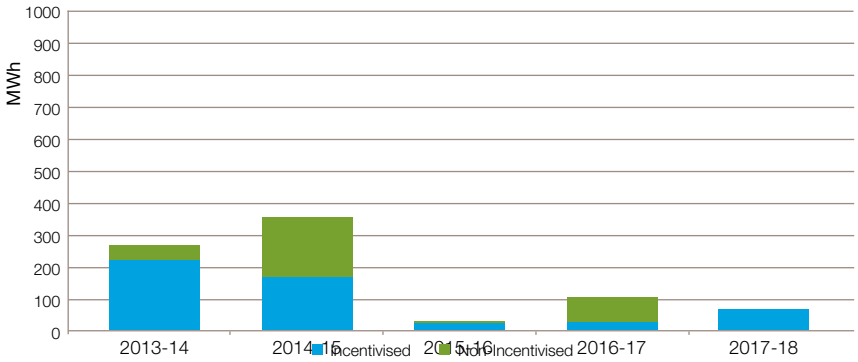
The chart shows the annual comparison of the numbers of Loss of Supply Incidents that occurred within the National Electricity Transmission System.



	2013-14	2014-15	2015-16	2016-17	2017-18
Incentivised	17	8	6	11	5
Non-Incentivised	27	49	30	18	16

Total Estimated Unsupplied Energy

The chart shows the annual comparison of the Estimated Unsupplied Energy for Loss of Supply Incidents that occurs within the National Electricity Transmission System.



	2013-14	2014-15	2015-16	2016-17	2017-18
Incentivised	212.93	178.18	18.35	22.48	67.07
Non-Incentivised	45.37	196.01	1.67	82.53	0.23

Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the National Electricity Transmission System during 2017-18 was:

67.30 MWh

Quality of Service

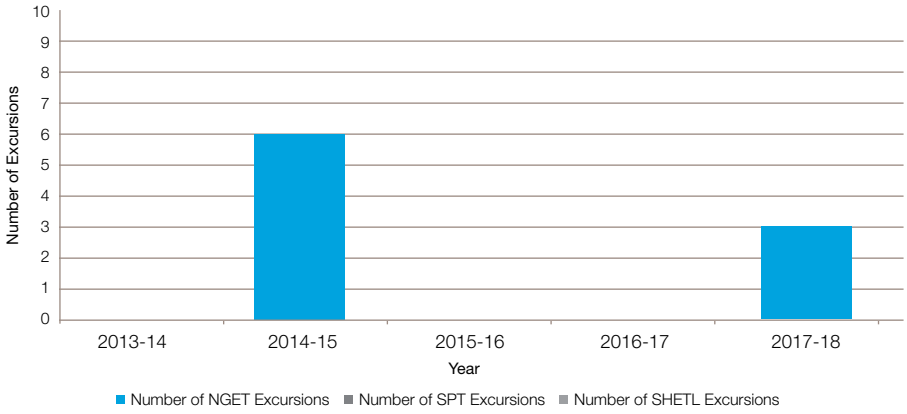
Quality of service is measured with reference to system Voltage and Frequency. The criteria for reportable Voltage and Frequency Excursions can be found in the Glossary of Terms at the end of this report

Voltage Excursions

During 2017-18 there were three reportable Voltage Excursions within the National Electricity Transmission System.

The chart below summarises the reportable Voltage Excursions that have occurred on the National Electricity Transmission System.

	2013-14	2014-15	2015-16	2016-17	2017-18
Number of NGET Excursions	0	6	0	0	3
Number of SPT Excursions	0	0	0	0	0
Number of SHETL Excursions	0	0	0	0	0



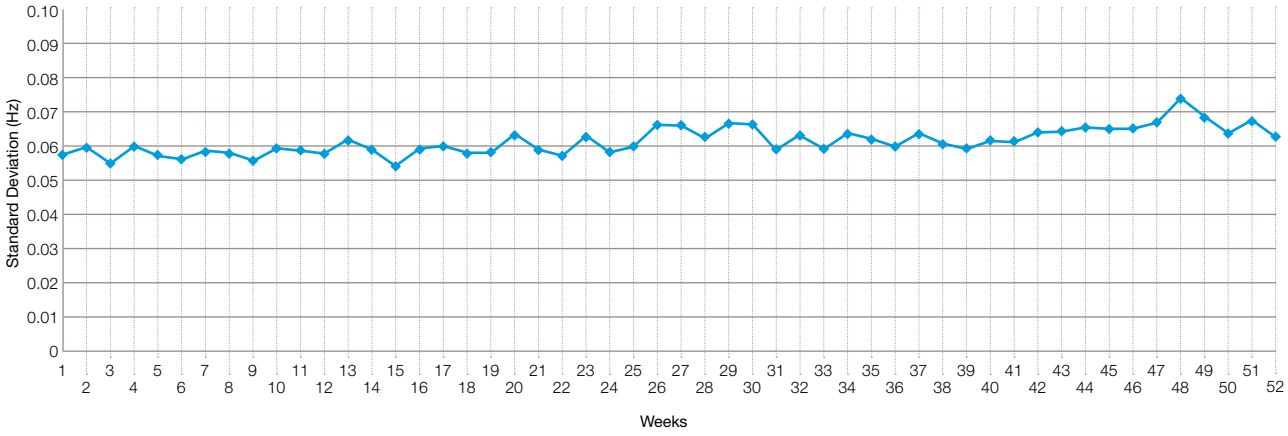
GB System Voltage Excursion			
Incident Date, Time & Location	**Nominal Voltage**	**Max Voltage**	**Duration**
23 April 2017 06:43 at 8 substations across South Manchester, West Midlands and North Wales.	**400kV**	**424kV**	**21 mins**
11 June 2017 05:14 at Walham 400kV Substation	**400kV**	**422.25kV**	**42 mins**
18 February 2018 07:52 at Pentir 400kV Substation	**400kV**	**425kV**	**19 mins**

Frequency Excursions

During 2017-18 there has been no reportable Frequency Excursion within the National Electricity Transmission System. The last reported Frequency Excursion was in 2008-09 reporting period.

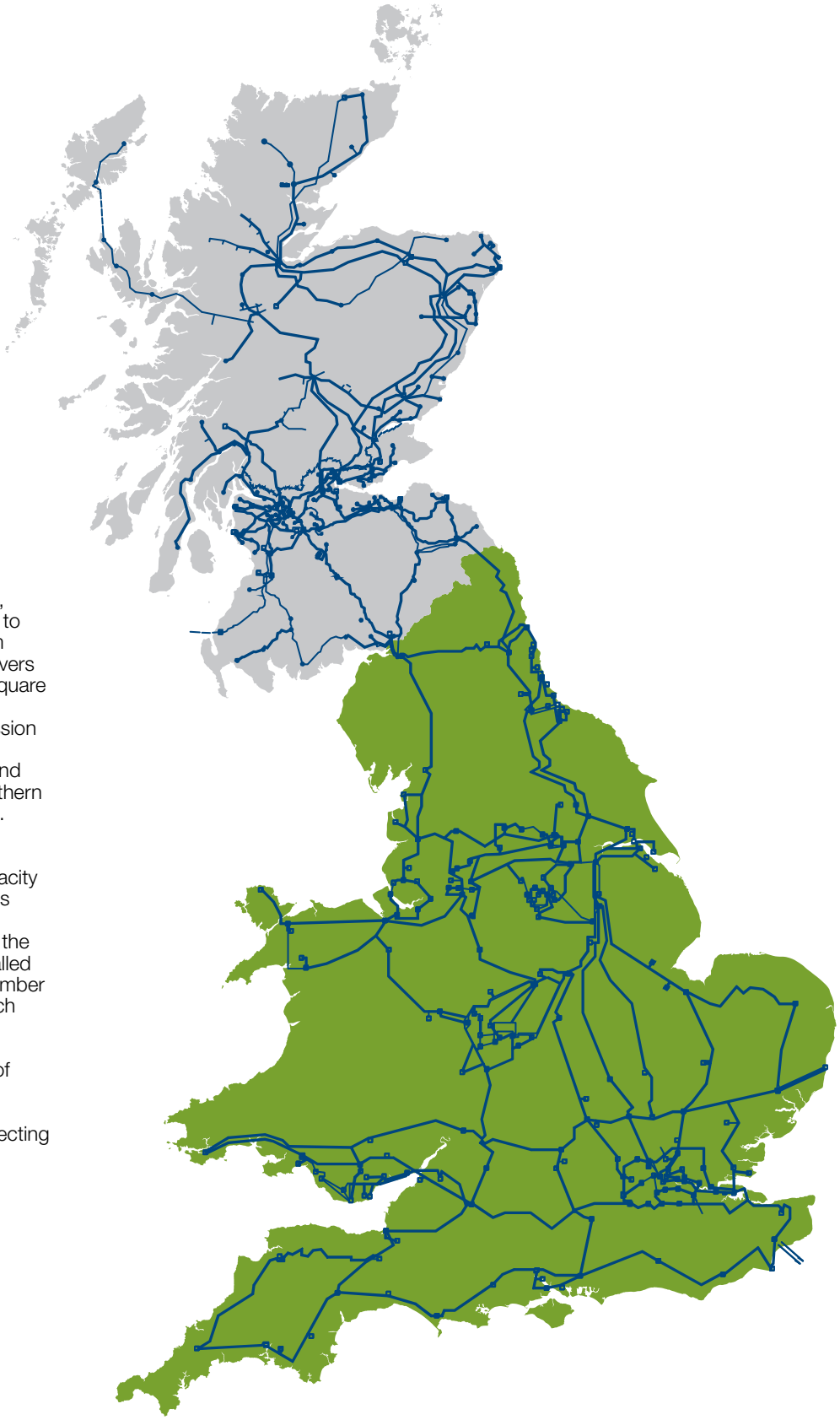
Frequency Standard Deviation

The chart below displays the recorded Frequency Standard Deviation from 50Hz on a weekly basis for the year 2017-18.




SWL

02 NGET System (England & Wales Network)



System Description

The NGET network operates at 400, 275 and 132kV supplying electricity to England and Wales with a maximum demand of 45.7GW. 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 SP Transmission System to the North and three HVDC Interconnectors to Southern Ireland, France and the Netherlands.

There are 45 large power stations totalling 47.6 GW of generation capacity connected to the England and Wales transmission system. There are 12 Distribution Networks connected to the NGET system via 131.4GVA of installed transformer capacity and a small number of directly connected customers such as steelworks.

The Transmission System consists of 14,176 kilometres of overhead line and 653 kilometres of underground transmission cable routes interconnecting over 300 substations.

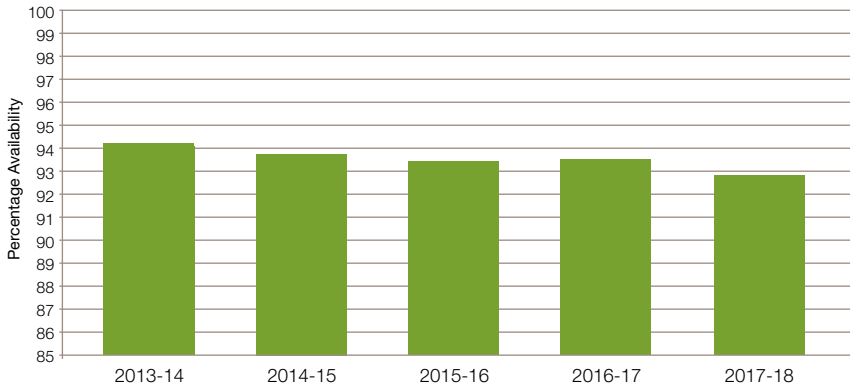
Availability

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.

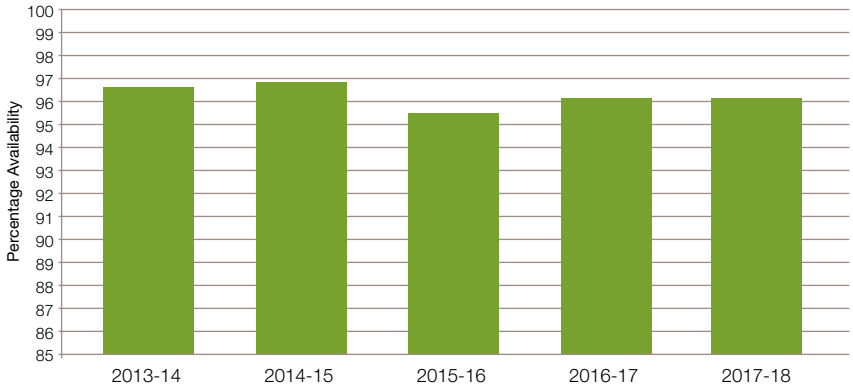
% Annual System Availability

2013-14	2014-15	2015-16	2016-17	2017-18
94.16	93.82	93.42	93.48	92.89



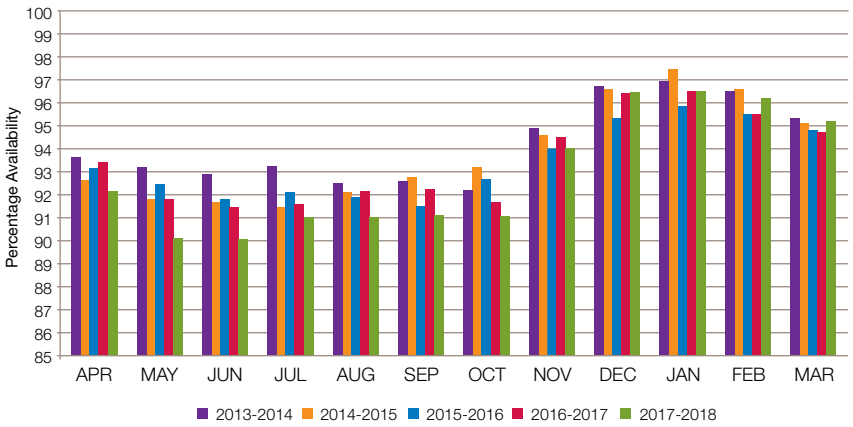
% Winter Peak System Availability

2013-14	2014-15	2015-16	2016-17	2017-18
96.75	96.93	95.51	96.13	96.02



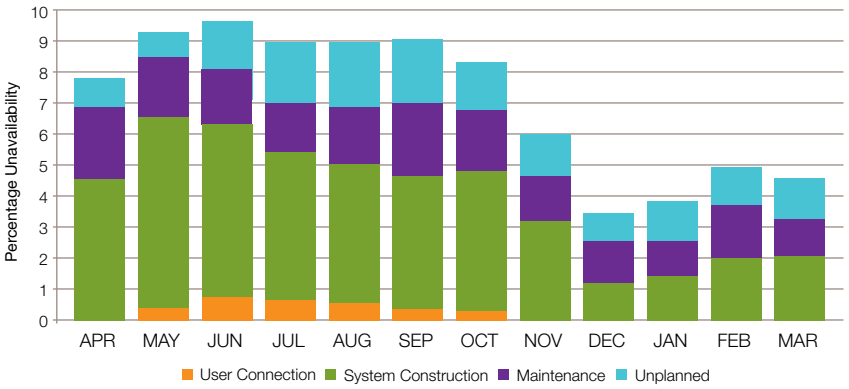
Planned and Unplanned Unavailability (%) for NGET Transmission System

	2013-14	2014-15	2015-16	2016-17	2017-18
Apr	93.56	92.49	93.15	93.37	92.18
May	93.22	91.80	92.47	91.80	90.75
Jun	92.92	91.62	91.78	91.47	90.36
Jul	93.14	91.46	92.11	91.59	91.03
Aug	92.52	92.09	91.91	92.12	91.05
Sep	92.58	92.84	91.51	92.22	90.95
Oct	92.18	93.21	92.70	91.68	91.54
Nov	94.89	94.61	94.00	94.56	94.07
Dec	96.77	96.70	95.35	96.43	96.57
Jan	96.97	97.47	95.85	96.48	96.22
Feb	96.51	96.60	95.47	95.47	95.20
Mar	95.33	95.12	94.81	94.76	95.33



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
Apr	0.11	4.40	2.33	0.98	7.82
May	0.33	6.28	1.86	0.78	9.25
Jun	0.70	5.62	1.77	1.56	9.64
Jul	0.58	4.85	1.50	2.04	8.97
Aug	0.56	4.45	1.88	2.07	8.96
Sep	0.32	4.28	2.41	2.04	9.05
Oct	0.24	4.46	2.03	1.72	8.46
Nov	0.13	3.07	1.47	1.26	5.93
Dec	0.10	1.12	1.33	0.88	3.43
Jan	0.07	1.33	1.18	1.20	3.78
Feb	0.07	1.88	1.69	1.16	4.80
Mar	0.15	1.87	1.31	1.33	4.67

Security

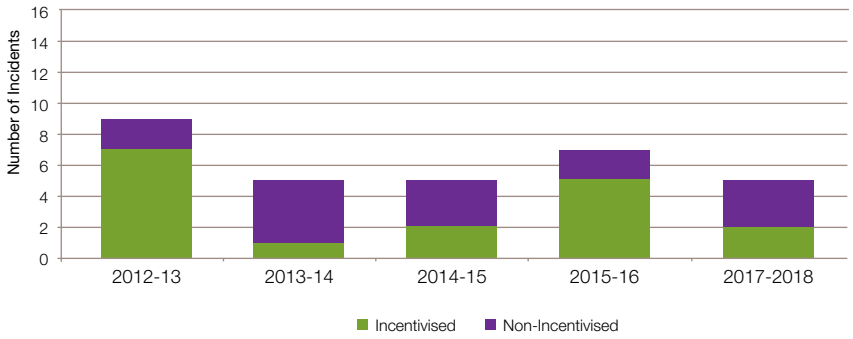
The definitions and criteria for system security can be found in the Glossary of Terms at the end of this report.

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

During 2017-18 there were 398 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 5 resulting in loss of supplies to customers.

Number of Loss of Supply Incidents

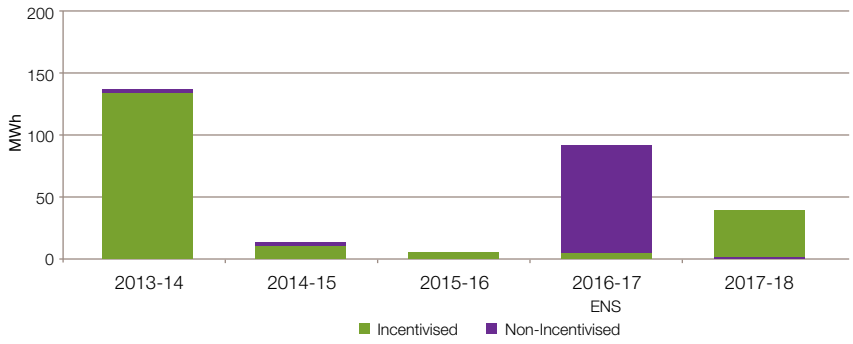
The chart shows the annual comparison of the numbers of Loss of Supply Incidents that occurred within the NGET Transmission System.



	2013-14	2014-15	2015-16	2016-17	2017-18
Incentivised	7	1	2	5	2
Non-Incentivised	2	4	3	2	3

Total Estimated Unsupplied Energy

The chart shows the annual comparison of the Estimated Unsupplied Energy for Loss of Supply Incidents that occurs within the NGET Transmission System.



	2013-14	2014-15	2015-16	2016-17	2017-18
Incentivised	135.03	8.69	4.45	6.77	39.70
Non-Incentivised	0.87	1.11	0.00	82.49	0.23

Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the NGET Transmission System during 2017-18 was

39.93 MWh

Reliability of Supply

The Overall Reliability of Supply for the NGET Transmission System during 2017-18 was:

99.999984%

compared with 99.999964% in 2016-17 and 99.999998% in 2015-16.

Loss of Supply Incident Details

NGET Loss of Supply Incidents – Incentivised

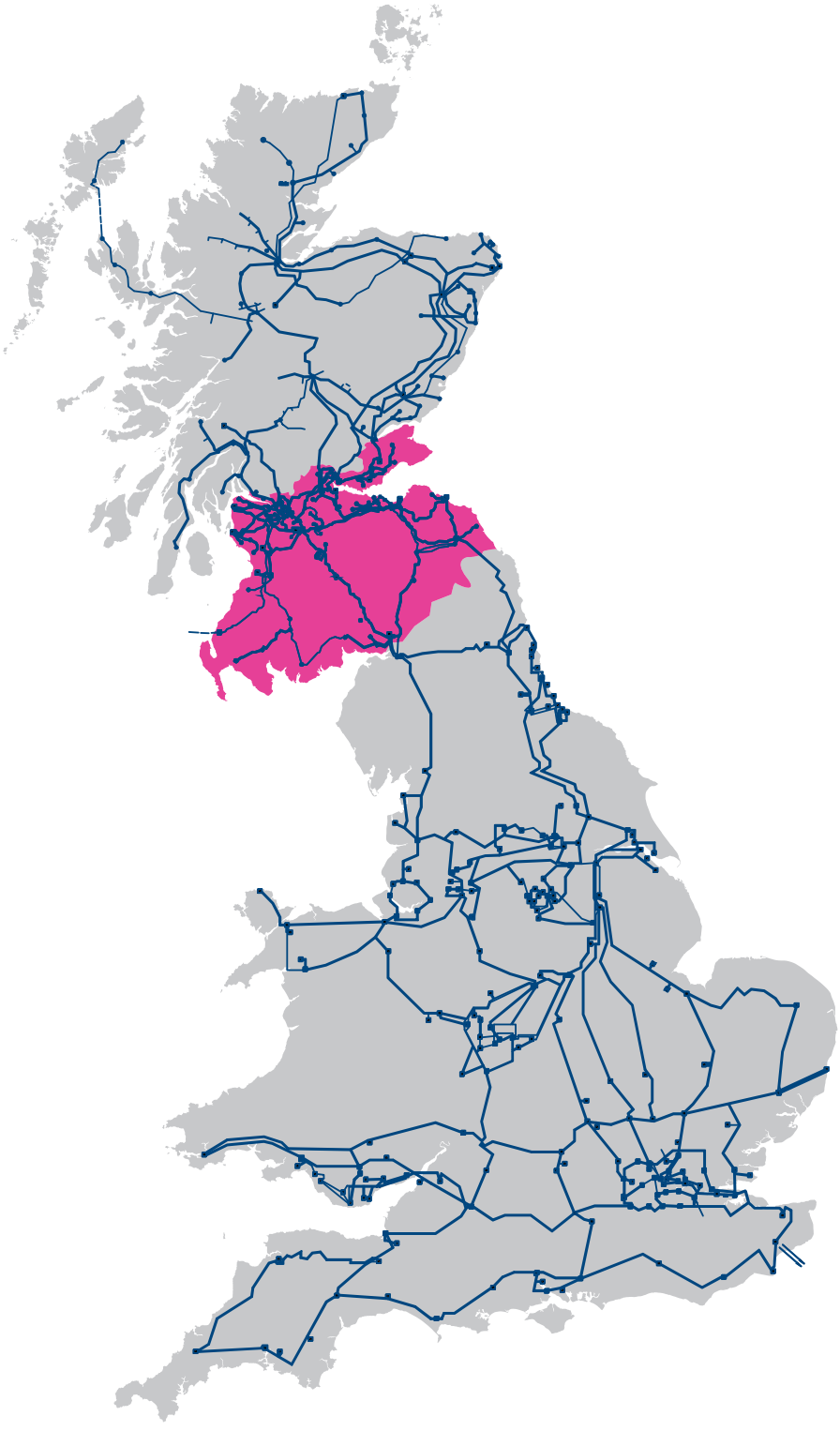
Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
21 August 2017 12:22 at Chickerell 400kV substation A catastrophic failure of a GEC FEX2 SF6 section circuit breaker X120 upon opening to facilitate switching into service of SGT1 after a planned outage. In total the supply was lost for 1 hour, 9 minutes and 39 seconds.	**34.20**	**69**	**39.70**
10 January 2018 15:00 at Hutton 400kV substation A trip of Heysham – Hutton – Penwortham 400kV circuit resulted in a trip of SGT3B at Hutton 400kV substation and disconnected one side of the Network Rail's track. In total, the supply was lost for 1 hour, 29 minutes and 20 seconds (this includes maintenance period).	**0**	**89**	**0**
		Total	**39.70 MWh**

NGET Loss of Supply Incidents – Non-Incentivised

Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
27 June 2017 12:35 at Elstree 400kV substation An arching observed on disconnector X103A which resulted in Elstree – Sundon 400kV No. 1 circuit and Elstree SGT5B (Network Rail feeder) being switched out of service. In total the supply was lost for 1 minute and 54 seconds.	**Unknown**	**1.90**	**0.10†**
01 August 2017 15:36 Poppleton 400kV substation A trip of Knaresborough – Poppleton 275kV circuit. This resulted in a loss of supply to Network Rail via SGT2B. In total the supply was lost for 42 seconds.	**4.77**	**0.70**	**0.06**
29 October 2017 07:33 at Wincobank 275kV substation Wincobank 33kV demand was left at a single-circuit risk and fed from Wincobank 275kV SGT2 via Templeborough Wincobank 275kV circuit only. This circuit tripped disconnected Wincobank SGT2 from the system. In total the supply was lost for 26 seconds.	**10**	**0.43**	**0.07**
		Total	**0.23 MWh**

† According to Transmission Procedure (TP167), for an unknown loss of supply volume, the MWh value can be estimated to a minimum of 0.10MWh.

03 SP Transmission System



System Description

The SPT Transmission System comprises approximately 4,000 circuit kilometres of overhead line and cable and 152 substations operating at 400, 275 and 132kV supplying approximately 2 million customers and covering an area of 22,951 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 9 major demand customers supplied directly from the SP Transmission System with the majority of the load being taken by approximately 2 million customers connected to the SP Distribution System via 14.4GVA of installed transformer capacity. There is approximately 6.3GW of directly connected and Large Embedded generation capacity connected in the SP Transmission area, including 33 power stations directly connected to the SP Transmission system. In 2017-18 the maximum recorded demand on the network was 5.7GW.

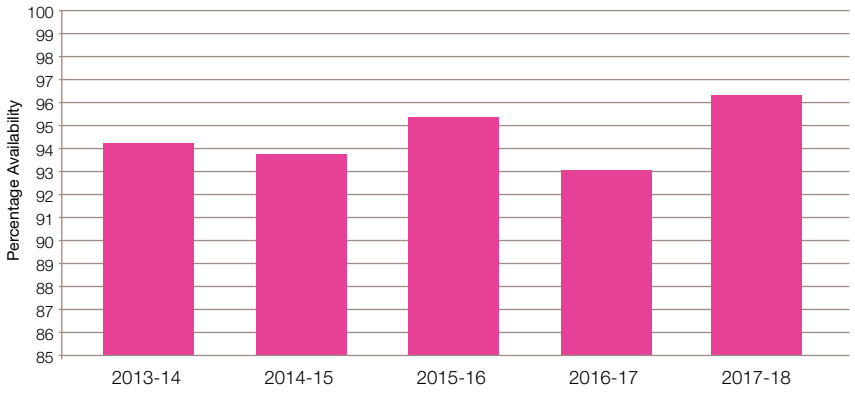
Availability

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.

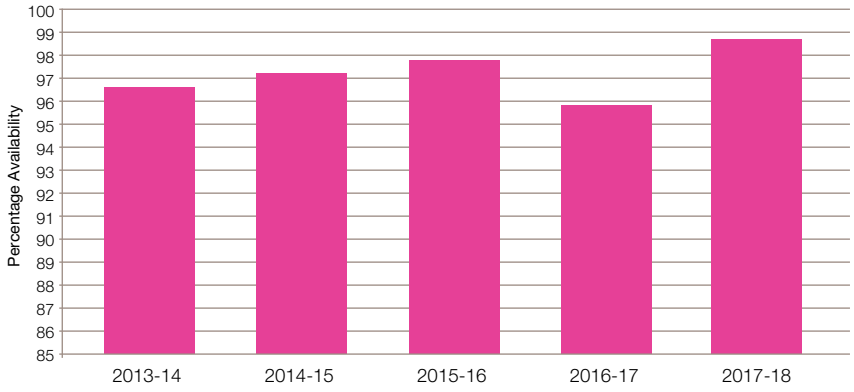
% Annual System Availability

2013-14	2014-15	2015-16	2016-17	2017-18
94.14	93.88	95.29	93.01	96.29



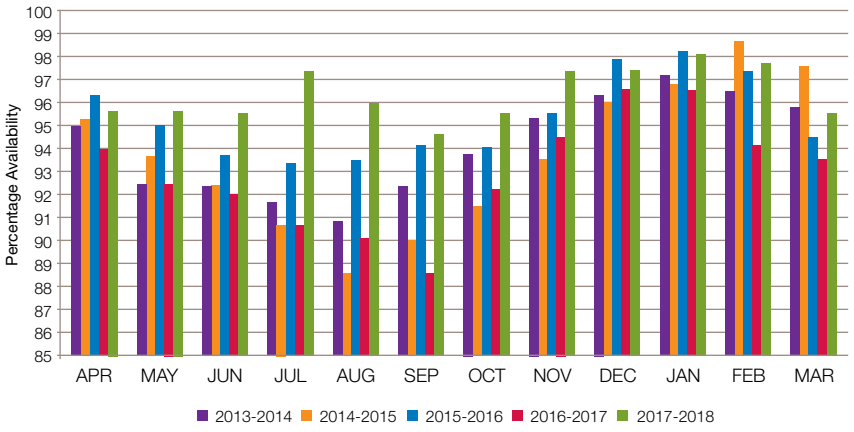
% Winter Peak System Availability

2013-14	2014-15	2015-16	2016-17	2017-18
96.68	97.13	97.80	95.82	97.88



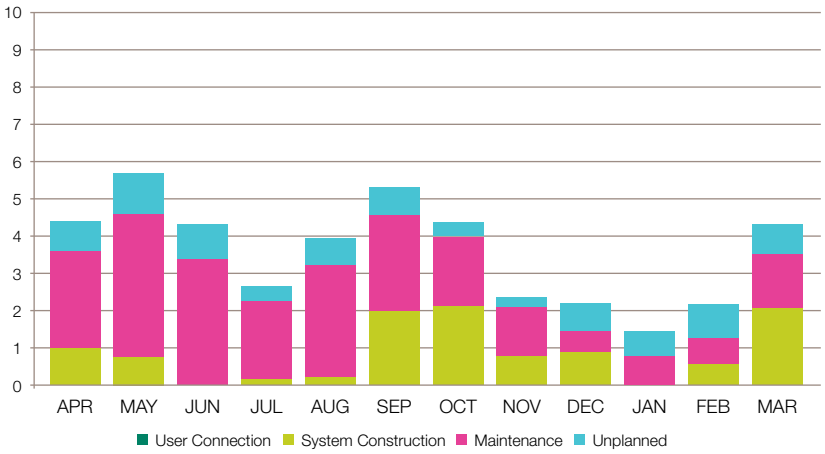
% Monthly System Availability

	2013-14	2014-15	2015-16	2016-17	2017-18
Apr	94.97	95.26	96.39	93.94	95.64
May	92.44	93.69	94.99	92.45	94.63
Jun	92.31	92.35	93.70	91.99	94.73
Jul	91.70	90.70	93.37	90.69	97.38
Aug	90.88	88.65	93.48	90.24	96.09
Sep	92.41	90.00	94.12	88.59	94.65
Oct	93.85	91.50	94.06	92.21	95.55
Nov	95.31	93.61	95.55	94.67	97.59
Dec	96.33	95.99	97.86	96.60	97.87
Jan	97.21	96.83	98.20	96.54	98.14
Feb	96.48	98.73	97.32	94.17	97.78
Mar	95.85	97.58	94.49	93.51	95.65



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
Apr	0.00	1.00	2.61	0.75	4.36
May	0.00	0.86	3.79	0.72	5.37
Jun	0.00	0.01	3.46	0.81	5.27
Jul	0.00	0.17	2.05	0.40	2.62
Aug	0.00	0.27	2.94	0.71	3.91
Sep	0.00	2.00	2.61	0.74	5.35
Oct	0.00	2.04	1.88	0.53	4.45
Nov	0.00	0.83	1.35	0.24	2.41
Dec	0.00	0.87	0.64	0.62	2.13
Jan	0.00	0.00	0.80	0.61	1.86
Feb	0.00	0.49	0.76	0.96	2.22
Mar	0.00	2.04	1.50	0.81	4.35

Security

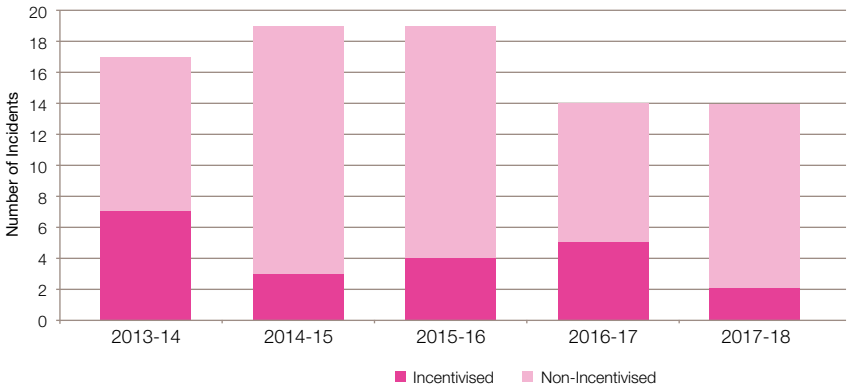
The definitions and criteria for system security can be found in the Glossary of Terms at the end of this report.

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

During 2017-18 there were 124 SPT 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 14 resulting in loss of supply to customers.

Number of Loss of Supply Incidents

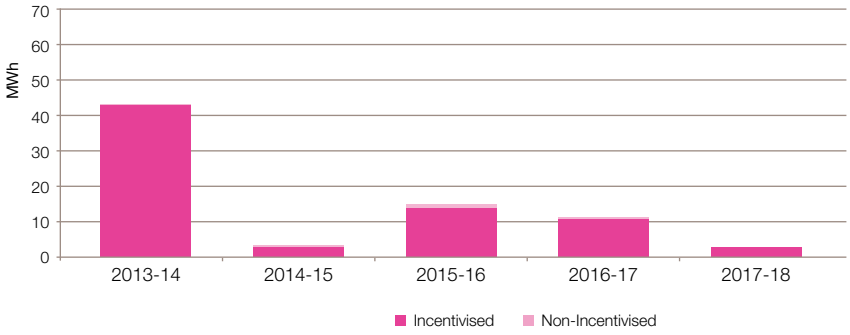
The chart shows the annual comparison of the numbers of Loss of Supply Incidents that occurred within the SP Transmission System.



	2013-14	2014-15	2015-16	2016-17	2017-18
Incentivised	7	3	4	5	2
Non-Incentivised	10	16	15	9	12

Total Estimated Unsupplied Energy

The chart shows the annual comparison of the Estimated Unsupplied Energy, incentivised, for Loss of Supply Incidents that occur within the SP Transmission System.



	2013-14	2014-15	2015-16	2016-17	2017-18
Incentivised	42.30	2.80	13.90	11.31	3.04
Non-Incentivised	0.10	0.20	0.80	0.04	0.00

Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SP Transmission System during 2017-18 was:

3.04 MWh

Reliability of Supply

The Overall Reliability of Supply for the SP Transmission System during 2017-18 was:

99.999984%

compared with 99.999939% in 2016-17 and 99.999920% in 2015-16.

Loss of Supply Incident Details

SPT Loss of Supply Incidents – Incentivised

Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
13 May 2017 07:30 on Ayr-Coylton-Kilmarnock South 1 275kV OHL cct AYR-COYL-KILS 1 cct tripped part DAR. AYR SG1 closed manually at 07:34 all customers back on. Wind farms at AREC and MAHI back on by 08:19. DESA available at 07:30 but not switched on by SPR until 08:45.	20.6	4	1.370
10 January 2017 13:00 on Wishaw-Ravenscraig No 2 33kV cct Trip on Wishaw - Ravenscraig 2 cct, supplying BOC site.	12.5	8	1.666
		Total	3.036 MWh

SPT Loss of Supply Incidents – Non-Incentivised

Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
06 May 2017 00:57 at Arecleoch 132/33kV Substation and Windfarm T2 @ AREC1 tripped off on Transformer protection	0.0	19681	0.0
11 May 2017 09:00 Linmill 132kV S/S Oil level investigation on T1 ET @ LINM1	0.0	225	0.0
24 May 2017 18:52 at Galawhistle 33kV S/S 33kV fault between Grid 1 and windfarm customer CB	0.0	47619	0.0
21 June 2017 19:46 on Dalmally-Windyhill 275kV OHL cct WIYH - DALL cct tripped via 1st & 2nd MP operation; DAR completed at WIYH end only. DALL Op ITP scheme tripped CRUA 1 & 2 and INVR cct. 320MW of generation lost from CRUA PS	0.0	20	0.0
21 June 2017 19:46 on Dalmally-Cruachan 1 275kV OHL cct DALL - CRUA 1 cct tripped via DALL Op ITP operation; 320MW of generation lost from CRUA PS	0.0	41	0.0
21 June 2017 19:46 on Dalmally-Cruachan 2 275kV OHL cct DALL - CRUA 2 cct tripped via DALL Op ITP operation; 320MW of generation lost from CRUA PS	0.0	41	0.0
21 June 2017 19:46 on Dalmally-Inverannan 275kV OHL cct DALL - INVR cct tripped via DALL Op ITP operation; 320MW of generation lost from CRUA PS	0.0	29	0.0
10 September 2017 17:09 at Blacklaw Extenstion 132/33kV Substation and Windfarm Blacklaw extension Windfarm T1 low oil alarm. Circuit switched out of service for urgent top up	0.0	50	0.0
14 September 2017 19:28 at Arecleoch 132/33kV Substation and Windfarm Arcing noise from 132kv terminal pole @ Arecleoch windafrm on circuit to Markhill. Circuit switched of service pending investigation.	0.0	3391	0.0
23 November 2017 04:58 on Gretna-Ewe Hill 33kV cct Ewe Hill wind farm T1 transformer protection and BB protection operation.	0.0	21017	0.0
07 January 2018 00:33 on Arecleoch-Auchencrosh-Coylton-Mark Hill 275kV cct Transient y phase trip on AUCC-COYL-MAHI cct and cascade trip to subsequent windfarms @KILG, AREC, GLAP	0.0	94	0.0
26 February 2018 12:43 on Arecleoch-Glenapp 33kV cct Arecleoch - Glen App cct tripped on main protection	0.0	0	0.0
		Total	0.0 MWh

04 SHE Transmission System

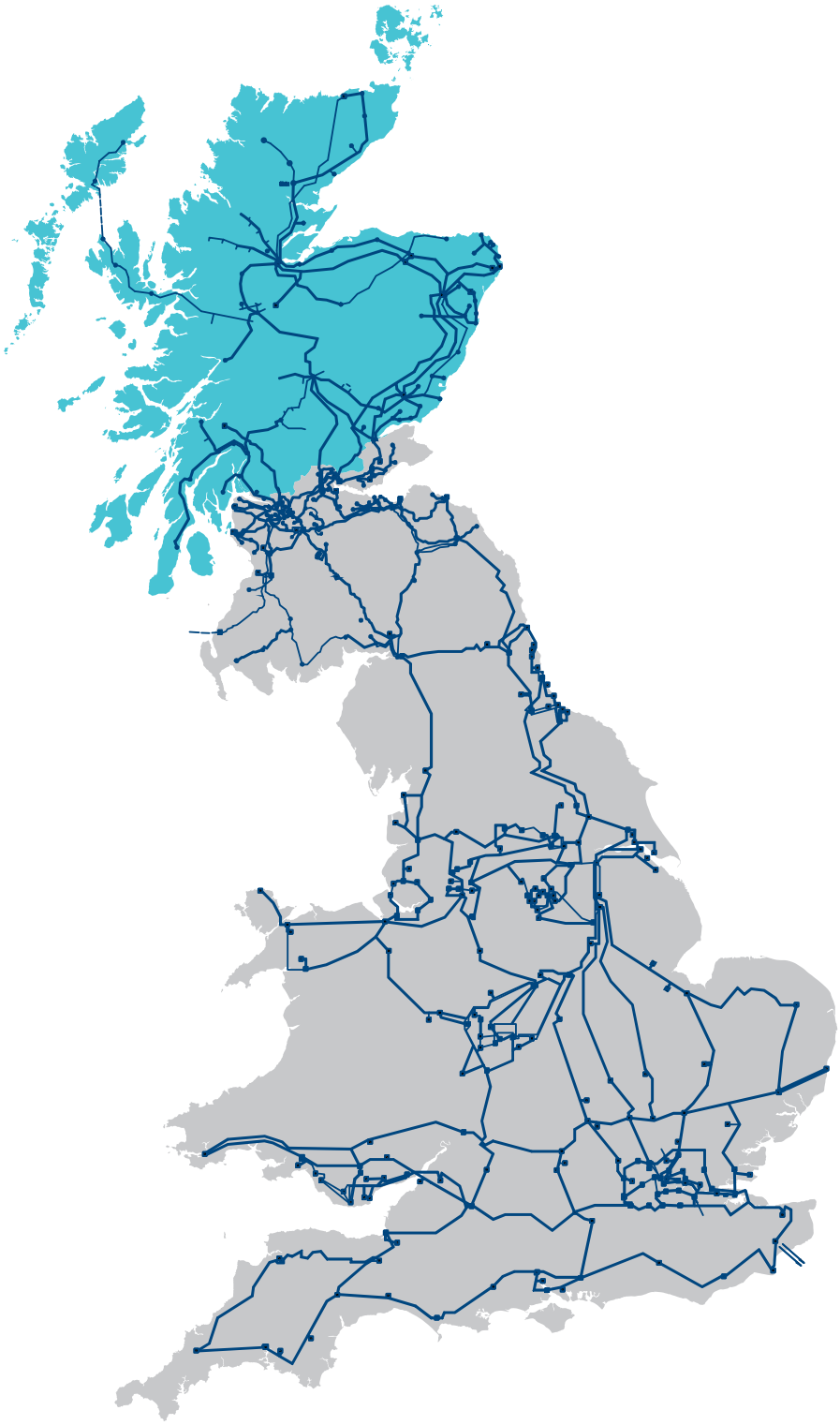
System Description

The SHE Transmission System comprises of 4,838 circuit kilometres of overhead line and over 268 circuit kilometres of underground transmission cable routes interconnecting 128 substations operating at 400, 275 and 132kV. The system covers an area of approximately 55,000 square kilometres or 24% of the Great Britain land mass. It is connected to the SP Transmission System to the South. In 2017-18 the maximum recorded demand on the network was 1.60GW.

There is over 6.9GW of generation capacity in the SHE Transmission area and 1 major customer supplied directly from the SHE Transmission System. The majority of the load is taken by approximately 0.77 million customers connected to the Scottish Hydro Electric Power Distribution Network via 7.94GVA of installed transformer capacity. There are 38 Large Power Stations directly connected to the SHE Transmission system.

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 132kV 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 400kV and as such may have lower security standards applied.



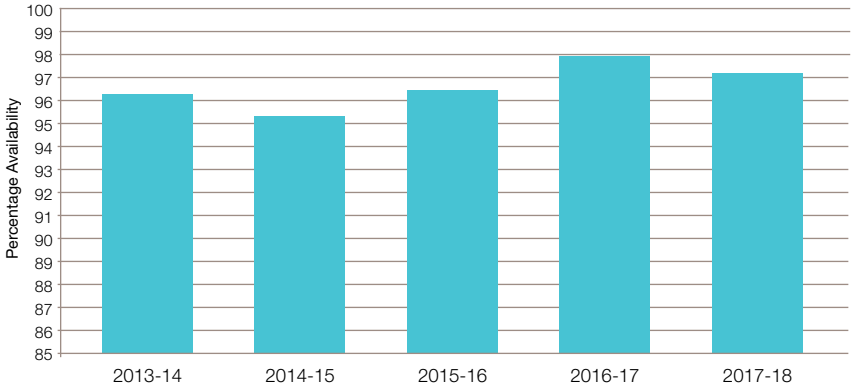
Availability

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.

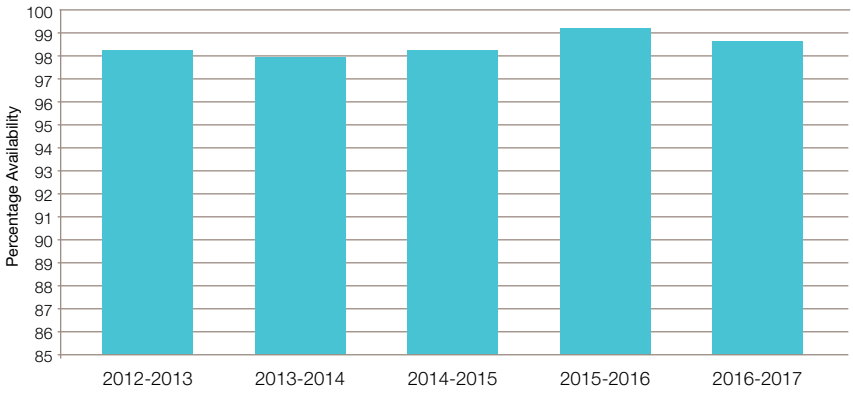
% Annual System Availability

2013-14	2014-15	2015-16	2016-17	2017-18
96.29	95.32	96.53	97.92	97.29



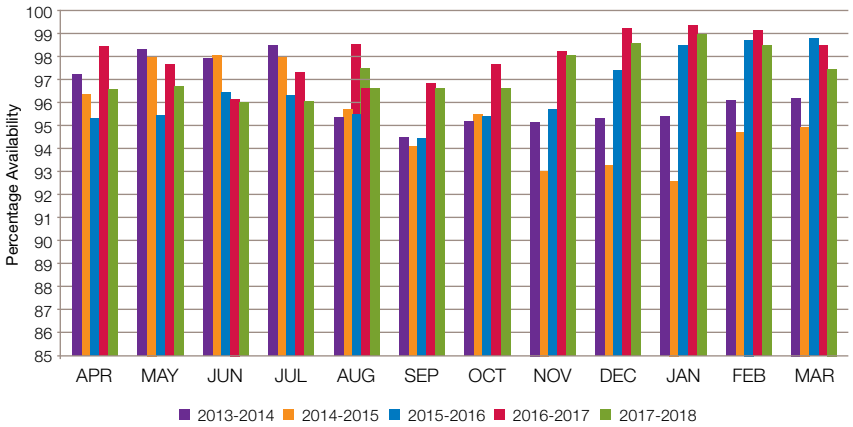
% Winter Peak System Availability

2013-14	2014-15	2015-16	2016-17	2017-18
98.26	97.97	98.21	99.22	98.68



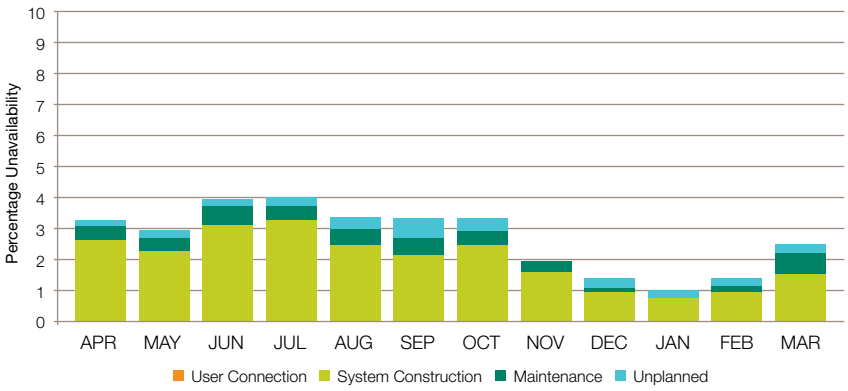
% Monthly System Availability

	2013-14	2014-15	2015-16	2016-17	2017-18
Apr	97.26	96.34	95.29	98.41	96.73
May	98.29	97.99	95.45	97.62	97.06
Jun	97.94	98.03	96.44	96.08	96.01
Jul	98.55	97.96	96.30	97.33	96.03
Aug	95.39	95.73	95.56	96.66	96.67
Sep	94.58	94.09	94.44	96.81	96.69
Oct	95.17	95.42	95.40	97.67	96.61
Nov	95.22	93.01	95.74	98.25	98.04
Dec	95.30	93.13	97.42	99.19	98.58
Jan	95.46	92.66	98.50	99.34	98.93
Feb	96.04	94.70	98.74	99.12	98.53
Mar	96.26	94.98	98.81	98.58	97.44



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
Apr	0.00	2.71	0.35	0.21	3.27
May	0.00	2.36	0.39	0.20	2.94
Jun	0.00	3.14	0.63	0.21	3.99
Jul	0.00	3.37	0.38	0.22	3.97
Aug	0.00	2.51	0.49	0.33	3.33
Sep	0.00	2.21	0.53	0.57	3.31
Oct	0.00	2.54	0.47	0.38	3.39
Nov	0.00	1.72	0.18	0.05	1.96
Dec	0.00	1.04	0.08	0.30	1.42
Jan	0.00	0.75	0.12	0.20	1.07
Feb	0.00	1.06	0.13	0.28	1.47
Mar	0.00	1.59	0.68	0.29	2.56

Security

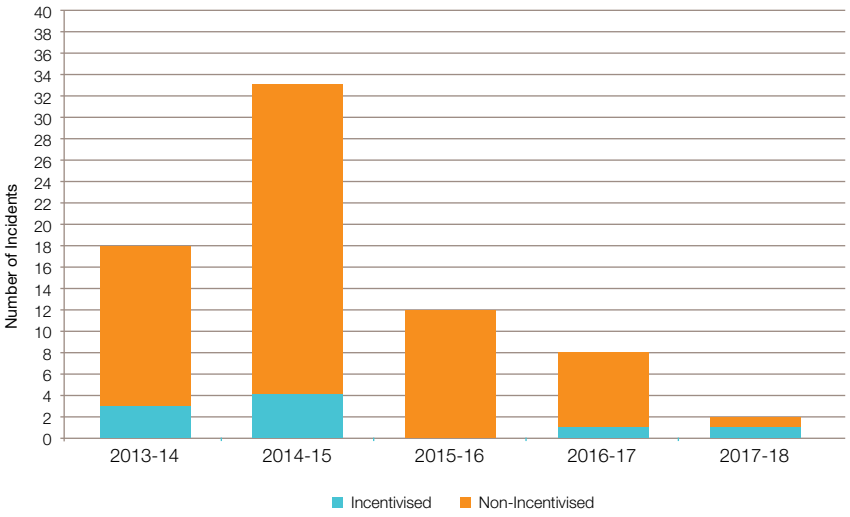
The definitions and criteria for system security can be found in the Glossary of Terms at the end of this report.

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

During 2017-18 there were 85 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 2 resulting in loss of supplies to customers.

Number of Loss of Supply Incidents

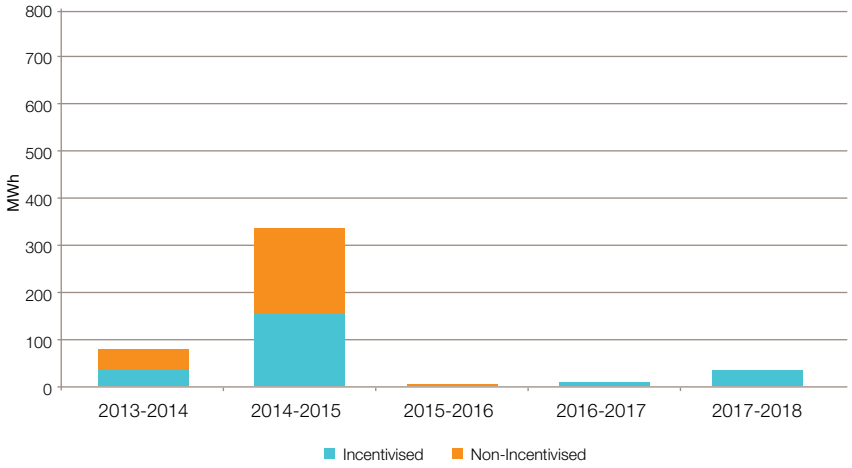
The chart shows the annual comparison of the numbers of Loss of Supply Incidents that occurred within the SHE Transmission System.



	2013-14	2014-15	2015-16	2016-17	2017-18
Incentivised	3	4	0	1	1
Non-Incentivised	15	29	12	7	1

Total Estimated Unsupplied Energy

The chart shows the annual comparison of the Estimated Unsupplied Energy for Loss of Supply Incidents that occur within the SHE Transmission System.



	2013-14	2014-15	2015-16	2016-17	2017-18
Incentivised	35.60	166.69	0.00	4.40	24.33
Non-Incentivised	44.40	194.70	0.87	0.00	0.00

Total Estimated Unsupplied Energy

The Overall Reliability of Supply for the SHE Transmission System during 2017-18 was:

24.33 MWh

Reliability of Supply

The Overall Reliability of Supply for the SHE Transmission System during 2017-18 was:

99.999555%

compared with 99.999925% in 2016-17 and 99.999987% in 2015-16

Loss of Supply Incident Details

SHE Transmission Loss of Supply Incidents – Incentivised

Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
28 February 2018 06:04 at Willowdale 132kV Substation Loss of GT1 and GT2 following tap changer run away on GT1. GT1 was switched out, but this was followed by operation of GT2 directional overcurrent protection causing it to trip.	**28.5**	**60**	**24.33**
		Total	**24.33 MWh**

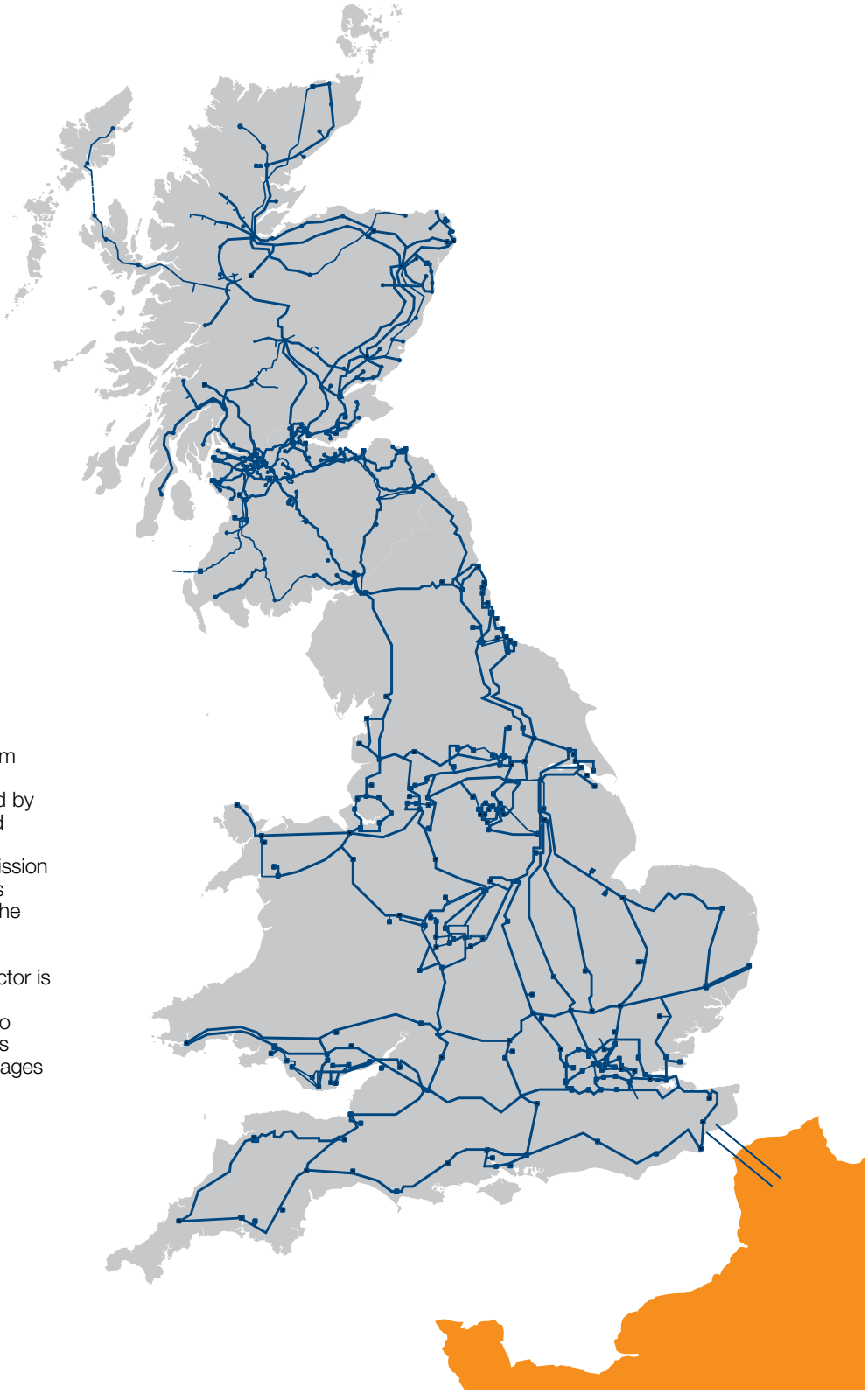
SHE Transmission Loss of Supply Incidents – Non-Incentivised

Incident Date, Time & Location	MW Lost	Mins	MWh Unsupplied
6 February 2018 Fort Augustus - Fort William/Kinlochleven/Invergarry 132kV Substations Fort William GT1 Earthing Transformer Buchholz Gas Trip signal caused the OHL and all ends to trip whilst on maintenance. Protection maloperation disrupted supplies.	**0.0**	**112**	**0.0**
		Total	**0.0 MWh**

05

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.

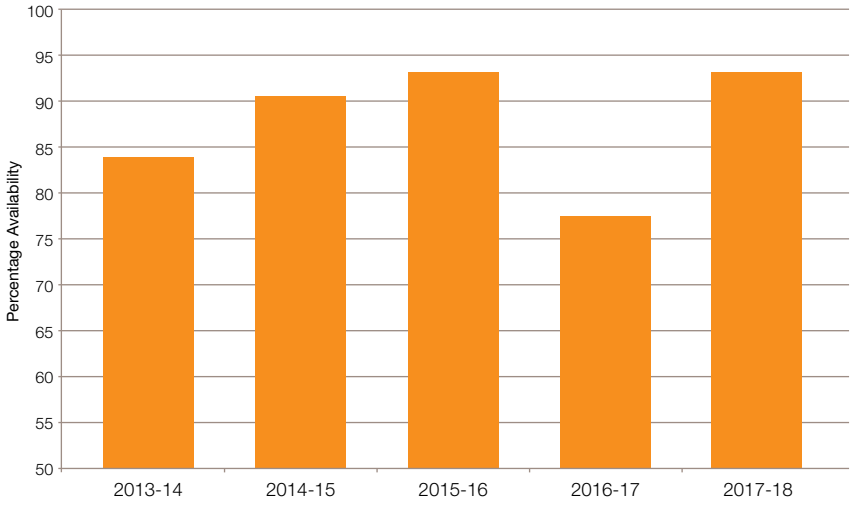
The total capability of the Interconnector is 2000MW. This is made up of four 'circuits', each of 500MW. There is no redundancy of the major components making up each circuit, hence all outages effect real time capability.

Availability

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

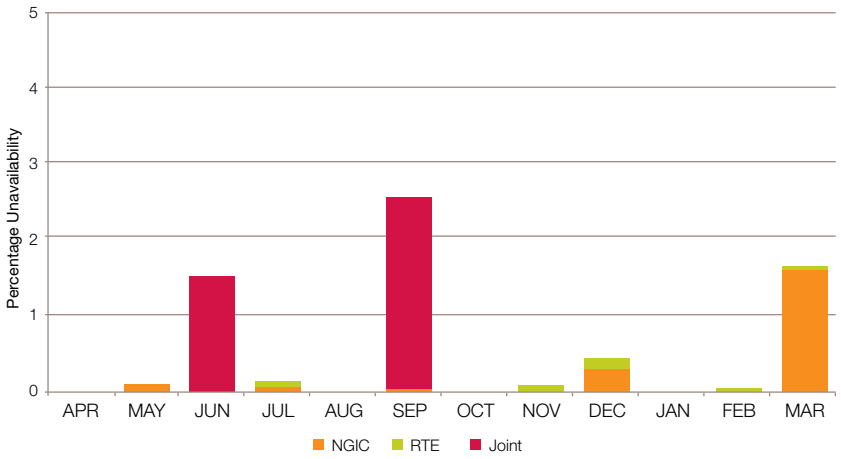
% Annual Availability

2013-14	2014-15	2015-16	2016-17	2017-18
83.84	90.46	92.94	77.54	92.61



% Monthly Unavailability

	NGIC	RTE	Joint
Apr	0.00	0.00	0.00
May	0.12	0.02	0.00
Jun	0.00	0.00	1.48
Jul	0.09	0.10	0.00
Aug	0.00	0.00	0.00
Sep	0.30	0.01	2.53
Oct	0.00	0.00	0.00
Nov	0.02	0.14	0.00
Dec	0.30	0.21	0.00
Jan	0.00	0.00	0.00
Feb	0.00	0.12	0.00
Mar	1.61	0.13	0.00
Average	0.20	0.06	0.33



Annual System Availability

Annual Availability of England – France Interconnector

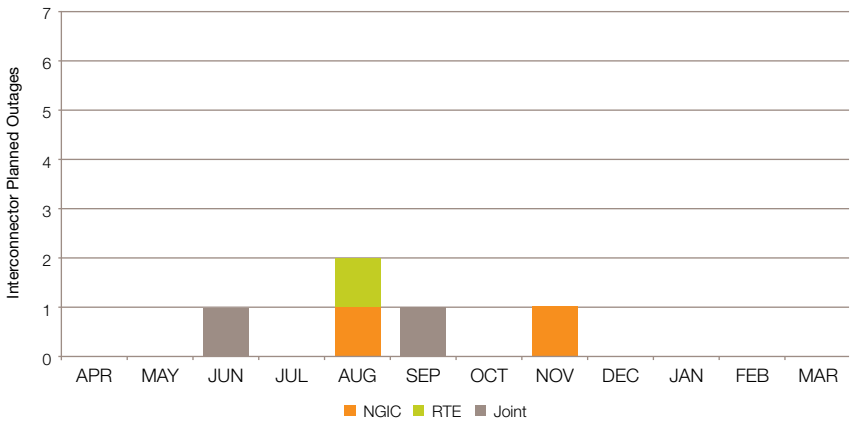
92.61%

Outages

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.

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

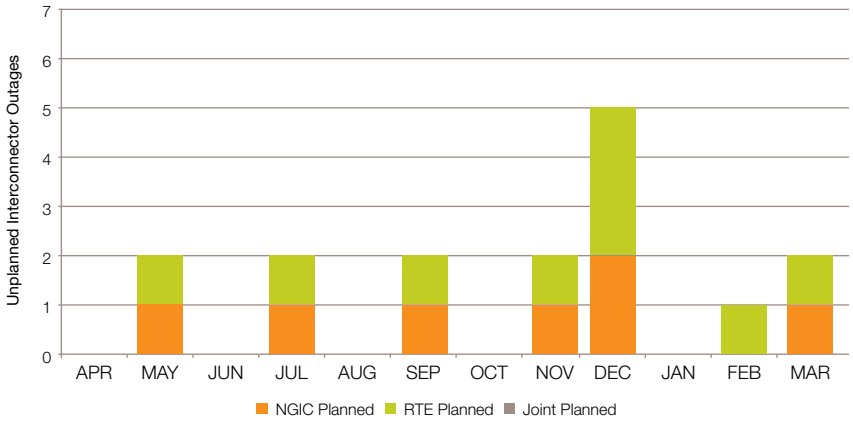
Planned outages



NGIC	2
RTE	1
Joint	2
Total	**5**

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

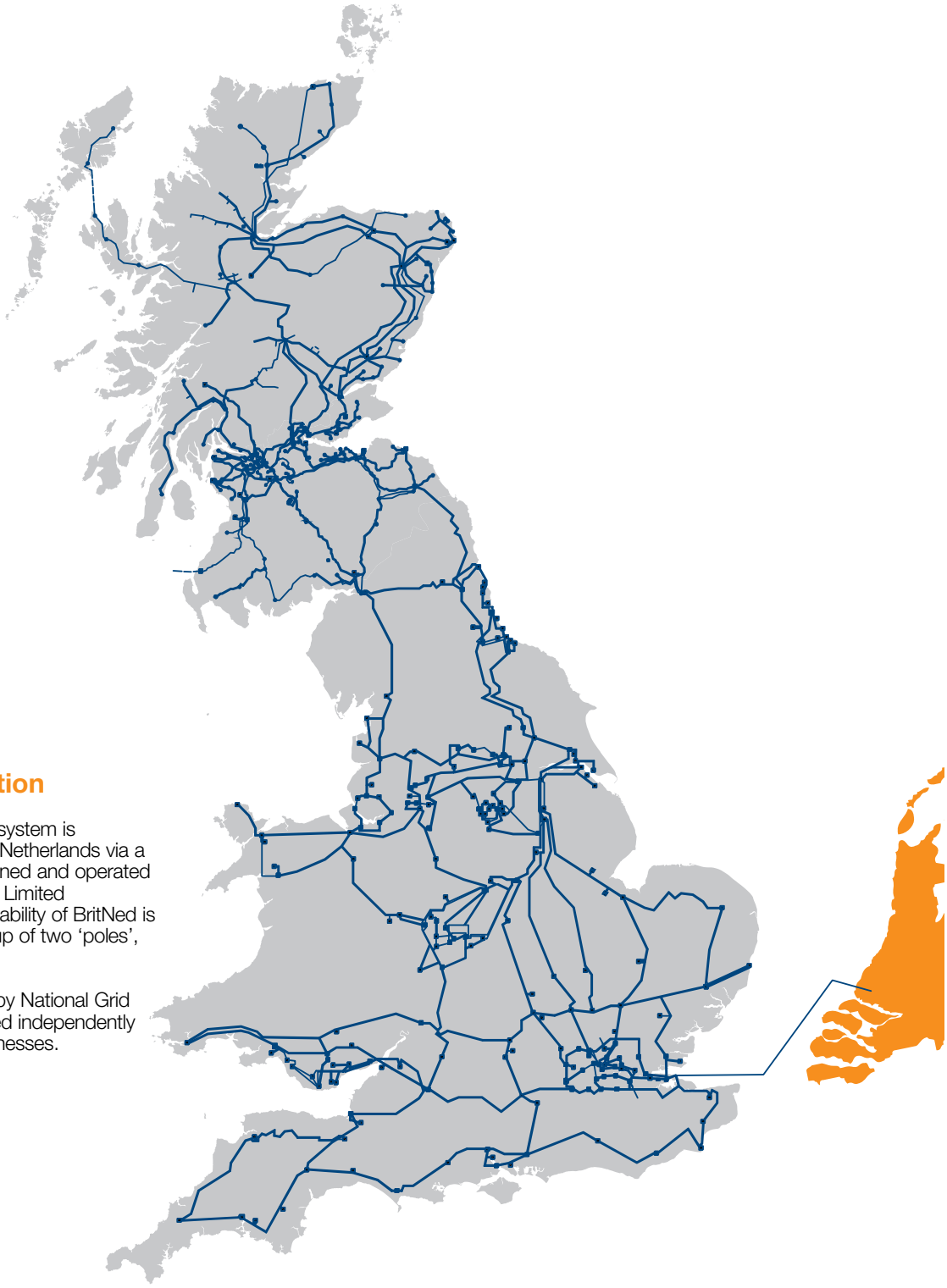
Unplanned outages



NGIC	7
RTE	9
Joint	0
Total	**16**

Interconnectors

England – Netherlands Interconnector



System Description

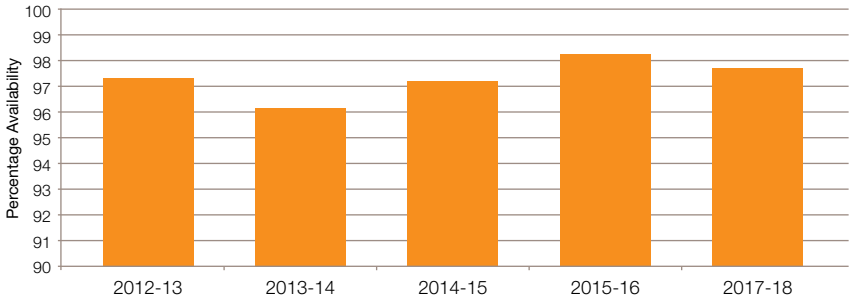
The NGET transmission system is interconnected with The Netherlands via a 260km subsea cable owned and operated by BritNed Development Limited ("BritNed"). The total capability of BritNed is 1000 MW and is made up of two 'poles', 500 MW each.

BritNed is jointly owned by National Grid and TenneT, and operated independently from their regulated businesses.

Availability

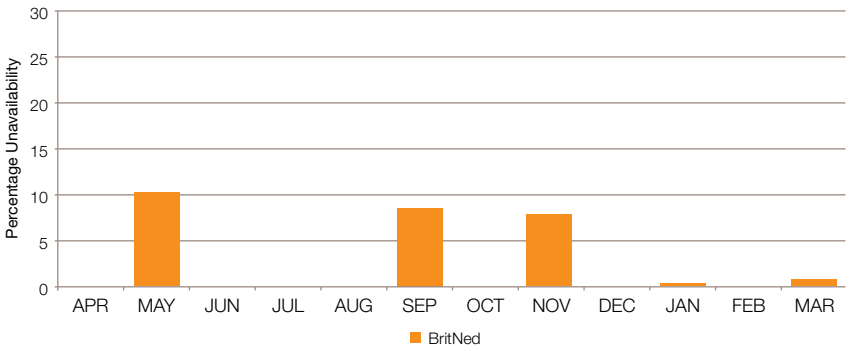
The chart below shows the availability of the England – Netherlands Interconnector.

% Annual Availability



2013-14	2014-15	2015-16	2016-17	2017-18
97.37	96.15	97.22	98.2	97.78

% Monthly Unavailability



	BritNed
Apr	0.00
May	10.22
Jun	0.00
Jul	0.00
Aug	0.00
Sep	7.92
Oct	0.00
Nov	6.88
Dec	0.00
Jan	0.13
Feb	0.00
Mar	1.43
Average	2.22

Annual System Availability

Annual Availability of
England – Netherlands Interconnector

97.78%

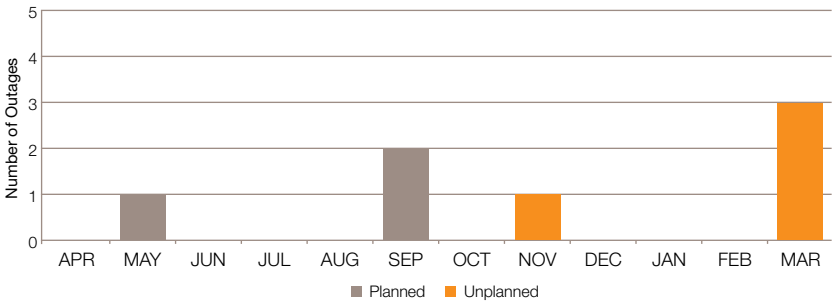
Outages

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.

The chart below shows the Interconnector Planned and Unplanned Outages on a per month basis.

	Planned	Unplanned
Apr	0	0
May	1	0
Jun	0	0
Jul	0	0
Aug	0	0
Sep	2	0
Oct	0	0
Nov	0	1
Dec	0	0
Jan	0	1
Feb	0	0
Mar	0	3
Total	3	5

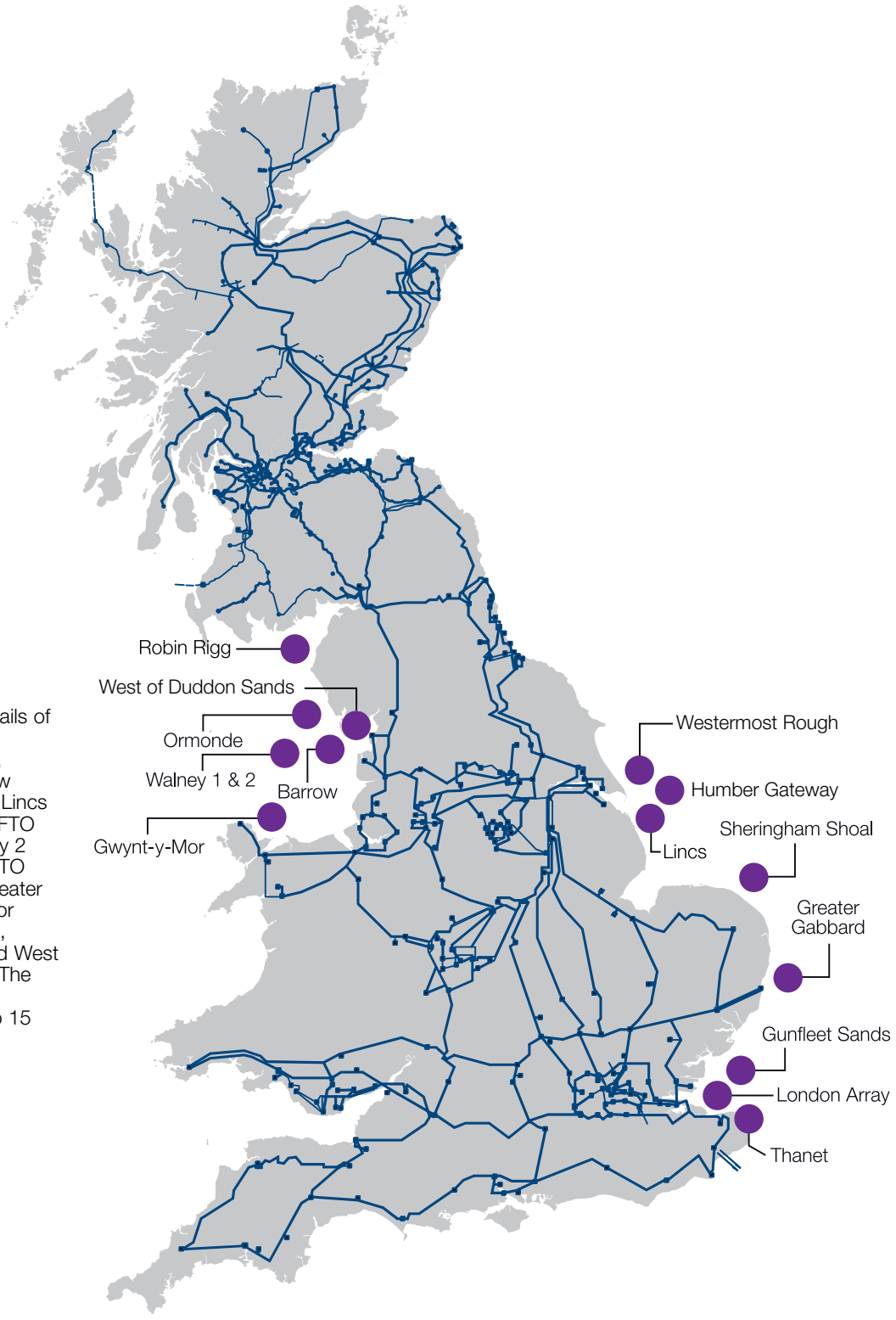
Planned outages



06 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), Lincs OFTO (TC), Westermost Rough OFTO (TC), Walney 1 OFTO (BT), Walney 2 OFTO (BT), Sheringham Shoal OFTO (BT), London Array OFTO (BT), Greater Gabbard OFTO (EQ), Gwynt-Y-Mor OFTO (BBE), Thanet OFTO (BBE), Humber Gateway OFTO (BBE) and West of Duddon Sands OFTO (WoDS). The offshore network consists of 1077 kilometres of circuit, connecting to 15 offshore substations totalling over 4.33GW of generating capacity.



TC: Transmission Capital
BT: Blue Transmission Investments Limited
EQ: Equitix
BBE: Balfour Beatty & Equitix Consortium

Offshore Transmission Networks

Offshore Transmission Networks						
	Go Live	Number of Circuits	Circuit Length km	Generating Capacity MW	Connection Voltage	Interfacing Party
TC Robin Rigg	02/03/2011	2	28.8	184	132kV	DNO
TC Gunfleet Sands	19/07/2011	1	12.76	163.9	132kV	DNO
TC Barrow	27/09/2011	1	30.1	90	132kV	DNO
TC Ormonde	10/07/2012	1	44.3	150	132kV	DNO
TC Lincs	11/11/2014	2	122.6	250	400kV	Transmission
TC Westermost Rough	11/02/2016	1	26.16	210	275kV	Transmission
BT Walney 1	31/10/2011	1	48	182	132kV	Transmission
BT Walney 2	04/10/2012	1	49	182	132kV	DNO
BT Sheringham Shoal	05/07/2013	2	88	315	132kV	DNO
BT London Array	18/09/2013	4	216	630	400kV	Transmission
EQ Greater Gabbard	29/11/2013	3	135	500	132kV	Transmission
BBE Gwynt Y Mor	17/02/2015	4	126.8	574	132kV	Transmission
BBE Thanet	17/12/2014	2	28.9	300	132kV	DNO
BBE Humber Gateway	15/09/2016	2	78	219	275kV	Transmission
West of Duddon Sands	25/08/2015	2	43	382	400kV	Transmission

Availability

Offshore Transmission Systems are radial and only connect offshore generation to the wider NETS. OFTOs' performance to be subject to regulatory incentivisation is different from that for onshore TOs', and is based on availability rather than loss of supply. OFTO provides availability information including all outages originating on an OFTO's system, but excluding outages that originate elsewhere, for example on a generator, DNO or TO's system. The OFTO availability incentive would adjust the outage data differently to calculate incentivised performance for each OFTO.

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

Offshore Transmission Networks % Annual Availability					
	2013-14	2014-15	2015-16	2016-17	2017-18
TC Robin Rigg	99.85	100	99.99	99.99*	100
TC Gunfleet Sands	100	99.53	100	99.95	99.81
TC Barrow	99.64	100	99.88	100	99.99
TC Ormonde	100	99.93	100	99.59	100
TC Lincs	N/A	100	99.96	99.93	99.78
TC Westermost Rough	N/A	N/A	100	100	100
BT Walney 1	99.99	100	100	99.62	99.70
BT Walney 2	94.89	100	92.47	100	100
BT Sheringham Shoal	99.20	99.84	100	99.95	99.23
BT London Array	99.97	99.90	99.98	98.88	99.80
EQ Greater Gabbard	99.81	100	100	99.78	99.61
BBE Gwynt Y Mor	N/A	82.59	82.58	99.73	100
BBE Thanet	N/A	82.47	83.05	96.15	86.92
BBE Humber Gateway	N/A	N/A	N/A	100	93.75
West of Duddon Sands	N/A	N/A	100	99.64	99.45

*Figure has been updated from 98.08%. This event has been agreed with OFGEM as an exceptional event.

% Winter Peak System Availability

Offshore Transmission Networks % Winter Availability					
	2013-14	2014-15	2015-16	2016-17	2017-18
TC Robin Rigg	100	100	100	100	100
TC Gunfleet Sands	100	100	100	100	100
TC Barrow	100	100	100	100	100
TC Ormonde	100	100	100	100	100
TC Lincs	N/A	100	100	100	99.87
TC Westermost Rough	N/A	N/A	100	100	100
BT Walney 1	100	100	100	100	100
BT Walney 2	100	100	3.87	100	100
BT Sheringham Shoal	99.01	100	100	100	99.99
BT London Array	99.98	100	100	100	100
EQ Greater Gabbard	100	100	100	100	99.79
BBE Gwynt Y Mor	N/A	100	76.24	99.94	100
BBE Thanet	N/A	96.93	100	100	100
BBE Humber Gateway	N/A	N/A	N/A	100	86.55
West of Duddon Sands	N/A	N/A	100	100	100

% Monthly System Availability

Offshore Transmission Networks												
	April	May	June	July	August	September	October	November	December	January	February	March
TC Robin Rigg	100	100	100	100	100	100	100	100	100	100	100	100
TC Gunfleet Sands	100	100	100	100	97.72	100	100	100	100	100	100	100
TC Barrow	100	100	100	100	100	100	99.89	100	100	100	100	100
TC Ormonde	100	100	54.59	23.43	100	100	100	100	100	100	100	100
TC Lincs	100	100	100	100	97.81	100	100	100	100	100	99.60	100
TC Westermost Rough	100	100	100	100	100	100	100	100	100	100	100	100
BT Walney 1	100	100	100	96.36	100	100	100	100	100	100	100	100
BT Walney 2	100	100	100	100	100	100	100	100	100	100	100	100
BT Sheringham Shoal	100	100	98.84	92.03	100	100	99.97	99.94	99.98	100	100	99.95
BT London Array	100	100	99.30	100	98.31	100	100	100	100	100	100	100
EQ Greater Gabbard	100	100	100	100	100	100	100	100	100	100	99.38	95.95
BBE Gwynt Y Mor	100	100	100	100	100	100	100	100	100	100	100	100
BBE Thanet	100	63.67	53.18	50	76.19	100	100	100	100	100	100	100
BBE Humber Gateway	100	100	100	99.91	100	100	100	100	100	100	59.65	65.41
West of Duddon Sands	100	100	100	100	93.35	100	100	100	100	100	100	100

Annual System Availability

Annual Availability of
Offshore Networks for 2017-18 was

98.22%

% Monthly Planned & 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 as a result of Non-OFTO.

% Monthly Planned & Unplanned Unavailability													
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
TC Robin Rigg	OFTO 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
	Non-OFTO	0.49	0	0	1.17	0	1.35	2.99	1.46	0.17	1.47	0	4.10
TC Gunfleet Sands	OFTO Planned	0	0	0	0	2.28	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	1.5	0	1.32	0	0	0	0	0
TC Barrow	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0.11	0	0	0	0	0
	Non-OFTO	0	0	0	45.93	0	0	0	0	0	0	0.17	0
TC Ormonde	OFTO Planned	0	0	45.41	76.57	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0.5	0	0	0	0	0
TC Lincs	OFTO Planned	0	0	0	0	2.19	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0.4	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
TC Westermost Rough	OFTO 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
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
BT Walney 1	OFTO Planned	0	0	0	3.64	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
BT Walney 2	OFTO 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
	Non-OFTO	0	0	0	0	0	17.11	0.69	0	0	0	0	0
BT Sheringham Shoal	OFTO Planned	0	0	0	7.97	0	0	0.03	0.06	0.02	0	0	0.05
	OFTO Unplanned	0	0	1.16	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0.06	0	0	0	0	0	0	0	0
BT London Array	OFTO Planned	0	0	0.70	0	0.48	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	1.21	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
EQ Greater Gabbard	OFTO 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	0.62	4.05
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
BBE Gwynt Y Mor	OFTO 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
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
BBE Thanet	OFTO 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
	Non-OFTO	0	36.33	46.82	50	23.81	0	0	0	0	0	0	0
BBE Humber Gateway	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0.09	0	0	0	0	0	0	40.35	34.59
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
West of Duddon Sands	OFTO Planned	0	0	0	0	6.65	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0

Outage Details

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

TC Robin Rigg

Outage Date & Time	Reason	Days & Hours	MWh
18 April 2017 09:50 DNO request (Robin Rigg East Outage)	Non-OFTO	3.53 hours	324.76
27 July 2017 08:00 DNO request (Robin Rigg East Outage)	Non-OFTO	2.65 hours	243.80
27 July 2017 11:00 DNO request (Robin Rigg West Outage)	Non-OFTO	6.08 hours	559.36
26 September 2017 08:14 Generator Maintenance (Robin Rigg East Outage)	Non-OFTO	9.73 hours	895.16
3 October 2017 08:15 DNO request (Robin Rigg East Outage)	Non-OFTO	6.55 hours	602.60
18 October 2017 08:06 DNO request (Robin Rigg West Outage)	Non-OFTO	5.33 hours	490.36
27 October 2017 09:35 DNO request (Robin Rigg East Outage)	Non-OFTO	0.75 hours	69.00
28 October 2017 08:22 DNO request (Robin Rigg West Outage)	Non-OFTO	5.03 hours	462.76
30 October 2017 10:07 DNO request (Robin Rigg East Outage)	Non-OFTO	4.57 hours	420.44
15 November 2017 07:20 Generator Maintenance (Robin Rigg West Outage)	Non-OFTO	10.53 hours	968.76
25 December 2017 01:57 DNO request (Robin Rigg West Outage)	Non-OFTO	1.25 hours	115.00
15 January 2018 09:34 DNO request (Robin Rigg East Outage)	Non-OFTO	6.50 hours	598.00
27 January 2018 06:34 DNO request (Robin Rigg West Outage)	Non-OFTO	4.43 hours	407.56
1 March 2018 08:52 DNO request (Robin Rigg West Outage)	Non-OFTO	7.25 hours	667.00
4 March 2018 09:03 DNO request (Robin Rigg East Outage)	Non-OFTO	8.33 hours	766.36
19 March 2018 09:50 DNO request (Robin Rigg East Outage)	Non-OFTO	6.98 hours	642.16
20 March 2018 08:41 DNO request (Robin Rigg West Outage)	Non-OFTO	7.92 hours	728.64
		Total	**8961.72 MWh**

TC Gunfleet Sands

Outage Date & Time	Reason	Days & Hours	MWh
02 August 2017 09:57 DNO outage to maintain CB305	Non-OFTO	7.05 hours	1155.50
02 August 2017 17:01 OFTO annual maintenance	OFTO	17 hours	2786.30
03 August 2017 10:02 DNO outage to switch circuit back into service after outage	Non-OFTO	4.12 hours	674.72
17 October 2017 09:35 Generator outage of Offshore Transformer 1 (T1) to investigate high partial discharge*	Non-OFTO	2 days 1.22 hours	1613.32
		Total	**6229.84 MWh**

*This offshore transformer (T1) resulted in 80% availability.

TC Barrow			
Outage Date & Time	Reason	Days & Hours	MWh
10 July 2017 09:58 DNO outage to refurbish CB105	Non-OFTO	14 days 5.52 hours	30754.50
09 October 2017 13:44 Unplanned circuit trip during fibre testing	OFTO	0.85 hours	76.50
19 February 2018 10:30 DNO outage to re-configure circuit	Non-OFTO	1.13 hours	102.00
		Total	30933 MWh

TC Ormonde			
Outage Date & Time	Reason	Days & Hours	MWh
17 June 2017 09:02 Export cable repair*	OFTO	37 days 8.65 hours	134497.50
02 October 2017 11:14 DNO outage to work on Trimpell 2 circuit	Non-OFTO	3.02 hours	425.50
11 October 2017 13:05 DNO outage to re-configure Trimpell 2 circuit	Non-OFTO	0.73 hours	110.00
		Total	135060 MWh

*This event has been agreed with OFGEM as an exceptional event.

TC Lincs			
Outage Date & Time	Reason	Days & Hours	MWh
15 August 2017 07:08 SVC repair and annual maintenance	OFTO	11.43 hours	2858.33
16 August 2017 11:49 Offshore transformer protection testing+	OFTO	6.93 hours	693.33
17 August 2017 13:32 Offshore transformer protection testing+	OFTO	5.28 hours	528.33
22 February 2018 17:41 SVC flashover tripped full windfarm	OFTO	2.70 hours	675.00
		Total	4755 MWh

+This is not a full system outage, instead generation was restricted to 150MW to account for one export cable being out of service.

TC Westermost Rough			
Outage Date & Time	Reason	Days & Hours	MWh
-None-			
		Total	0MWh

BT Walney 1			
Outage Date & Time	Reason	Days & Hours	MWh
12 July 2017 09:03 Cable sealing end inspection	OFTO	1 day 0.98 hours	4547.00
		Total	4547 MWh

BT Walney 2			
Outage Date & Time	Reason	Days & Hours	MWh
10 September 2017 10:11 DNO System fault (excluded from availability calculation)	NON-OFTO	4 days 17.74hours	20700.00
26 October 2017 13:07 DNO System fault (excluded from availability calculation)	NON-OFTO	4.74 hours	862.00
		Total	21562 MWh

BT Sheringham Shoal

Outage Date & Time	Reason	Days & Hours	MWh
08 March 2017 07:11 Fibre optic earth bonding repairs	OFTO	9.47 hours	1491.00
20 June 2017 18:34 Shunt reactor voltage control rise	OFTO	16.71 hours	2631.75
02 July 2017 07:33 Outage to enable switching for UKPN (excluded from availability calculation)	NON-OFTO	0.96 hours	150.94
23 July 2017 10:13 Circuit 2 maintenance outage	OFTO	4 days 22.52 hours	18672.00
09 October 2017 13:20 Top up SF6 in 34kV Bushbar Section	OFTO	0.50 hours	78.00
15 November 2017 08:18 Top up SF6 in 34kV Bushbar Section	OFTO	0.86 hours	135.60
19 December 2017 09:37 Top up SF6 in 34kV Bushbar Section	OFTO	0.30 hours	47.25
		Total	23206.54 MWh

BT London Array

Outage Date & Time	Reason	Days & Hours	MWh
17 June 2017 11:35 400kV circuit breaker fault	OFTO	19.86 hours	3128.00
02 August 2017 18:58 Bird strike on SVCs	OFTO	1 day 12.15 hours	5693.00
24 August 2017 08:24 No.2 export cable and STG2 maintenance	OFTO	8.08 hours	1272.00
25 August 2017 09:01 No.4 export cable and STG4 maintenance	OFTO	6.16 hours	970.00
		Total	11063 MWh

Equitix Greater Gabbard

Outage Date & Time	Reason	Days & Hours	MWh
28 February 2018 00:27 Export Circuit 2 - Transformer low oil trip and suspected surge damage.	OFTO	13 days 6.70 hours	17169.44
		Total	17169.44 MWh

BBE Gwynt-Y-Mor

Outage Date & Time	Reason	Days & Hours	MWh
-None-			
		Total	0 MWh

BBE Thanet			
Outage Date & Time	Reason	Days & Hours	MWh
9 May 2017 11:28 Generator requested - Radiator replacement works	Non-OFTO	22 days 12.53 hours	81079.96
1 June 2017 00:00 Generator requested - Radiator replacement works	Non-OFTO	12 days 13.50 hours	45225.00
15 June 2017 11:16 Generator requested - Radiator replacement works	Non-OFTO	15 days 12.73 hours	55909.96
1 July 2017 00:00 Generator requested - Radiator replacement works	Non-OFTO	30 days 23.99 hours	111599.96
1 August 2017 00:00 Generator requested - Radiator replacement works	Non-OFTO	14 days 16 hours	52800.00
21 August 2017 11:04 Buchholz Gas Alarm Investigation	Non-OFTO	2.37 hours	355.00
		Total	346969.88 MWh

BBE Humber Gateway			
Outage Date & Time	Reason	Days & Hours	MWh
10 July 2017 16:15 Circuit 2 tripped on Restricted Earth Fault	OFTO	0 days 1.40 hours	154.00
06 February 2018 09:43 Cable fault on Circuit 1	OFTO	22 days 14.27 hours	59649.00
01 March 2018 00:00 Cable fault on Circuit 1	OFTO	21 days 10.65 hours	56612.00
		Total	116415 MWh

West of Duddon Sands			
Outage Date & Time	Reason	Days & Hours	MWh
15 August 2017 11:50 OFTO planned warranty repairs - Circuit 2	OFTO	2 days 9.67 hours	9527.00
22 August 2017 11:50 OFTO planned warranty repairs - Circuit 1	OFTO	2 days 8.67 hours	9361.00
		Total	18888 MWh

Glossary of terms

This glossary provides explanations and definitions for common terms:

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:

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

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 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 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:

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

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 example 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 the date, time and location of the event, duration, demand lost, an estimate of unsupplied energy and relevant factual information relating to the event.

Since 1st April 2013, loss of supply incidents are governed by the Energy Not Supplied (ENS) scheme. The scheme aims to incentivise the Transmission Licensees to minimise the impact of any loss of supply to their customers, that is, to restore supplies as soon as possible after an incident.

Loss of Supply Incidents – Incentivised

An Incentivised loss of supply event is an event on the Licensee's Transmission System that causes electricity not to be supplied to a customer, subject to the exclusions defined in the Special Conditions of the Transmission Licence.

Loss of Supply Incidents – Non-Incentivised

The Non-Incentivised category covers loss of supply incidents that are less than 3 minutes in duration, the energy not supplied is calculated and recorded but not included in the incentivised energy not supplied figure and is reported separately. The Non-Incentivised category also applies to connection arrangements that 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 security. Loss of supply initiated on a DNO network are not included within this category.

Overall Reliability of Supply

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

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

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 132kV 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 400kV 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 1320 and 1800 MW are considered abnormal and a maximum frequency change of 0.8Hz 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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