National Electricity Transmission System Performance Report

Report to the Office of Gas and Electricity Markets (Ofgem)

2019-20

nationalgridESO

Contents

Introduction

This report details the performance of the National Electricity Transmission System in Great Britain for 2019-20, as required by 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 plc, Gwynt-Y-Mor OFTO plc, Thanet OFTO Ltd, Humber Gateway OFTO Ltd, West of Duddon Sands (WoDS) Transmission plc, Diamond Transmission Partners (DTP) BBE Ltd, DTP RB Ltd and DTP Galloper Ltd.

Following legal separation of the Electricity System Operator from NGET on 1st April 2019, National Grid Electricity System Operator became the National Electricity Transmission System Operator (NETSO) for the onshore and offshore transmission networks.

In accordance with Standard Licence Condition C17 (Transmission System Security Standard and Quality of Service) of the Transmission Licence, the NETSO is required by The Office of Gas and Electricity Markets, 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 NG Electricity Transmission plc, 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, TC Dudgeon OFTO plc, BT Walney 1 Ltd, BT Walney 2 Ltd, BT Sheringham Shoal Ltd, BT London Array Ltd, Greater Gabbard OFTO plc, Gwynt-Y-Mor OFTO plc, Thanet OFTO Ltd, Humber Gateway OFTO Ltd, WoDS Transmission plc, DTP BBE Ltd, DTP RB Ltd and DTP Galloper Ltd 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 transmission networks it should be recognised that this can be influenced by both the Transmission Owners and the NETSO.

The National Electricity Transmission System is connected via interconnectors to transmission systems in Northern Ireland, Republic of Ireland, France, the Netherlands and Belgium.

The interconnectors with Northern Ireland and the Republic of Ireland fall outside the scope of this report, as they are regulated by the Northern Ireland Authority for Utility Regulation (NIAUR) and the Commission for Regulation of Utilities (CRU) respectively.

Information relating to interconnectors with France (Interconnexion France–Angleterre), the Netherlands (BritNed) and Belgium (Nemo Link) has been provided by National Grid Ventures.

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.

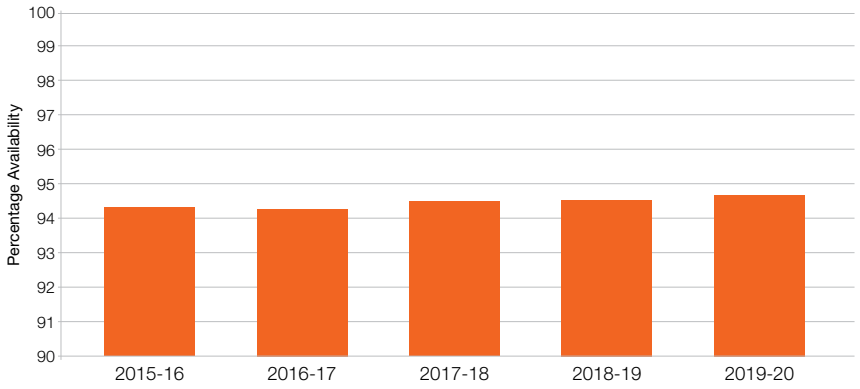
National Electricity Transmission System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability.

Annual System Availability

Annual System Availability of the National Electricity Transmission System for 2019 - 20 was 94.69%

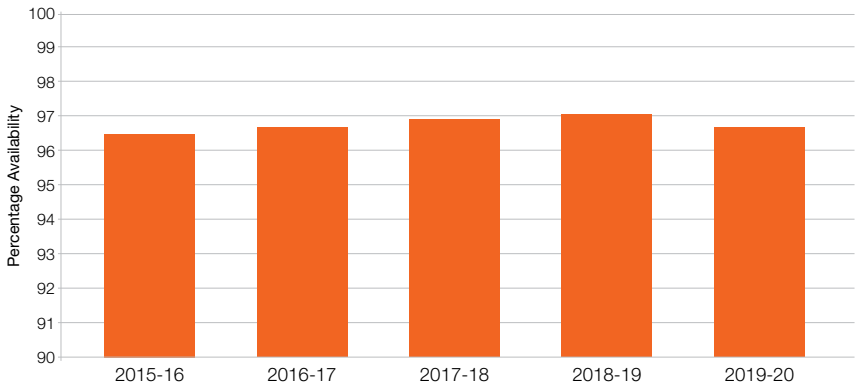
% Annual System Availability

GB % Annual System Availability				
2015-16	2016-17	2017-18	2018-19	2019-20
94.36	94.31	94.44	94.55	94.69

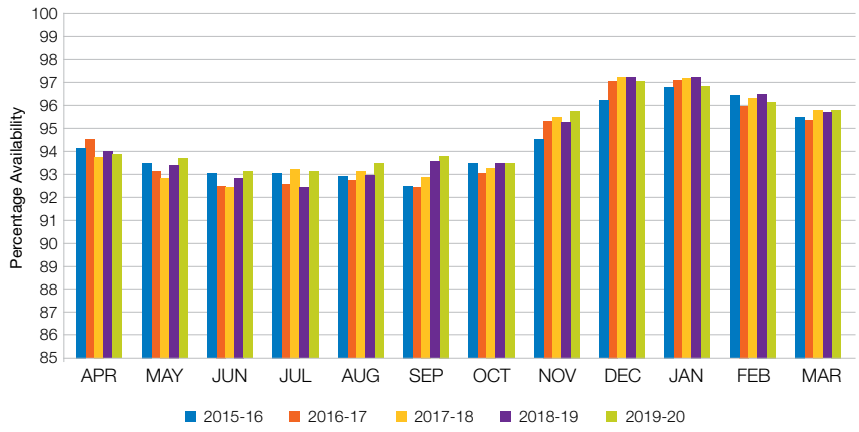


% Winter Peak System Availability

GB % Winter Peak System Availability				
2015-16	2016-17	2017-18	2018-19	2019-20
96.46	96.71	96.92	97.05	96.72



GB % Monthly System Availability



GB % Monthly System Availability					
	2015-16	2016-17	2017-18	2018-19	2019-20
Apr	94.17	94.61	93.77	94.00	93.88
May	93.51	93.12	92.78	93.39	93.77
Jun	93.03	92.52	92.35	92.80	93.16
Jul	93.15	92.61	93.27	92.39	93.11
Aug	92.90	92.70	93.16	92.97	93.51
Sep	92.56	92.47	92.83	93.55	93.71
Oct	93.47	93.02	93.35	93.52	93.52
Nov	94.63	95.34	95.55	95.26	95.70
Dec	96.22	97.03	97.23	97.24	97.05
Jan	96.80	97.08	97.14	97.29	96.89
Feb	96.44	95.97	96.37	96.58	96.17
Mar	95.51	95.31	95.82	95.74	95.80

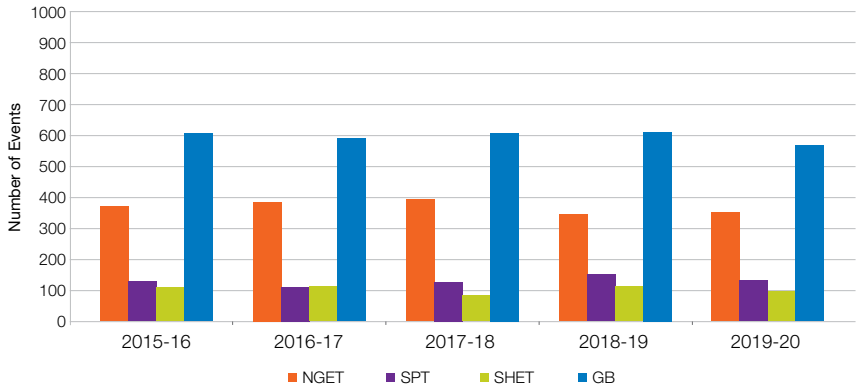
Security

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 2019-20 there were 586 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 20 resulting in loss of supplies to customers.

GB System Events

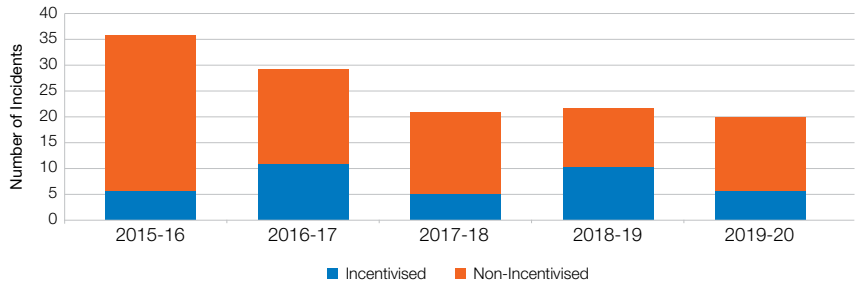


GB System Events					
	2015-16	2016-17	2017-18	2018-19	2019-20
NGET	374	379	398	347	355
SPT	126	108	124	157	131
SHET	104	109	85	108	100
GB	604	596	607	612	586

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.

GB System - Number of Incidents					
	2015-16	2016-17	2017-18	2018-19	2019-20
Incentivised	6	11	5	10	6
Non-Incentivised	30	18	16	12	14

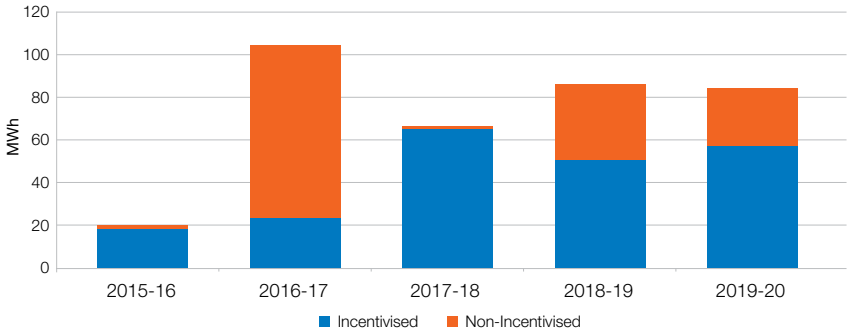


Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the National Electricity Transmission System during 2019-20 was: **83.68 MWh**

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

GB System - Estimated Unsupplied Energy (MWh)					
	2015-16	2016-17	2017-18	2018-19	2019-20
Incentivised	18.35	22.48	67.07	51.14	57.59
Non-Incentivised	1.67	82.53	0.23	34.31	26.10



Reliability of Supply

The Overall Reliability of Supply for the National Electricity Transmission System during 2019-20 was: **99.999967%**

compared with 99.999967% in 2018-19 and 99.999975% in 2017-18.


100% elect
PULL

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.

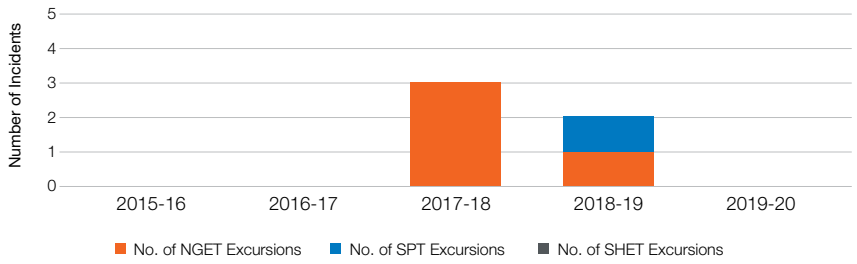
Voltage Excursions

During 2019-20 there were no 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.

GB System Voltage Excursions

GB System - Voltage Excurisons					
	2015-16	2016-17	2017-18	2018-19	2019-20
Number of NGET Excursions	0	0	3	1	0
Number of SPT Excursions	0	0	0	1	0
Number of SHET Excursions	0	0	0	0	0



GB System Voltage Excursion

Incident Date, Time and Location	Nominal Voltage	Max Voltage	Duration
None			

Frequency Excursions

During 2019-20, there was one reportable Frequency Excursion within the National Electricity Transmission System. The previous Frequency Excursion was in the 2008-09 reporting period.

GB System Frequency Excursions

GB System - Frequency Excurisons					
	2015-16	2016-17	2017-18	2018-19	2019-20
Number of Excursions	0	0	0	0	1

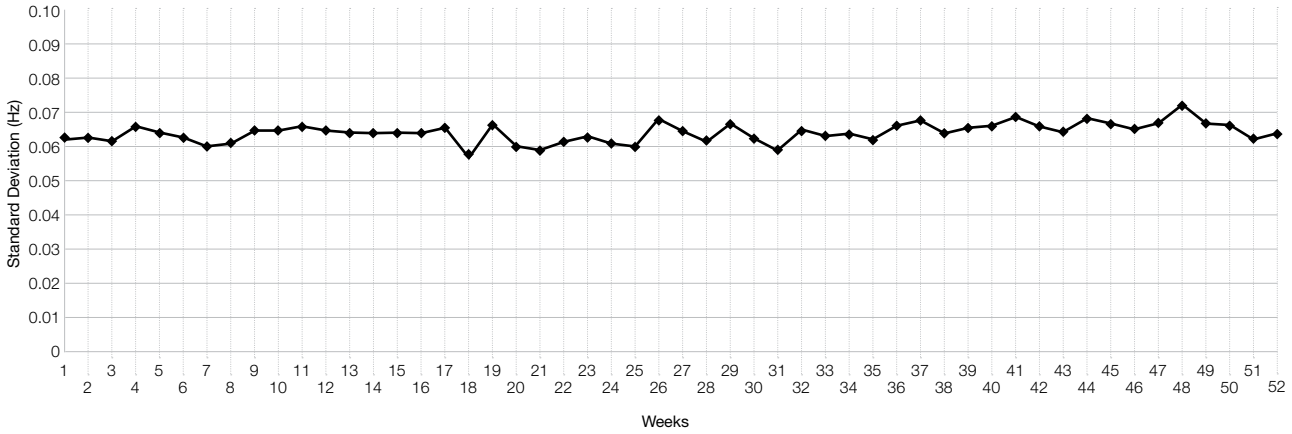
GB System Frequency Excursion

Incident Date & Time	Statutory Limits	Frequency	Duration
09 August 16:52:33 A lightning strike occurred on the Eaton Socon – Wymondley Main circuit at 16:52:33, which resulted in a cumulative loss of 1,481MW of generation and a rapid decline in system frequency outside of the lower statutory limit of 49.5Hz at 16:52:38, to a low of 49.1Hz after 20 seconds. As the frequency began to recover there was a further loss of 210MW of generation with the frequency hitting a new low point of 48.8Hz after 1 minute 20 seconds. Following response actions, the frequency returned to the statutory limit at 16:55:00. This event resulted in the system frequency being outside of the statutory limits for 2 minutes 22 seconds.	**50.5 - 49.5Hz**	**48.8Hz**	**142 seconds**

Frequency Standard Deviation

The chart below displays the recorded Frequency Standard Deviation from 50Hz on a weekly basis for the year 2019-20.

GB System - Frequency Standard Deviation



National Grid Electricity Transmission System

System Description

The National Grid Electricity Transmission System operates at 400, 275 and 132kV supplying electricity to England and Wales.

The system covers an area of approximately 151,000 square kilometres and consists of about 14,400 circuit kilometres of overhead line and over 700 kilometres of underground transmission cable routes interconnecting over 340 substations.

It is connected to the SP Transmission System to the north and through four HVDC interconnectors to the Republic of Ireland, France, the Netherlands and Belgium.

There are 54 large power stations totalling 49.6GW of generation capacity connected to the England and Wales transmission system. The NGET system supplies 12 distribution networks via over 130GVA of installed transformer capacity and a small number of directly connected customers such as steelworks and traction supplies.

In 2019-20 the maximum recorded demand on the network was 41.3GW.

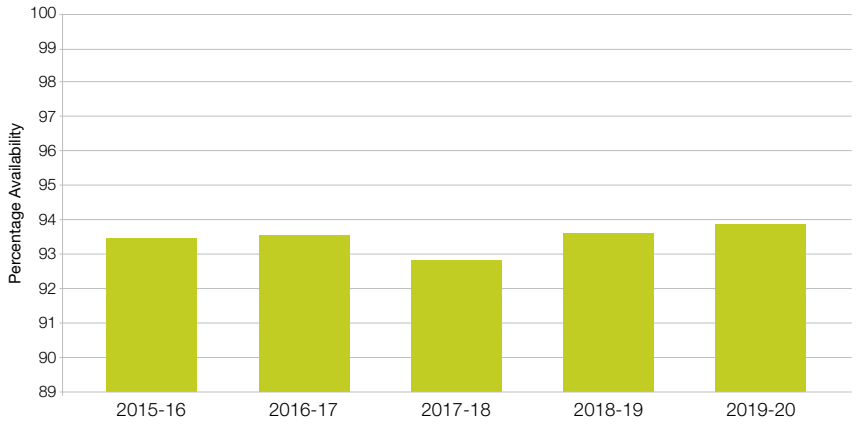
Availability

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

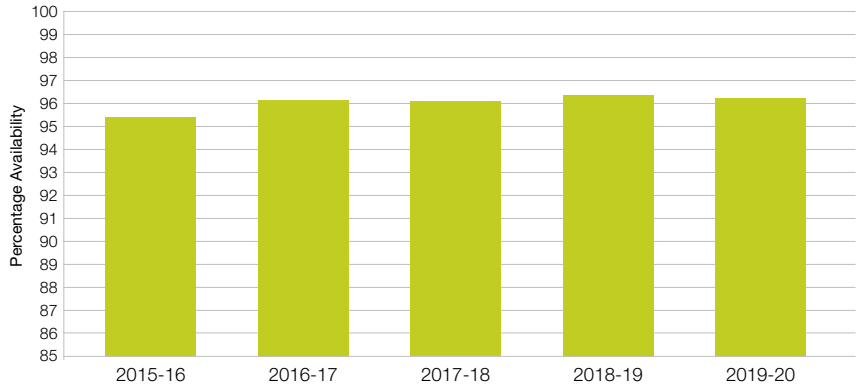
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

NGET % Annual System Availability				
2015-16	2016-17	2017-18	2018-19	2019-20
93.42	93.48	92.89	93.45	93.88

% Annual System Availability

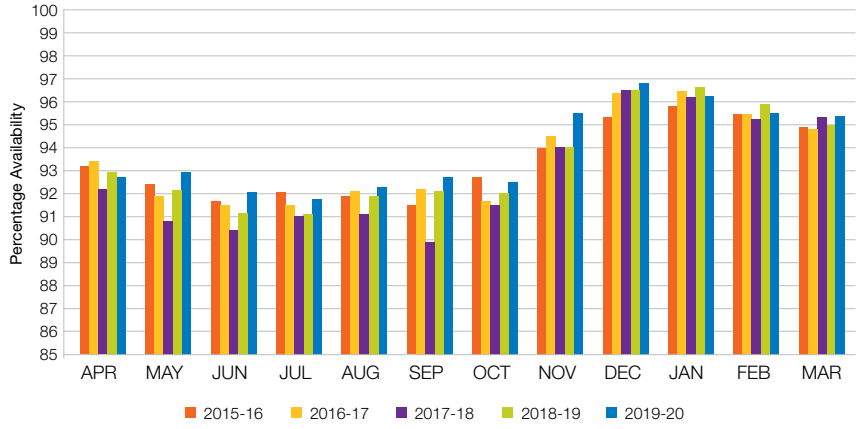


% Winter Peak System Availability



NGET % Winter Peak System Availability				
2015-16	2016-17	2017-18	2018-19	2019-20
95.51	96.13	96.02	96.37	96.26

% Monthly System Availability

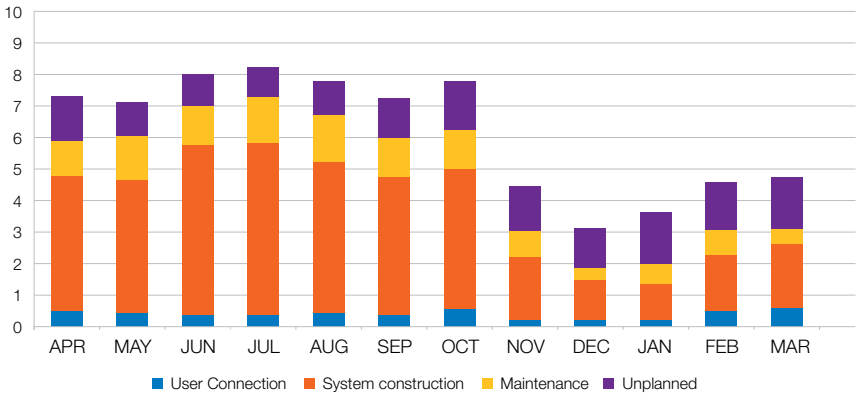


NGET % Monthly System Availability					
	2015-16	2016-17	2017-18	2018-19	2019-20
Apr	93.15	93.37	92.18	92.91	92.73
May	92.47	91.80	90.75	92.19	92.92
Jun	91.78	91.47	90.36	91.16	92.08
Jul	92.11	91.59	91.03	91.09	91.78
Aug	91.91	92.12	91.05	91.88	92.25
Sep	91.51	92.22	90.95	92.17	92.74
Oct	92.70	91.68	91.54	92.07	92.39
Nov	94.00	94.56	94.07	94.08	95.60
Dec	95.35	96.43	96.57	96.57	96.84
Jan	95.85	96.48	96.22	96.63	96.38
Feb	95.47	95.47	95.20	95.85	95.51
Mar	94.81	94.76	95.33	95.00	95.38

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) %



Planned and Unplanned Unavailability (%) for NGET Transmission System					
	User Connection	System Construction	Maintenance	Unplanned	Total
Apr	0.49	4.34	1.11	1.33	7.27
May	0.46	4.20	1.38	1.04	7.08
Jun	0.37	5.33	1.27	0.95	7.92
Jul	0.40	5.41	1.43	0.98	8.22
Aug	0.46	4.87	1.36	1.06	7.75
Sep	0.43	4.23	1.34	1.27	7.26
Oct	0.59	4.45	1.16	1.41	7.61
Nov	0.24	2.08	0.79	1.29	4.40
Dec	0.23	1.25	0.34	1.35	3.16
Jan	0.26	1.14	0.61	1.61	3.62
Feb	0.49	1.81	0.76	1.42	4.49
Mar	0.53	2.11	0.53	1.46	4.62

Security

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

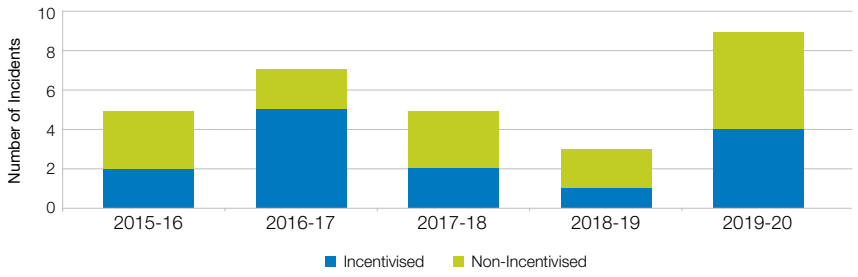
System performance is monitored by the Estimated Unsupplied Energy from the NGET Transmission System for each incident.

During 2019-20 there were 355 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 9 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.

NGET System – Number of incidents					
	2015-16	2016-17	2017-18	2018-19	2019-20
Incentivised	2	5	2	1	4
Non-Incentivised	3	2	3	2	5

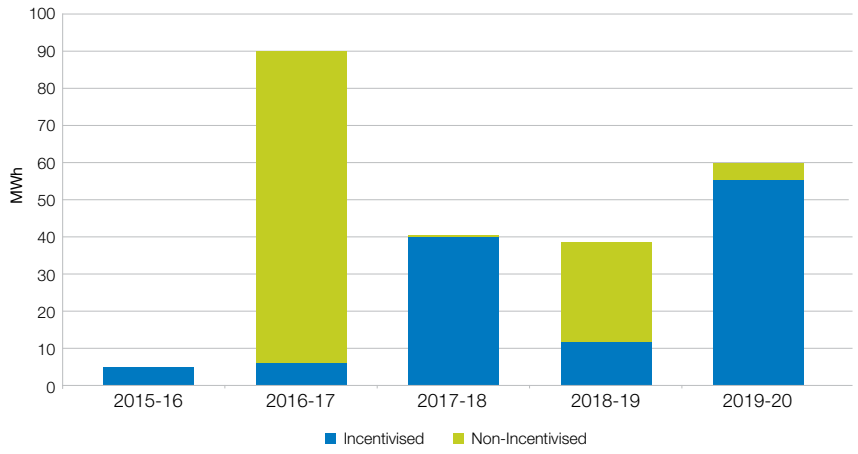


Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the NGET Transmission System during 2019-20 was: **59.42 MWh**

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

NGET System - Estimated Unsupplied Energy (MWh)					
	2015-16	2016-17	2017-18	2018-19	2019-20
Incentivised	4.45	6.77	39.70	12.06	54.45
Non-Incentivised	0.00	82.49	0.23	25.16	4.98



Reliability of Supply

The Overall Reliability of Supply for the NGET Transmission System during 2019-20 was: **99.999974%**

compared with 99.999984% in 2018-19 and 99.999984% in 2017-18.

Loss of Supply Incident Details

NGET Loss of Supply Incidents – Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
24 September 2019 21:51 at Shrewsbury 400/132kV Substation Site supplies were lost at Legacy 400kV substation, and the backup diesel supply did not switch in. This resulted in a requirement for the Ironbridge - Legacy - Shrewsbury 400kV circuit to be switched out of service to allow the Quad Booster (Legacy QB4) to be bypassed to avoid overheating. At the time, a 132kV outage meant that demand was at risk for the loss of Shrewsbury SGT3, which needed to be switched out with this 400kV circuit. The demand was restored in stages, with total restoration after 8 minutes and 5 seconds. A portion of demand was restored within 3 minutes and therefore 0.54MWh relating to this incident is not incentivised.	25.6	8*	1.22
02 October 2019 18:00 at Wymondley 400/25kV Substation Wymondley SGT4 tripped as a result of a bird strike, disconnecting supplies to Network Rail's Coreys Mill 25kV substation. Network Rail carried out switching on their network to restore demand and remove the impact on the railway network. In total the supply was lost for seven minutes.	31.0	7	3.62
07 December 2019 10:20 at Wymondley 400/25kV Substation Wymondley SGT4 tripped as a result of a bird strike, disconnecting supplies to Network Rail's Coreys Mill 25kV substation. Network Rail carried out switching on their network to restore demand and remove the impact on the railway network. In total the supply was lost for five minutes.	3.7	5	0.31
19 February 2020 04:42 at Axminster 400/132kV Substation An overhead line fault occurred on the Axminster - Chickerell - Mannington 400kV overhead line circuit, and an unrelated protection fault prevented the operation of the delayed auto reclose whilst the Axminster - Exeter 400kV overhead line circuit was out of service, resulting in Axminster 400kV and 132kV substations being disconnected from the transmission system. The demand was restored in stages, with total restoration after 35 minutes and 26 seconds. A portion of demand was restored within 3 minutes and therefore 0.04MWh relating to this incident is not incentivised.	108.0	35*	49.31
Total			**54.45 MWh**

*Minutes quoted is the overall time following staged restoration to customers.

NGET Loss of Supply Incidents - Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
19 April 2019 16:42 at Uskmouth 275/33kV Substation A fault on the bushing of the 33kV circuit breaker caused 275/33kV SGT4B to trip. The 33kV substation was configured in such a way that demand was lost as a result of the loss of this single SGT. The remaining SGT was available to supply the lost demand immediately without further action needing to be taken by NGET.	1.1	0	0.00
23rd June 2019 11:45 at Culham Jet 400kV Substation Incorrect operation of DAR during a trip test of the Cowley - Leighton Buzzard - Sundon circuit caused a temporary voltage dip which led to Culham Jet SGT1 tripping. Circuit breaker X110 at Culham Jet 400kV substation opened to disconnect Culham Jet (who were not taking load at the time) from the system.	0.0	138	0.00
13 September 2019 15:14 at Didcot 400kV Substation Didcot Generator Unit 6, which was not generating but taking site supplies, was disconnected from the transmission system by the inadvertant operation of circuit breaker X620 at Didcot 400kV substation during planned switching. The lost load was immediately and automatically picked up by Generator 5.	0.2	0	0.00
24 September 2019 21:51 at Shrewsbury 400/132kV Substation Site supplies were lost at Legacy 400kV substation, and the backup diesel supply did not switch in. This resulted in a requirement for the Ironbridge - Legacy - Shrewsbury 400kV circuit to be switched out of service to allow the Quad Booster (Legacy QB4) to be bypassed to avoid overheating. At the time, a 132kV outage meant that demand was at risk for the loss of Shrewsbury SGT3, which needed to be switched out with this 400kV circuit. The demand was restored in stages, with total restoration after 8 minutes and 5 seconds. This figure relates to the MWh restored during the first 3 minutes of the incident which is not incentivised.	-	-	0.54
17 October 2019 11:36 at Lea Marston 132kV Substation Failure of a relay caused the Lea Marston - Chelmsley Wood - Hams Hall circuit to trip, disconnecting radial demand. The demand was restored in stages in less than three minutes by post fault switching by the DNO. Total demand restoration was achieved after 2 minutes and 36 seconds.	26.3	2*	1.20
17 December 2019 06:58 at Tremorfa 275/33kV Substation A trip relay at Tremorfa 33kV substation operated and tripped SGT1, SGT2 and both 275kV circuits. The 275kV circuits were returned to service by DAR and SGT1 was made available for load restoration after 3 minutes and 49 seconds.	50.3	3	3.20
19 February 2020 04:42 at Axminster 400/132kV Substation An overhead line fault occurred on the Axminster - Chickerell - Mannington 400kV overhead line circuit whilst the Axminster - Exeter 400kV overhead line circuit was out of service, resulting in Axminster 400kV and 132kV substations being disconnected from the transmission system. In total the supply was lost for 35 minutes and 26 seconds. This figure relates to the MWh restored during the first 3 minutes of the incident which is not incentivised.	-	-	0.04
Total			**4.98 MWh**

*Minutes quoted is the overall time following staged restoration to customers.

Scottish Power Transmission System

System Description

The SP Transmission System comprises approximately 4,000 circuit kilometres of overhead line and cable and 154 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 14.5GVA of installed transformer capacity. There is approximately 6.5GW of directly connected and Large Embedded generation capacity connected in the SP Transmission area, including 36 power stations directly connected to the SP Transmission system. In 2019-20 the maximum recorded demand on the network was 3.3GW.

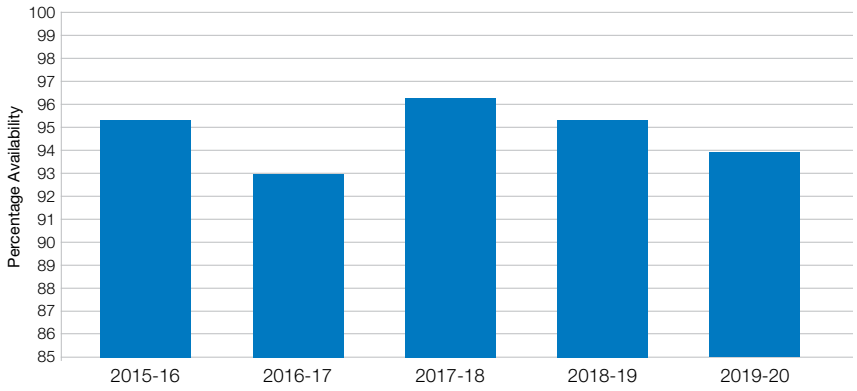
Availability

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

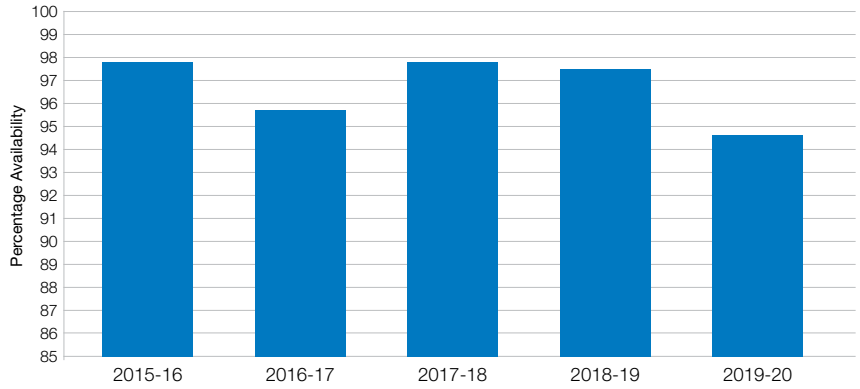
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

SPT % Annual System Availability				
2015-16	2016-17	2017-18	2018-19	2019-20
95.29	93.01	96.29	95.31	93.90

% Annual System Availability

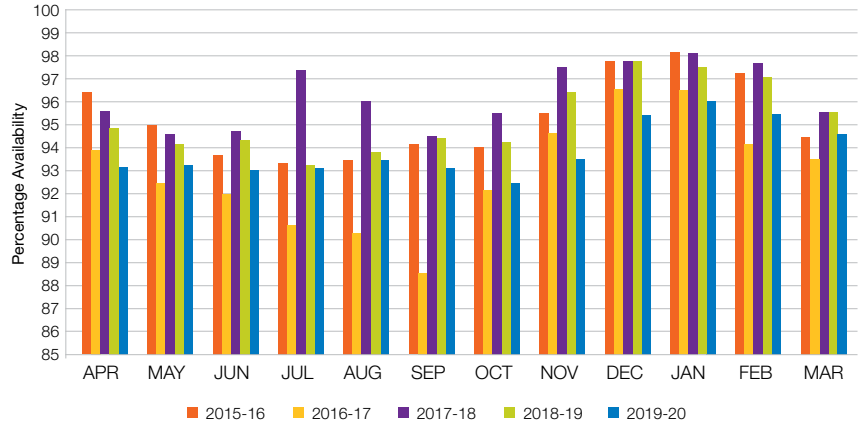


% Winter Peak System Availability



SPT % Winter Peak System Availability				
2015-16	2016-17	2017-18	2018-19	2019-20
97.80	95.82	97.88	97.55	95.64

% Monthly System Availability

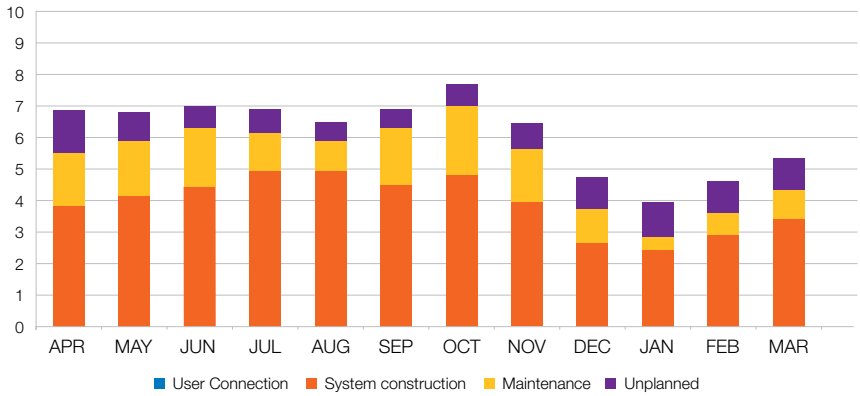


SPT % Monthly System Availability					
	2015-16	2016-17	2017-18	2018-19	2019-20
Apr	96.39	93.94	95.64	94.80	93.21
May	94.99	92.45	94.63	94.16	93.29
Jun	93.70	91.99	94.73	94.35	93.01
Jul	93.37	90.69	97.38	93.24	93.15
Aug	93.48	90.24	96.09	93.79	93.43
Sep	94.12	88.59	94.65	94.41	93.12
Oct	94.06	92.21	95.55	94.27	92.40
Nov	95.55	94.67	97.59	96.36	93.56
Dec	97.86	96.60	97.87	97.87	95.39
Jan	98.20	96.54	98.14	97.58	96.08
Feb	97.32	94.17	97.78	97.17	95.44
Mar	94.49	93.51	95.65	95.69	94.69

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) %



Planned and Unplanned Unavailability (%) for SP Transmission System					
	User Connection	System Construction	Maintenance	Unplanned	Total
Apr	0.00	3.73	1.92	1.14	6.79
May	0.00	4.11	1.78	0.82	6.71
Jun	0.00	4.56	1.77	0.66	6.99
Jul	0.00	5.03	1.15	0.67	6.85
Aug	0.00	4.91	1.03	0.63	6.57
Sep	0.00	4.51	1.96	0.41	6.88
Oct	0.00	4.69	2.42	0.50	7.60
Nov	0.00	3.91	1.68	0.85	6.44
Dec	0.00	2.70	1.04	0.88	4.61
Jan	0.00	2.38	0.45	1.09	3.92
Feb	0.00	2.95	0.71	0.89	4.56
Mar	0.00	3.40	1.00	0.92	5.31

Security

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

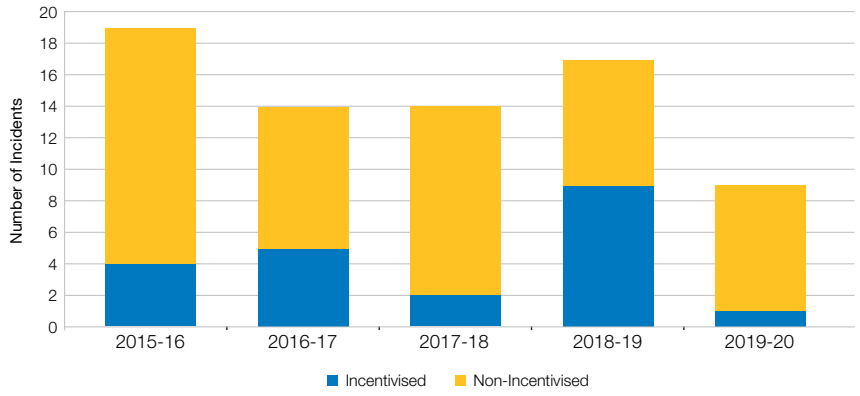
System performance is monitored by the estimated unsupplied energy from the SP Transmission System for each incident.

During 2019-20 there were 131 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 9 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.

SPT System – Number of incidents					
	2015-16	2016-17	2017-18	2018-19	2019-20
Incentivised	4	5	2	9	1
Non-Incentivised	15	9	12	8	8

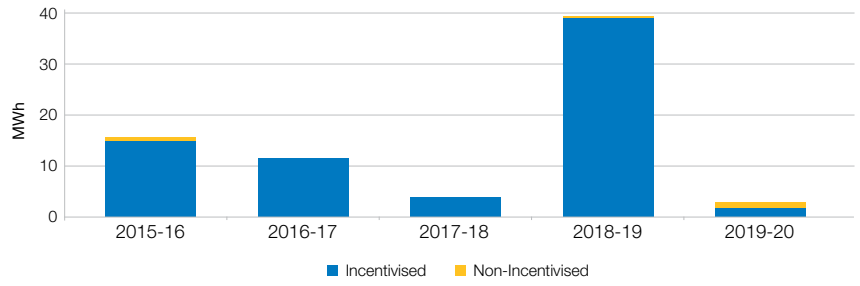


Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SP Transmission System during 2019-20 was: **3.21 MWh**

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

SPT System - Estimated Unsupplied Energy (MWh)					
	2015-16	2016-17	2017-18	2018-19	2019-20
Incentivised	13.90	11.31	3.04	39.08	1.99
Non-Incentivised	0.80	0.04	0.00	0.35	1.22



Reliability of Supply

The Overall Reliability of Supply for the SP Transmission System during 2019-20 was: **99.999981%**

compared with 99.999772% in 2018-19 and 99.999984% in 2017-18.

Loss of Supply Incident Details

SPT Loss of Supply Incidents – Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
20 September 2019 07:03 at Tongland 132kV Substation Tongland Circuit Breaker Grid 2A tripped following a distribution fault, with Tongland Transformer T1A on outage for planned works. The Grid 2A Circuit Breaker tripped as a result of incorrect protection settings, which did not allow discrimination with the distribution protection. This resulted in the loss of Tongland GSP, with demand subsequently restored via distribution system backfeeds.	2.6	46	1.99
Total			**1.99 MWh**

SPT Loss of Supply Incidents – Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
25 April 2019 08:03 at Stirling 132kV Substation Simultaneous trip and successful auto reclose of the Bonnybridge-Devonside-Stirling circuit and Bonnybridge-Stirling-Westfield circuit, resulting in a loss of supply to Stirling GSP for less than 1 minute. The Bonnybridge-Stirling-Westfield circuit tripped due to a lightning strike on the circuit, with the Bonnybridge-Stirling-Devonside circuit tripping inadvertently due to faulty relay, which was subsequently replaced.	27.8	1	0.46
21 May 2019 10:54 at Glenlee 132kV Substation Transient fault on the Glenlee-Tongland circuit, resulting in loss of supplies to Earlstoun & Glenlee GSP's. Coincidental with the fault, the Glenlee Circuit Breaker 120 was out of service for maintenance, which resulted in a further loss of supplies to Newton Stewart & Glenluce GSP's. A total of -15.79MW of power was being transferred through Transmission at the time of the fault due to the level of embedded generation around the area.	0.0	9	0.00
23 July 2019 09:25 at Dumfries 132kV Substation Transient fault on the Chapelcross-Dumfries 1 circuit and successful auto reclose. Fault was due to a suspected bird strike. Supplies lost through a single circuit to Dumfries Transformer T4 for less than a minute..	8.9	0	0.05
07 August 2019 17:14 at Stirling 132kV Substation Transient fault on the Bonnybridge-Stirling-Westfield circuit and succesful auto reclose, resulting in a loss of supply to Stirling GSP for less than 1 minute. Fault was due to a lightning strike on the circuit. The Bonnybridge-Stirling-Devonside circuit was out of service due to planned construction works.	41.3	1	0.69
10 February 2020 19:36 at Kendoon 132kV Substation Transient fault on the New Cumnock-Kendoon circuit and successfully auto reclose, following adverse weather. Supplies lost to Kendoon GSP for 3 minutes, with the Kendoon Circuit Breaker Grid 2 having to be manually closed via telecontrol. A total of -13.6MW of power was being transferred through Transmission at time of fault due to embedded generation.	0.0	3	0.00
10 February 2020 19:40 at Kendoon 132kV Substation Transient fault on the New Cumnock-Kendoon circuit and successfully auto reclose, following adverse weather. Supplies lost to Kendoon GSP for 2 minutes, with the Kendoon Circuit Breaker Grid 2 having to be manually closed via telecontrol.	0.3	2	0.01
10 February 2020 19:44 at Kendoon 132kV Substation Transient fault on the New Cumnock-Kendoon circuit and successfully auto reclose, following adverse weather. Supplies lost to Kendoon GSP for 1 minute, with the normally open at Carsfad GSP closed via telecontrol to restore supplies.	0.4	1	0.01
11 February 2020 05:24 at Kendoon 132kV Substation Transient fault on the New Cumnock-Kendoon circuit and successfully auto reclose, following adverse weather. Supplies lost to Kendoon GSP for 13 minutes, with the normally open at Carsfad GSP closed via telecontrol to restore supplies. A total of -24.4MW of power was being transferred through Transmission at time of fault due to embedded generation.	0.0	13	0.00
Total			**1.22 MWh**

*Minutes quoted is the overall time following staged restoration to customers.

Scottish Hydro Electric Transmission System

System Description

The SHE Transmission system comprises of 199km of 400kV, 1936km of 275kV and 2767km of 132kV overhead line and over 275km of mainly 132kV AC high voltage underground transmission cables, interconnecting 145 substations. There is also an HVDC link with 163km of cable connecting Caithness to the Moray coast. 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 and the Beatrice Offshore Windfarm operator in the Highlands.

In 2019-20 the maximum recorded demand on the network was 1.41GW. Mostly the demand is taken by approximately 0.78 million customers connected to the Scottish Hydro Electric Power Distribution network via 12.4GVA of installed transformer capacity, with 1 major customer supplied directly from the SHE Transmission system. There are over 40 large generators directly connected to the SHE Transmission system and many smaller units combining to produce more than 8GW capacity.

When operating 132kV systems as transmission it should be borne in mind that amounts of power transmitted at this voltage level are generally lower than at 275kV and 400kV, which can lead to an increased unreliability compared to higher voltage systems.

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 and as such might experience greater risk of disruption, but on the whole reliability of the network has been very high.

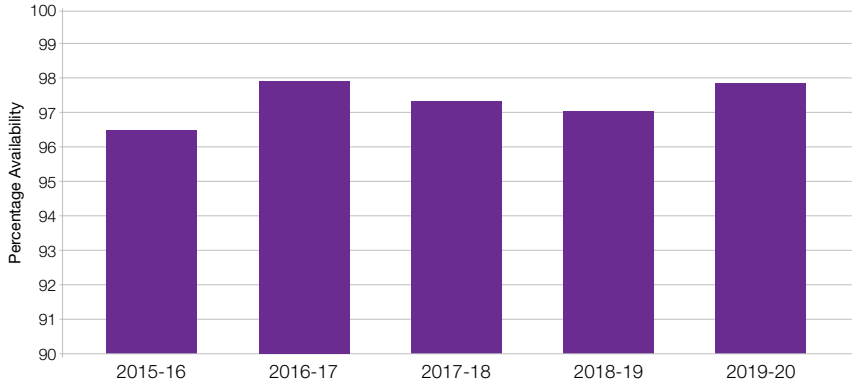
Availability

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

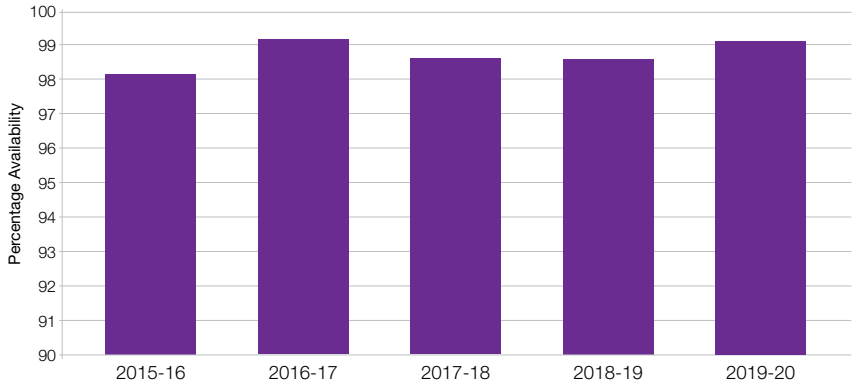
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

SHE Transmission % Annual System Availability				
2015-16	2016-17	2017-18	2018-19	2019-20
96.53	97.92	97.29	97.09	97.83

% Annual System Availability

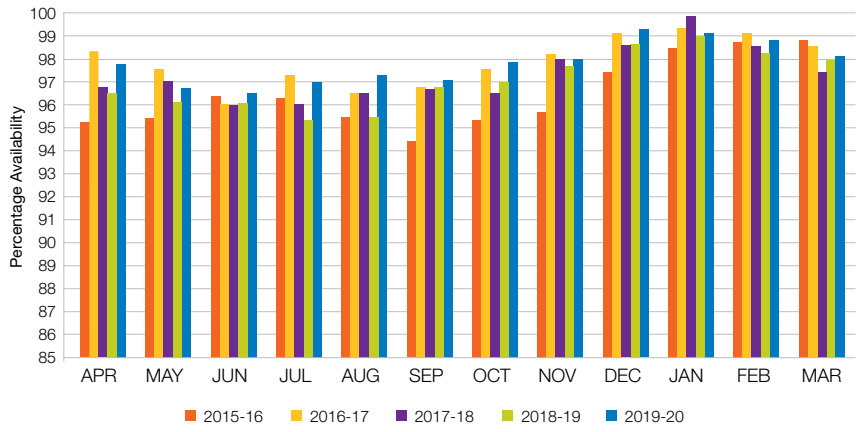


% Winter Peak System Availability



SHE Transmission % Winter Peak System Availability				
2015-16	2016-17	2017-18	2018-19	2019-20
98.21	99.22	98.68	98.61	99.10

% Monthly System Availability

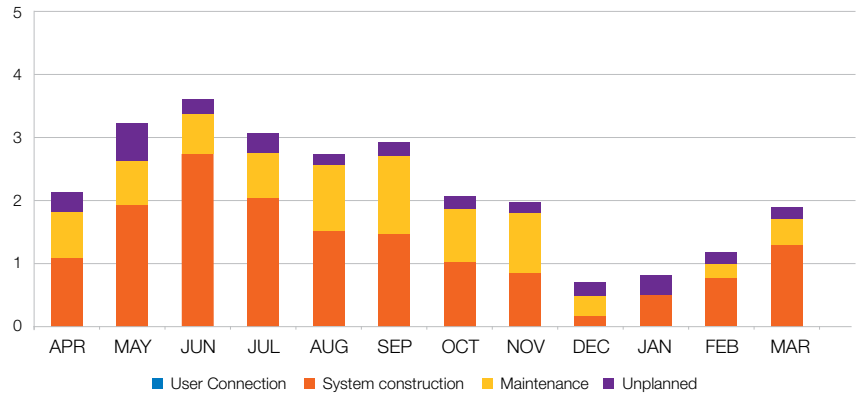


SHE Transmission % Monthly System Availability					
	2015-16	2016-17	2017-18	2018-19	2019-20
Apr	95.29	98.41	96.73	96.48	97.87
May	95.45	97.62	97.06	96.19	96.72
Jun	96.44	96.08	96.01	96.14	96.48
Jul	96.30	97.33	96.03	95.39	96.95
Aug	95.56	96.66	96.67	95.42	97.28
Sep	94.44	96.81	96.69	96.81	97.10
Oct	95.40	97.67	96.61	97.07	97.94
Nov	95.74	98.25	98.04	97.72	98.07
Dec	97.42	99.19	98.58	98.62	99.29
Jan	98.50	99.34	98.93	98.99	99.18
Feb	98.74	99.12	98.53	98.17	98.82
Mar	98.81	98.58	97.44	97.99	98.13

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) %



Planned and Unplanned Unavailability (%) for SHE Transmission System for 2018-19					
	User Connection	System Construction	Maintenance	Unplanned	Total
Apr	0.00	1.11	0.67	0.35	2.13
May	0.04	1.93	0.65	0.66	3.28
Jun	0.02	2.72	0.57	0.21	3.52
Jul	0.00	2.07	0.74	0.25	3.05
Aug	0.00	1.57	0.99	0.16	2.72
Sep	0.00	1.53	1.16	0.21	2.90
Oct	0.00	1.03	0.86	0.16	2.06
Nov	0.00	0.81	0.97	0.15	1.93
Dec	0.00	0.20	0.32	0.20	0.71
Jan	0.00	0.54	0.02	0.26	0.82
Feb	0.00	0.80	0.21	0.17	1.18
Mar	0.00	1.30	0.41	0.16	1.87

Security

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

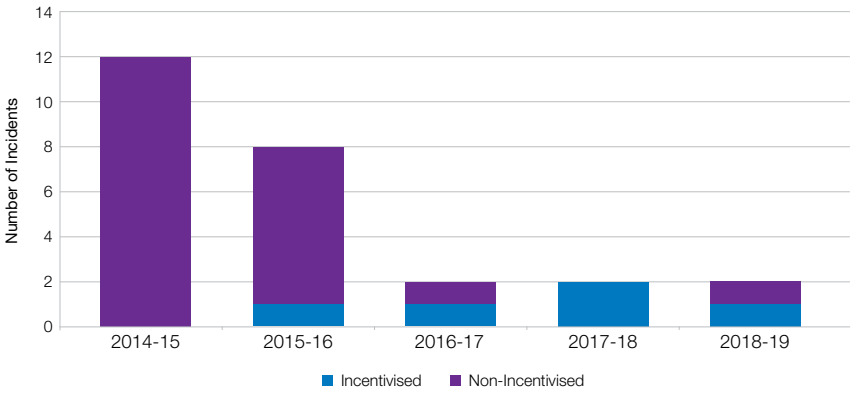
System performance is monitored by the Estimated Unsupplied Energy from the SHE Transmission System for each incident.

During 2019-20 there were 100 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

SHE Transmission System – Number of Incidents					
	2015-16	2016-17	2017-18	2018-19	2019-20
Incentivised	0	1	1	0	1
Non-Incentivised	12	7	1	2	1

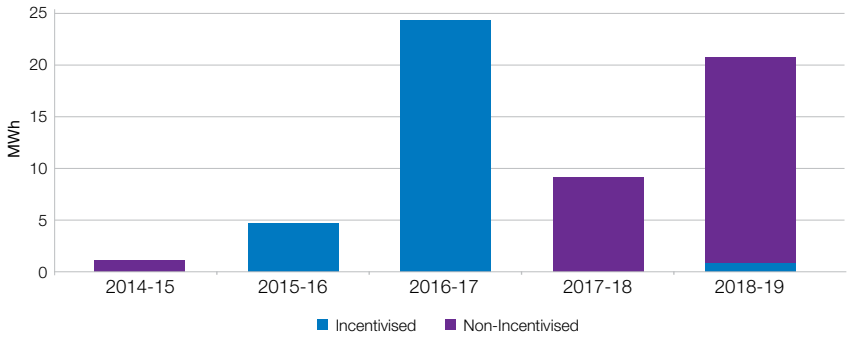


Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SHE Transmission System during 2019-20 was: **21.05 MWh**

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

SHE Transmission System - Estimated Unsupplied Energy (MWh)					
	2015-16	2016-17	2017-18	2018-19	2019-20
Incentivised	0.00	4.40	24.33	0.00	1.15
Non-Incentivised	0.87	0.00	0.00	8.80	19.90



Reliability of Supply

The Overall Reliability of Supply for the SHE Transmission System during 2019-20 was: **99.999612%**

compared with 99.999837% in 2018-19 and 99.999555% in 2017-18.

Loss of Supply Incident Details

SHE Transmission Loss of Supply Incidents – Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
17 June 2019 Dounreay 275kV Substation Disconnected A lightning strike on the Dounreay - Connagill 275kV cct, produced a system condition that also triggered protection on the Dounreay - Thurso South 1 & 2 275kV ccts. With an outage on the Dounreay - Gordonbush 275kV, no infeeds remained to Dounreay. Demand was restored in stages after re-energisation of the supply point. The majority were within 10mins.	3.7	89	1.15
Total			**1.15 MWh**

SHE Transmission Loss of Supply Incidents – Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
09 April 2019 Harris - Stornaway 132kV Circuit The Fort Augustus – Broadford – Quoich 132kV circuit faulted due to a landslip. This caused loss of supply to the Western Isles and a number of generating sites. Demand was restored from local generation within the group.	14.9	180	19.90
Total			**19.90 MWh**

Interconnectors

England – France Interconnector

System Description

The NGET transmission system is interconnected with France, via a 70km cross-channel HVDC link owned and operated jointly by National Grid and Réseau de Transport d'Electricité (RTE); the French transmission system owner since 1986.

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 affect real time capability.

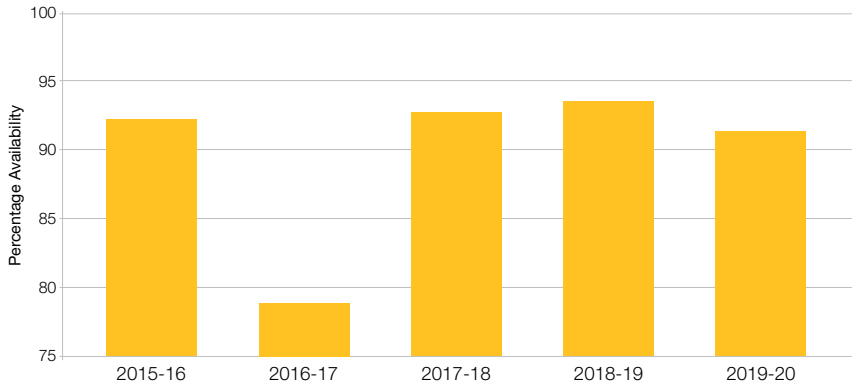
Annual Availability

Annual Availability of England – France Interconnector: **91.45%**

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

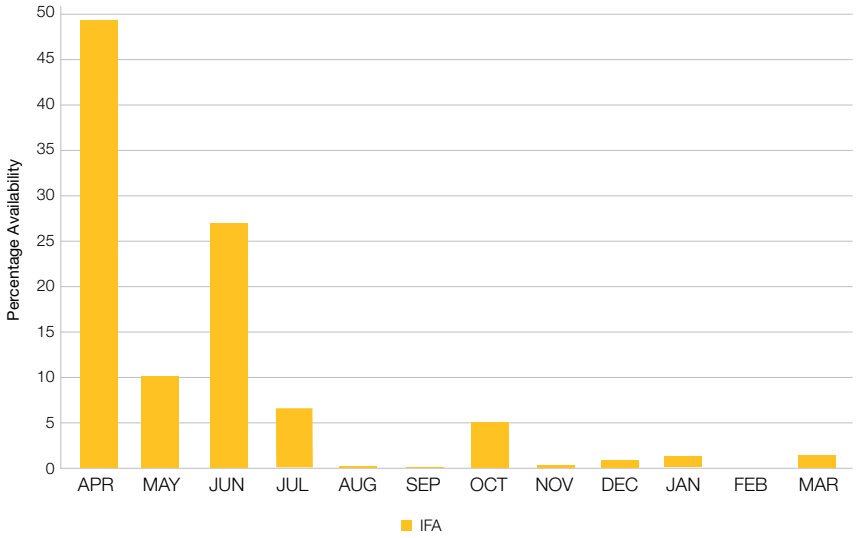
England – France Interconnector % Annual Availability				
2015-16	**2016-17**	**2017-18**	**2018-19**	**2019-20**
92.94	77.54	92.61	93.86	91.45

% Annual System Availability



Monthly Unavailability

% England – France Interconnector Monthly Unavailability

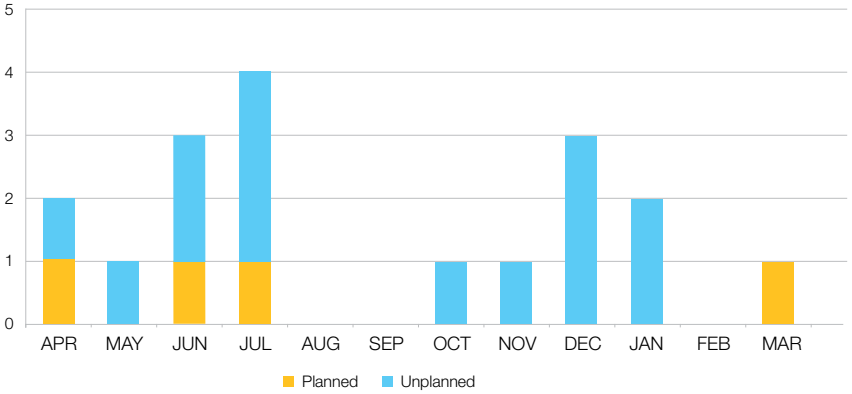


England – France Interconnector % Monthly Unavailability	
	IFA
April	49.13
May	10.01
June	27.19
July	7.63
August	0.18
September	0.06
October	3.70
November	0.50
December	1.17
January	1.80
February	0.00
March	2.10
Average	8.55

Outages 2019-20 (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.

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



Interconnector Planned and Unplanned Outages		
	Planned	Unplanned
April	1	1
May	0	1
June	1	2
July	1	3
August	0	0
September	0	0
October	0	1
November	0	1
December	0	3
January	0	2
February	0	0
March	1	0
Total	4	14

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") since 2011. The total capability of BritNed is 1000MW and is made up of two 'poles', 500MW each.

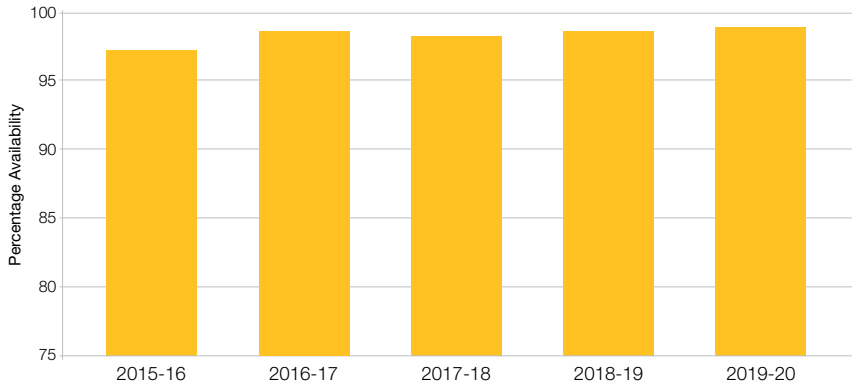
Annual Availability

Annual Availability of England – Netherlands Interconnector: **98.52%**

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

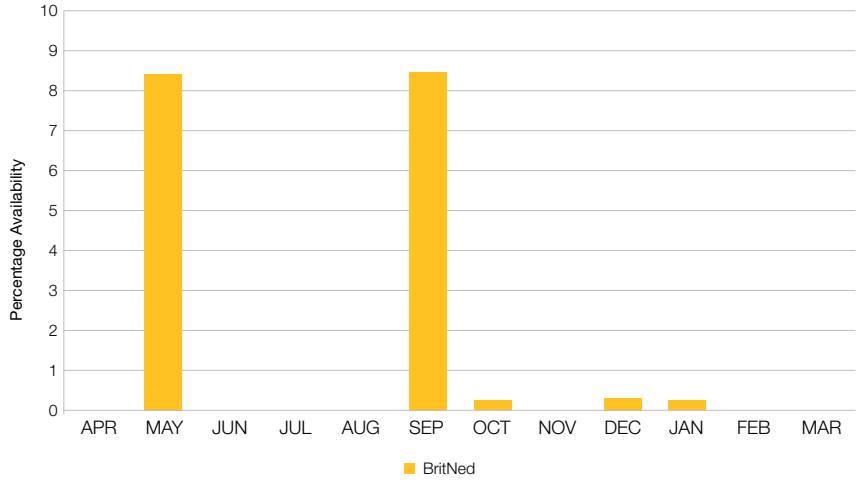
England – Netherlands Interconnector % Annual Availability				
2015-16	**2016-17**	**2017-18**	**2018-19**	**2019-20**
97.22	98.2	97.78	98.22	98.52

% Annual System Availability



Monthly Unavailability

% England – Netherlands Interconnector Monthly Unavailability

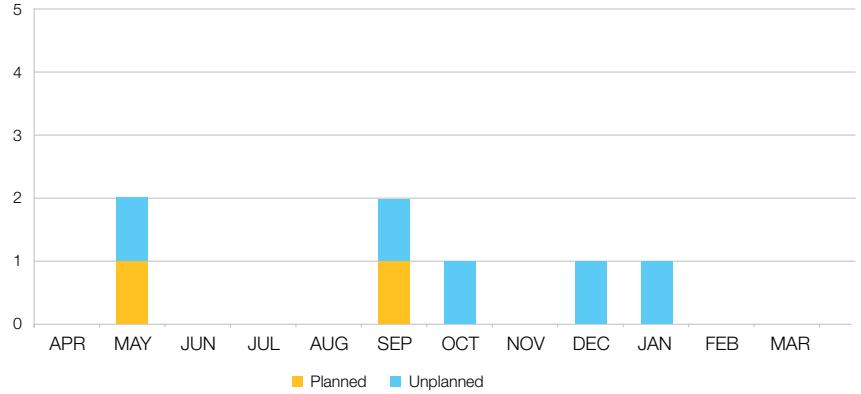


England – Netherlands Interconnector % Monthly Unavailability	
	BritNed
April	0.00
May	8.40
June	0.00
July	0.00
August	0.00
September	8.47
October	0.27
November	0.00
December	0.33
January	0.27
February	0.00
March	0.00
Average	1.48

Outages 2019-20 (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.

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



Interconnector Planned and Unplanned Outages		
	Planned	Unplanned
April	0	0
May	1	1
June	0	0
July	0	0
August	0	0
September	1	1
October	0	1
November	0	0
December	0	1
January	0	1
February	0	0
March	0	0
Total	2	5

England – Belgium Interconnector

System Description

The NGET transmission system is interconnected with Belgium, via a 140km subsea cable owned and operated by Nemo Link Limited ("Nemo Link") since January 2019. The total capability of the link is 1000MW and is a single 1000MW monopole design.

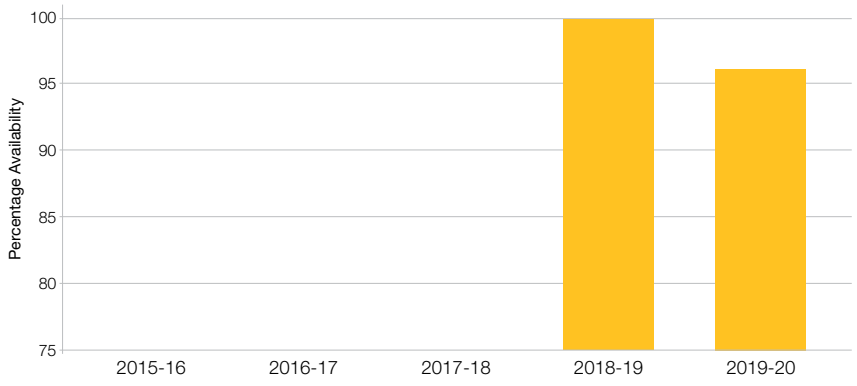
Annual Availability

Annual Availability of England – Belgium Interconnector: **96.14%**

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

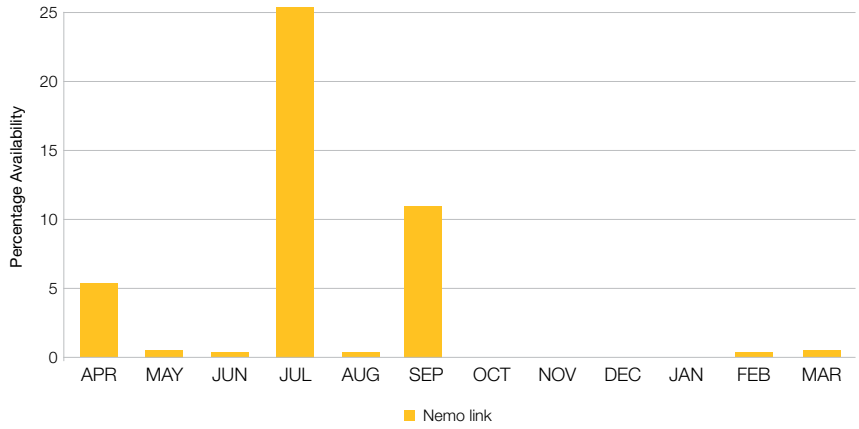
England – Belgium Interconnector % Annual Availability				
2015-16	2016-17	2017-18	2018-19	2019-20
N/A	N/A	N/A	99.86	96.14

% Annual System Availability



Monthly Unavailability

% England – Belgium Interconnector Monthly Unavailability

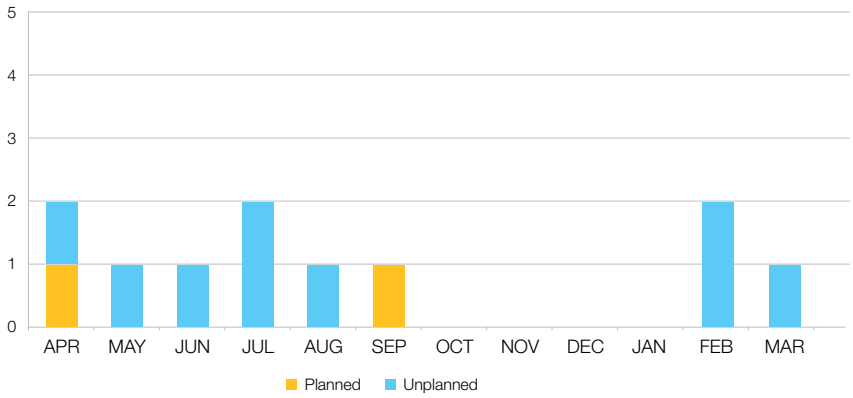


England – Belgium Interconnector % Monthly Unavailability	
	Nemo Link
April	5.19
May	1.08
June	0.90
July	25.20
August	0.94
September	12.22
October	0.00
November	0.00
December	0.00
January	0.00
February	0.25
March	0.45
Average	3.86

Outages 2019-20 (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.

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



Interconnector Planned and Unplanned Outages		
	Planned	Unplanned
April	1	1
May	0	1
June	0	1
July	0	2
August	0	1
September	1	0
October	0	0
November	0	0
December	0	0
January	0	0
February	0	2
March	0	1
Total	2	9

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), Dudgeon 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), West of Duddon Sands OFTO (WoDS), Burbo Bank Extension OFTO (DTP), Race Bank OFTO (DTP) and Galloper OFTO (DTP). The offshore network consists of 1615 kilometres of circuit, connecting to 19 offshore substations totalling over 5.91GW of generating capacity.

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	178	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	256	400kV	Transmission
TC Westermost Rough	11/02/2016	1	26.16	206.5	275kV	Transmission
TC Dudgeon	13/11/2018	2	178	400	400kV	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	58.8	300	132kV	DNO
BBE Humber Gateway	15/09/2016	2	78	219	275kV	Transmission
West of Duddon Sands	25/08/2015	2	84.6	382	400kV	Transmission
DTP Burbo Bank Extension	27/04/2018	1	35.3	258	400kV	Transmission
DTP Race Bank	10/11/2019	2	164.7	573	400kV	Transmission
DTP Galloper	27/02/2020	2	88.3	353	132kV	Transmission

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

Availability

Offshore Transmission Systems are radial and only connect offshore generation to the wider NETS. The regulatory incentivisation of OFTO performance is different to that of onshore TOs and is based on their system availability rather than loss of supply. The OFTOs provide information for outages that originate on their system or outages that have impacted their system, for example, a generator, DNO or TO system. The system availability performance for each OFTO is then calculated after categorising the outages as either OFTO or Non-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. The Annual System Availability of Offshore Networks for 2019-20 was **99.20%**

% Annual System Availability

Offshore Transmission Networks % Annual System Availability

	2015-16	2016-17	2017-18	2018-19	2019-20
TC Robin Rigg	99.99	99.99	100	100	99.87
TC Gunfleet Sands	100	99.95	99.81	99.97	100
TC Barrow	99.88	100	99.99	100	100
TC Ormonde	100	99.59	100	100	100
TC Lincs	100	99.93	99.78	100	99.56
TC Westermost Rough	100	100	100	99.73	100
TC Dudgeon	N/A	N/A	N/A	100	99.31
BT Walney 1	100	99.62	99.70	100	99.95
BT Walney 2	92	100	100	91.42	100
BT Sheringham Shoal	100	99.95	99.23	99.40	100
BT London Array	99.98	98.88	99.80	99.94	99.88
EQ Greater Gabbard	100	98.78	99.61	99.82	99.78
BBE Gwynt Y Mor	97.94*	99.71*	100	99.93*	96.10
BBE Thanet	100*	100*	100	100	100
BBE Humber Gateway	N/A	100	100*	100	99.83
West of Duddon Sands	100	99.64	99.45	100	95.42
DTP Burbo Bank Extension	N/A	N/A	N/A	98.15	99.67
DTP Race Bank	N/A	N/A	N/A	N/A	100
DTP Galloper	N/A	N/A	N/A	N/A	100

* Figure has been updated as an exceptional event with agreement from Ofgem.

% Winter Peak System Availability

Offshore Transmission Networks % Winter Peak System Availability					
	2015-16	2016-17	2017-18	2018-19	2019-20
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	100	100	99.87	100	100
TC Westermost Rough	100	100	100	100	100
TC Dudgeon	N/A	N/A	N/A	100	100
BT Walney 1	100	100	100	100	100
BT Walney 2	3.87	100	100	100	100
BT Sheringham Shoal	100	100	99.99	100	100
BT London Array	100	100	100	99.99	99.89
EQ Greater Gabbard	100	100	99.79	99.68	100
BBE Gwynt Y Mor	92.77*	99.94	100	99.61	100
BBE Thanet	100	100	100	100	100
BBE Humber Gateway	N/A	100	100*	100	99.82
West of Duddon Sands	100	100	100	100	100
DTP Burbo Bank Extension	N/A	N/A	N/A	100	100
DTP Race Bank	N/A	N/A	N/A	N/A	100
DTP Galloper	N/A	N/A	N/A	N/A	100

* Figure has been updated as an exceptional event with agreement from Ofgem.

% Monthly System Availability

Offshore Transmission Networks % Monthly System Availability												
	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
TC Robin Rigg	100	100	98.47	100	100	100	100	100	100	100	100	100
TC Gunfleet Sands	100	100	100	100	100	100	100	100	100	100	100	100
TC Barrow	100	100	100	100	100	100	100	100	100	100	100	100
TC Ormonde	100	100	100	100	100	100	100	100	100	100	100	100
TC Lincs	100	100	100	95.00	100	99.75	100	100	100	100	100	100
TC Westermost Rough	100	100	100	100	100	100	100	100	100	100	100	100
TC Dudgeon	100	100	97.47	94.42	100	100	100	100	100	100	100	99.91
BT Walney 1	100	100	100	99.45	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	100	99.94	100	100	100	100	100	100	100	100
BT London Array	100	100	99.19	100	100	100	100	100	99.52	99.85	100	100
EQ Greater Gabbard	100	100	99.70	100	100	100	97.69	100	100	100	100	100
BBE Gwynt Y Mor	100	100	100	100	90.16	77.40	100	85.67	100	100	100	100
BBE Thanet	100	100	100	100	100	100	100	100	100	100	100	100
BBE Humber Gateway	100	100	100	100	100	98.54	100	100	100	100	99.45	100
West of Duddon Sands	100	71.47	73.54	100	100	100	100	100	100	100	100	100
DTP Burbo Bank Extension	100	100	100	95.10	100	100	100	100	100	100	100	100
DTP Race Bank	N/A	N/A	N/A	N/A	N/A	N/A	100	100	100	100	100	100
DTP Galloper	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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 Non-OFTO (e.g. Generator)

		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
TC Robin Rigg	OFTO Planned	0	0	1.53	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	0.88	0.68	0	0	0.09	0.08	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
TC Gunfleet Sands	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
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
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	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0.95	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
TC Ormonde	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	0.14	0	44.09	0.35	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
TC Lincs	OFTO Planned	0	0	0	5.00	0	0.25	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
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
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
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
TC Dudgeon	OFTO Planned	0	0	2.53	5.58	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	0	0	0	0.09
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BT Walney 1	OFTO Planned	0	0	0	0.55	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
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
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	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BT Sheringham Shoal	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0.06	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0

% Monthly Planned and Unplanned Unavailability

		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BT London Array	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0.81	0	0	0	0	0	0.48	0.15	0	0
	Non-OFTO	7.75	0	0	0	0	0	0	0	0.68	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
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	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BBE Gwynt Y Mor	OFTO Planned	0	0	0	0	9.84	22.08	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0.52	0	14.33	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
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	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BBE Humber Gateway	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	1.46	0	0	0	0	0.55	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
West of Duddon Sands	OFTO Planned	0	28.53	26.46	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
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
DTP Burbo Bank Extension	OFTO Planned	0	0	0	4.9	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
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
DTP Race Bank	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
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
DTP Galloper	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

Outage Details

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

TC Robin Rigg

Outage Date and Time	Reason	Days, Hours and Mins	MWh
08 April 2019 08:42 Robin Rigg East 132kV. DNO reconfiguration for OHL maintenance.	Non-OFTO	6hr 4min	521.73
11 April 2019 08:35 Robin Rigg East 132kV. DNO reconfiguration for OHL maintenance.	Non-OFTO	7hr 2min	604.87
30 May 2019 07:44 Robin Rigg East 132kV. DNO reconfiguration for OHL maintenance.	Non-OFTO	10hr 30min	903.00
25 June 2019 07:09 Robin Rigg East 132kV. OFTO planned maintenance.	OFTO	11hr 1min	947.43
26 June 2019 07:12 Robin Rigg West 132kV. OFTO planned maintenance outage.	OFTO	11hr 1min	1013.53
18 August 2019 23:07 Robin Rigg West 132kV. DNO Outage - ENW 132kV circuit tripped due to a lightning strike.	Non-OFTO	1hr 20min	122.67
08 September 2019 17:31 Robin Rigg East 132kV. A fault on the ENW 132kV network caused OFTO circuit to trip.	Non-OFTO	0hr 23min	32.97
12 September 2019 06:56 Robin Rigg East 132kV. A fault on the ENW 132kV network caused OFTO circuit to trip.	Non-OFTO	0hr 28min	40.13
12 September 2019 22:23 Robin Rigg East 132kV. A fault on the ENW 132kV network caused OFTO circuit to trip.	Non-OFTO	0hr 25min	35.83
Total			**4222.17 MWh**

TC Gunfleet Sands

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			
Total			**0.00 MWh**

TC Barrow

Outage Date and Time	Reason	Days, Hours and Mins	MWh
13 January 2020 16:49 Barrow OFTO 132kV. ENW emergency outage on Trimpell 1 circuit.	Non-OFTO	7hr 5min	637.50
Total			**637.50 MWh**

TC Ormonde

Outage Date and Time	Reason	Days, Hours and Mins	MWh
04 June 2019 16:48 Outage requested by ENW to top up SF6 on CTs at Heysham	Non-OFTO	1hr 1min	152.50
12 August 2019 09:58 Outage by ENW due to work at Heysham and Trimpell. Partial capacity restored on RTS.	Non-OFTO	13days 8hr 14min	48035.00
25 August 2019 18:13 Continuing restoration of full export capacity.	Non-OFTO	20hr 15min	1173.53
24 September 2019 13:13 Outage requested by ENW to reconfigure Trimpell – Heysham network.	Non-OFTO	2hr 33min	382.50
Total			**49743.53 MWh**

TC Lincs

Outage Date and Time	Reason	Days, Hours and Mins	MWh
30 July 2019 07:15 OFTO Planned maintenance - full system.	OFTO	8hr 32min	3208.53
30 July 2019 19:47 Continuing export circuit 2 outage for CB fault investigations.	OFTO	2days 19hr 49min	6306.95
25 September 2019 10:10 Export circuit 2 outage - further CB investigations.	OFTO	4hr 52min	452.60
Total			**9968.08 MWh**

TC Westermost Rough

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			
Total			**0.00 MWh**

TC Dudgeon

Outage Date and Time	Reason	Days, Hours and Mins	MWh
27 June 2019 05:29 OFTO planned routine maintenance. Offshore circuit 1.	OFTO	1day 12hr 24min	7280.00
01 July 2019 06:47 OFTO planned routine maintenance. Offshore circuit 2 & Shunt Reactor 2 investigations.	OFTO	3days 11hr 1min	16603.33
05 March 2020 14:07 Protection work on GT2 caused an unexpected trip of CB 210.	OFTO	1hr 24min	280.00
Total			**24163.33 MWh**

BT Walney 1

Outage Date and Time	Reason	Days, Hours and Mins	MWh
30 April 2019 06:43 3 yearly planned maintenance (aborted).	Non-OFTO	6hr 46min	692.00
Total			**692.00 MWh**

BT Walney 2

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			
Total			**0.00 MWh**

BT Sheringham Shoal

Outage Date and Time	Reason	Days, Hours and Mins	MWh
25 July 2019 22:29 Shunt Reactor 1 controller fault.	OFTO	6hr 22min	131.00
Total			**131.00 MWh**

BT London Array

Outage Date and Time	Reason	Days, Hours and Mins	MWh
02 April 2019 12:11 Generator 33kV BB repairs.	Non-OFTO	10days 4hr 14min	35170.00
04 June 2019 10:25 CB X290/SGT2A works.	OFTO	12hr 22min	1781.00
04 June 2019 10:25 CB X290 works.	OFTO	13hr 1min	1874.00
21 June 2019 14:16 Restoration of Filter 2B.	OFTO	0hr 3min	7.00
03 December 2019 06:13 Modification to Generators 33kV BB to GT3.	Non-OFTO	10hr 29min	1510.00
03 December 2019 08:34 SGT1A / GT1 Switching time outage.	OFTO	0hr 39min	94.00
03 December 2019 16:42 SGT1B / GT3 Maintenance.	OFTO	0hr 52min	125.00
03 December 2019 17:34 Modification to Generators 33kV BB to GT3	Non-OFTO	5hr 16min	758.00
03 December 2019 20:08 SGT1A / GT1 Switching time outage.	OFTO	2hr 3min	295.00
16 December 2019 11:21 Modification to Generators 33kV BB to GT2.	Non-OFTO	6hr 16min	902.00
16 December 2019 12:47 SGT2B / GT4 Switching time outage.	OFTO	0hr 57min	137.00
16 December 2019 17:37 SGT2A / GT2 Maintenance.	OFTO	10hr 27min	1505.00
17 December 2019 02:50 SGT2B / GT4 Switching time outage.	OFTO	0hr 36min	86.00
17 December 2019 19:05 Filter 2B fault.	OFTO	4hr 39min	670.00
24 January 2020 10:47 Filter 2B fault.	OFTO	0hr 8min	19.00
Total			**44932.80 MWh**

Equitix Greater Gabbard

Outage Date and Time	Reason	Days, Hours and Mins	MWh
06 October 2019 02:06 GT1 and GT2.	OFTO	4hr 20min	137.00
06 October 2019 06:27 GT1 only.	OFTO	6days 11hr 53min	52.00
Total			**189.00 MWh**

BBE Gwynt-Y-Mor

Outage Date and Time	Reason	Days, Hours and Mins	MWh
05 August 2019 08:54 Maintenance.	OFTO	6days 6hr 31min	42153.00
03 September 2019 08:38 CSE repair.	OFTO	13days 6hr 1min	91271.00
23 September 2019 15:27 SVC trip.	OFTO	7hr 32min	2329.00
07 November 2019 10:00 400kV CB failure.	OFTO	9days 3hr 9min	62896.00
08 November 2019 15:28 SVC trip.	OFTO	0hr 27min	64.00
Total			**198713.00 MWh**

BBE Thanet

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			
Total			**0.00 MWh**

BBE Humber Gateway

Outage Date and Time	Reason	Days, Hours and Mins	MWh
23 September 2019 20:52 GT1 thermal trip..	OFTO	16hr 8min	1775.00
16 February 2020 04:22 Reactor fault.	OFTO	7hr 23min	812.00
Total			**2587.00 MWh**

West of Duddon Sands

Outage Date and Time	Reason	Days, Hours and Mins	MWh
07 May 2019 08:33 Circuit 2 warranty defect repairs on 400kV SF6 switchgear.	OFTO	20days 10hr 47min	81077.00
02 June 2019 08:33 Circuit 1 warranty defect repairs on 400kV SF6 switchgear.	OFTO	18days 0hr 51min	72765.00
Total			**153842.00 MWh**

DTP Burbo Bank Extension

Outage Date and Time	Reason	Days, Hours and Mins	MWh
23 July 2019 06:43 Transfer Agreement Orsted SCADA SAT / snagging works.	OFTO	1day 12hr 24min	7234.00
Total			**7234.00 MWh**

DTP Race Bank

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			
Total			**0.00 MWh**

DTP Galloper

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			
Total			**0.00 MWh**

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 following 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 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:

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

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 400kV and 275kV transmission voltages than for 132kV. Additionally, the 132kV network is, in parts, less interconnected than the higher voltage systems and so losses of 132kV 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 50Hz: a range of 49.5 to 50.5Hz. 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 50.2Hz.

Frequency may, however, move outside these limits under fault conditions or when abnormal changes to operating conditions occur. Losses of generation between 1320 and 1800MW 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 49.5Hz within 60 seconds.