National Electricity Transmission System Performance Report

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

2020 – 21

nationalgridESO

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Introduction

This report details the performance of the National Electricity Transmission System in Great Britain for 2020–21, 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. There is also a 2250MW HVDC undersea link between Hunterston in Western Scotland and Flintshire Bridge in North Wales, that is jointly owned by SPT and NGET.

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, DTP Galloper Ltd, DTP Walney Extension Ltd and DTP Hornsea One 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, DTP Galloper Ltd, DTP Walney Extension Ltd and DTP Hornsea One 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 IFA and IFA2), 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.

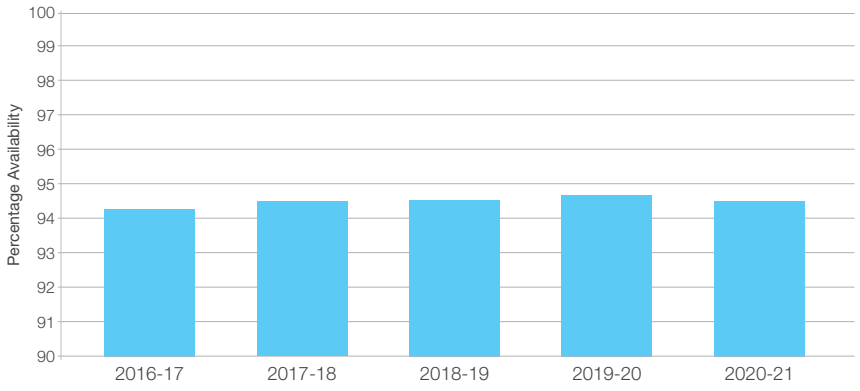
National Electricity Transmission System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability.

Annual System Availability

Annual System Availability of the National Electricity Transmission System for 2020–21 was: 94.50%

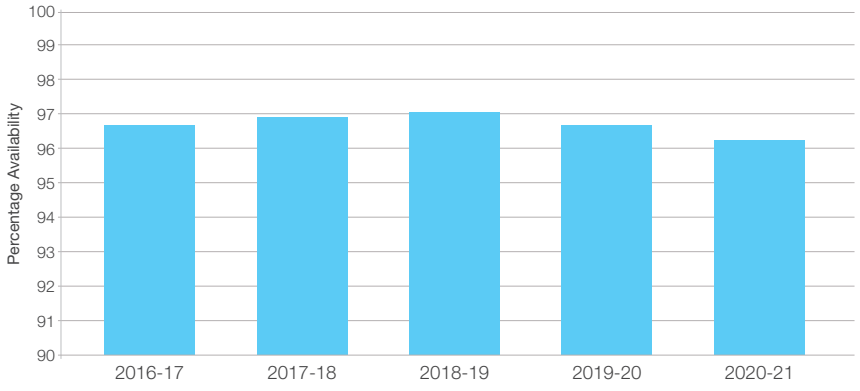
GB % Annual System Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
94.31	94.44	94.55	94.69	94.50

% Annual System Availability

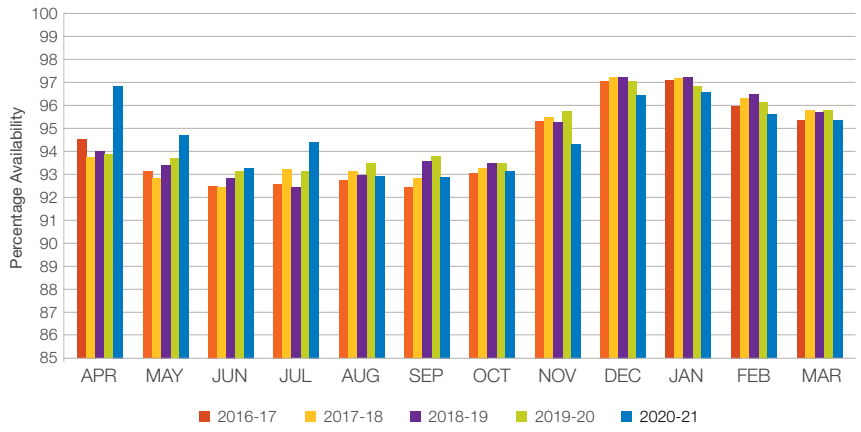


GB % Winter Peak System Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
96.71	96.92	97.05	96.72	96.22

% Winter Peak System Availability



% Monthly System Availability



GB % Monthly System Availability					
	2016-17	2017-18	2018-19	2019-20	2020-21
Apr	94.61	93.77	94.00	93.88	96.84
May	93.12	92.78	93.39	93.77	94.68
Jun	92.52	92.35	92.80	93.16	93.24
Jul	92.61	93.27	92.39	93.11	94.43
Aug	92.70	93.16	92.97	93.51	92.92
Sep	92.47	92.83	93.55	93.71	92.90
Oct	93.02	93.35	93.52	93.52	93.10
Nov	95.34	95.55	95.26	95.70	94.32
Dec	97.03	97.23	97.24	97.05	96.45
Jan	97.08	97.14	97.29	96.89	96.58
Feb	95.97	96.37	96.58	96.17	95.57
Mar	95.31	95.82	95.74	95.80	95.30

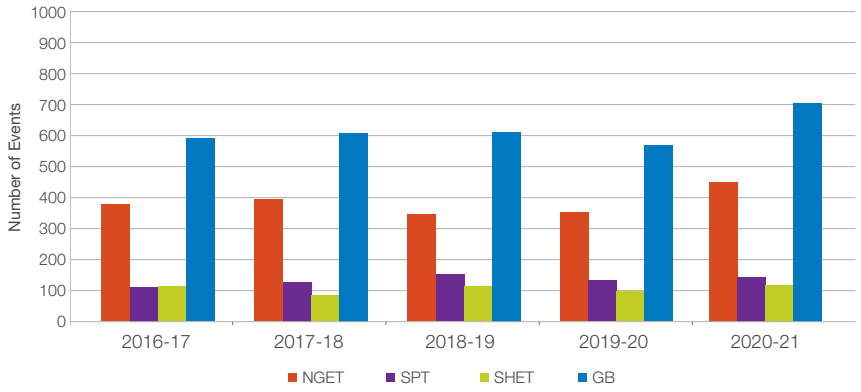
Security

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 2020–21 there were 706 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 25 resulting in loss of supplies to customers.

GB System Events

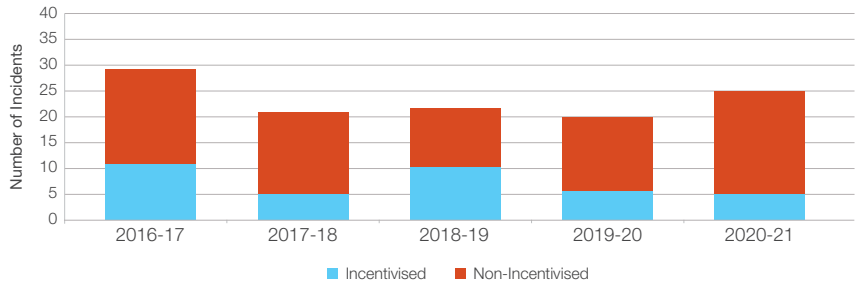


GB System Events					
	2016-17	2017-18	2018-19	2019-20	2020-21
NGET	379	398	347	355	455
SPT	108	124	157	131	138
SHET	109	85	108	100	113
GB	596	607	612	586	706

Number of Loss of Supply Incidents

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

GB System – Number of Incidents					
	2016-17	2017-18	2018-19	2019-20	2020-21
Incentivised	11	5	10	6	5
Non-Incentivised	18	16	12	14	20

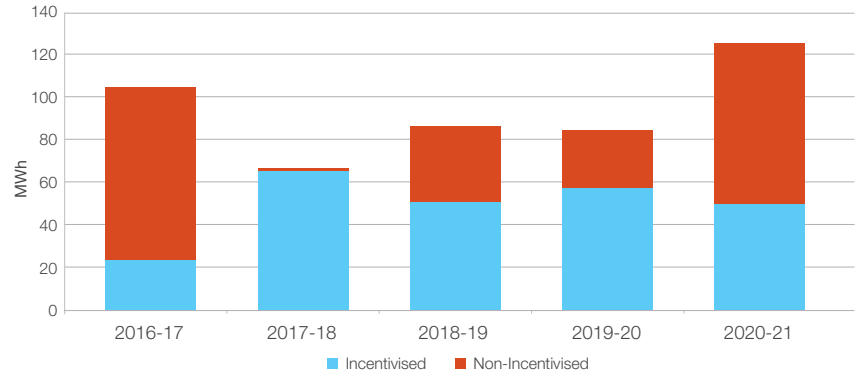


Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the National Electricity Transmission System during 2020-21 was: **124.83 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)					
	2016-17	2017-18	2018-19	2019-20	2020-21
Incentivised	22.48	67.07	51.14	57.59	47.98
Non-Incentivised	82.53	0.23	34.31	26.10	76.85



Reliability of Supply

The Overall Reliability of Supply for the National Electricity Transmission System during 2020–21 was: **99.999948%**

compared with 99.999967% in 2019–20 and 99.999967% in 2018–19.

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.

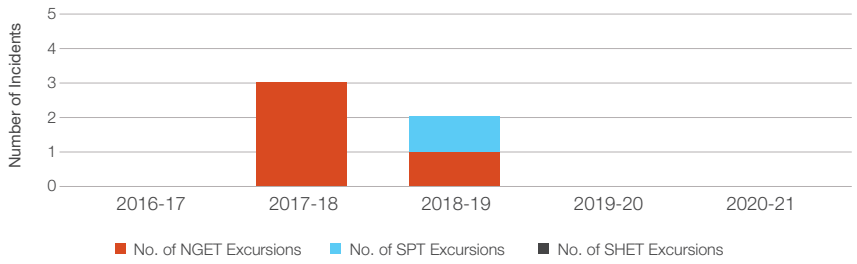
Voltage Excursions

During 2020–21 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					
	2016-17	2017-18	2018-19	2019-20	2020-21
Number of NGET Excursions	0	3	1	0	0
Number of SPT Excursions	0	0	1	0	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 2020–21, there were no reportable Frequency Excursion within the National Electricity Transmission System. The previous Frequency Excursions were in the 2019–20 and 2008–09 reporting periods.

GB System Frequency Excursions

GB System – Frequency Excurisons					
	2016-17	2017-18	2018-19	2019-20	2020-21
Number of Excursions	0	0	0	1	0

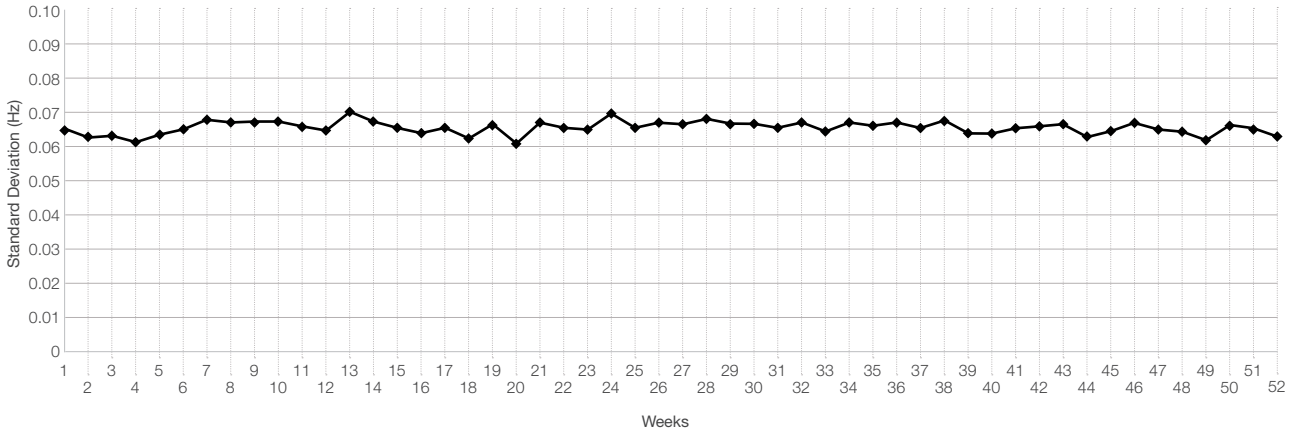
GB System Frequency Excursion

Incident Date & Time	Statutory Limits	Frequency	Duration
None	49.5 – 50.5Hz	N/A	0 seconds

Frequency Standard Deviation

The chart below displays the recorded Frequency Standard Deviation from 50Hz on a weekly basis for the year 2020–21.

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 14,200 circuit kilometres of overhead line and over 700 kilometres of underground transmission cable routes interconnecting over 300 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 53 large power stations totalling 50.4GW of generation capacity connected to the England and Wales transmission system. The NGET system supplies 12 distribution networks via over 129GVA of installed transformer capacity and a small number of directly connected customers such as steelworks and traction supplies.

In 2020–21 the maximum recorded demand on the network was 42.15GW.

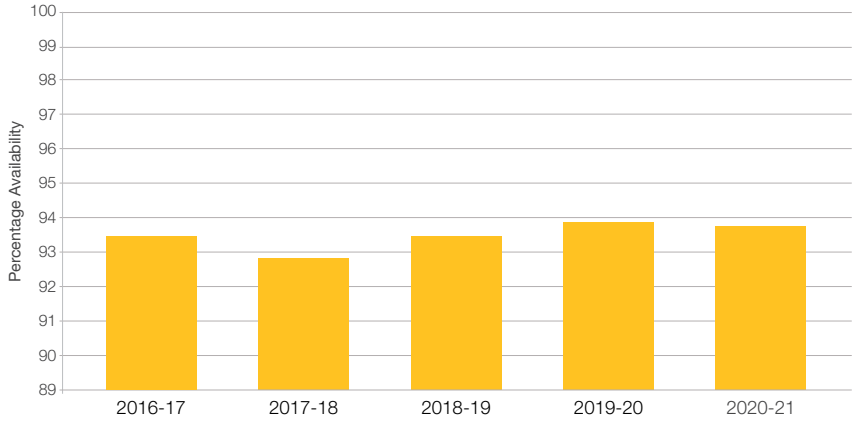
Availability

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

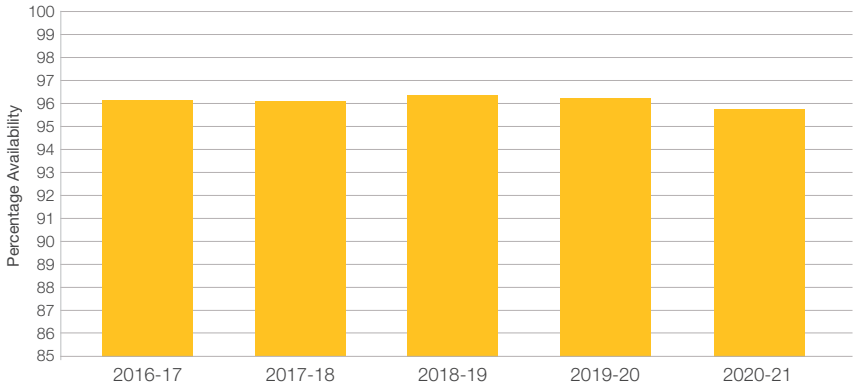
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

NGET % Annual System Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
93.48	92.89	93.45	93.88	93.76

% Annual System Availability

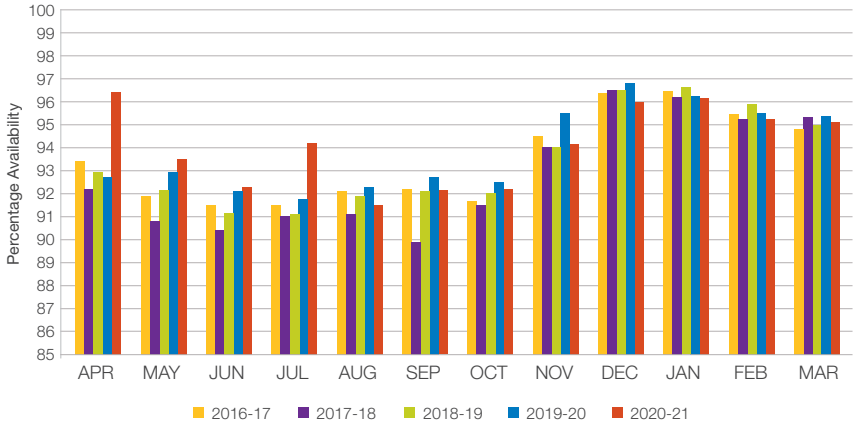


% Winter Peak System Availability



NGET % Winter Peak System Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
96.13	96.02	96.37	96.26	95.84

% Monthly System Availability

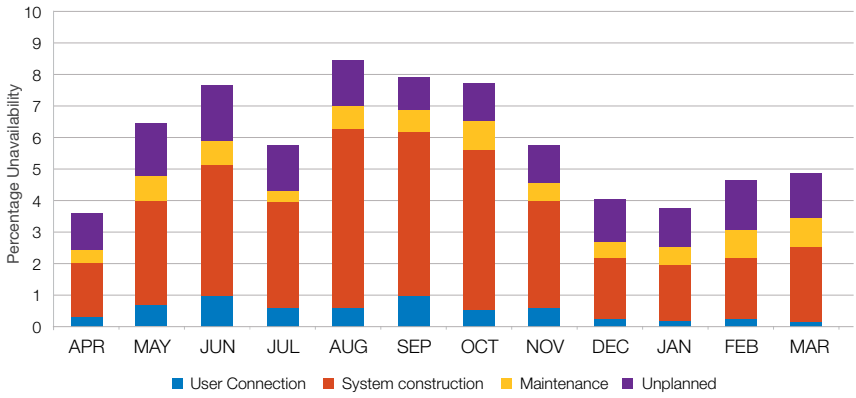


NGET % Monthly System Availability					
	2016-17	2017-18	2018-19	2019-20	2020-21
Apr	93.37	92.18	92.91	92.73	96.41
May	91.80	90.75	92.19	92.92	93.49
Jun	91.47	90.36	91.16	92.08	92.25
Jul	91.59	91.03	91.09	91.78	94.24
Aug	92.12	91.05	91.88	92.25	91.56
Sep	92.22	90.95	92.17	92.74	92.08
Oct	91.68	91.54	92.07	92.39	92.26
Nov	94.56	94.07	94.08	95.60	94.19
Dec	96.43	96.57	96.57	96.84	95.95
Jan	96.48	96.22	96.63	96.38	96.21
Feb	95.47	95.20	95.85	95.51	95.31
Mar	94.76	95.33	95.00	95.38	95.12

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	0.31	1.76	0.38	1.14	3.59
May	0.72	3.32	0.76	1.72	6.52
Jun	0.99	4.17	0.78	1.81	7.75
Jul	0.63	3.36	0.36	1.40	5.76
Aug	0.62	5.69	0.77	1.37	8.44
Sep	0.99	5.26	0.64	1.04	7.92
Oct	0.53	5.11	0.94	1.16	7.74
Nov	0.60	3.49	0.48	1.23	5.81
Dec	0.26	1.92	0.54	1.32	4.05
Jan	0.18	1.80	0.61	1.20	3.79
Feb	0.26	1.95	0.88	1.60	4.69
Mar	0.21	2.37	0.86	1.44	4.88

Security

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

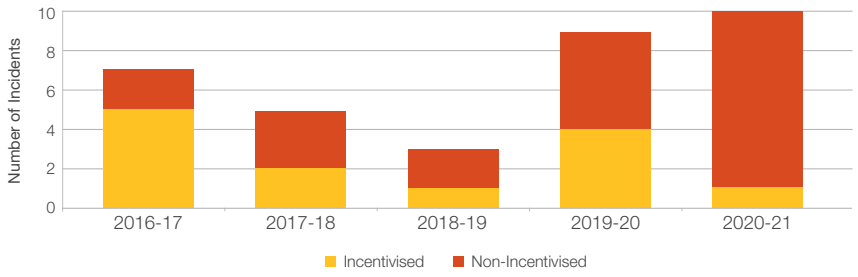
System performance is monitored by the Estimated Unsupplied Energy from the NGET Transmission System for each incident.

During 2020–21 there were 455 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 10 resulting in loss of supplies to customers.

Number of Loss of Supply Incidents

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

NGET System – Number of incidents					
	2016-17	2017-18	2018-19	2019-20	2020-21
Incentivised	5	2	1	4	1
Non-Incentivised	2	3	2	5	9

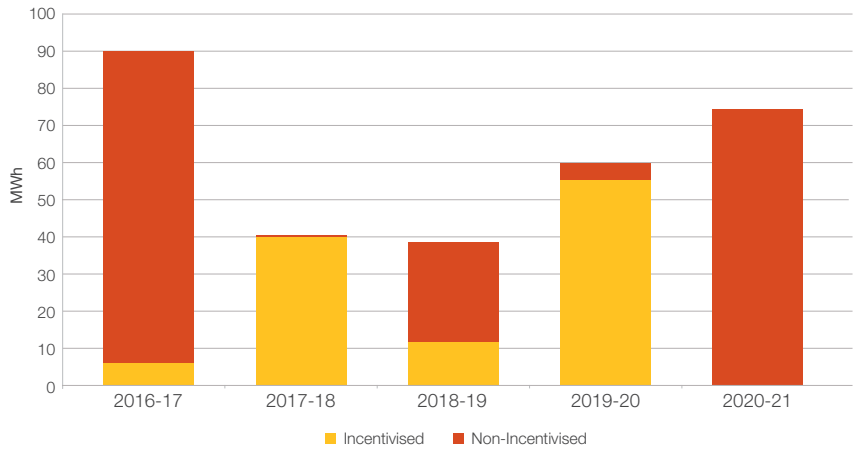


Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the NGET Transmission System during 2020–21 was: **74.36 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)					
	2016-17	2017-18	2018-19	2019-20	2020-21
Incentivised	6.77	39.70	12.06	54.45	0.0
Non-Incentivised	82.49	0.23	25.16	4.98	74.36



Reliability of Supply

The Overall Reliability of Supply for the NGET Transmission System during 2020–21 was: **99.999966%**

compared with 99.999974% in 2019–20 and 99.999984% in 2018–19.

Loss of Supply Incident Details

NGET Loss of Supply Incidents – Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
03 August 2020 08:00 at Harker 400/25kV Substation A fault of the Winding Temperature Indicator on the HV winding of SGT10A caused SGT10A and SGT10B protection to operate and the Network Rail owned LV circuit breaker to trip. No demand was being supplied at the time of the trip. Following liaison with Network Rail switching was completed on their LV system to restore demand at 08:04, giving a total time off supply of 3 minutes and 29 seconds.	0.0	3	0.00
Total			**0.00**

NGET Loss of Supply Incidents – Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
24 April 2020 23:04 at Ffestiniog 275kV Substation A communication channel failure required the Ffestiniog – Trawsfynydd 2 circuit to be switched out of service whilst the Ffestiniog – Trawsfynydd 1 circuit was already out of service to facilitate power station works. The number 1 circuit was available to be switched back into service but the power station did not require this. No demand was being supplied at the time the circuit was switched out.	0.0	0	0.00
27 April 2020 08:39 at Tinsley Park 275/33kV Substation SGT2A/2B and the Brinsworth – Tinsley Park 2 circuit tripped due to excess gassing of SGT2B, disconnecting the furnace bar which had only been supplied by a single SGT since the failure of SGT1B in September 2016. SGT2A and the Brinsworth – Tinsley Park 2 circuit were returned to service, and following LV switching by the customer SGT2A was able to supply the furnace bar.	3.2	274	14.55
01 June 2020 16:01 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 6 minutes. It has been determined that the protection on SGT2 is vulnerable to the harmonics caused by the steelworks load. There are options to address this issue which could be progressed if required by the customer.	46.3	6	4.41
13 June 2020 06:52 at Tinsley Park 275/33kV Substation The Brinsworth – Tinsley Park 2 circuit tripped during dense fog. DAR returned the circuit to service but SGT2A LV circuit breaker SGRID2A failed to close as it had no LV reference voltage. This disconnected the furnace bar, which at the time was not taking supplies. SGT2A was made available for energisation 24 minutes later.	0.0	24	0.00
23 November 2020 16:47 at Sellindge 400/132kV Substation During commissioning a fault occurred at Cheriton Convertor Station (owned by Eleclink). This caused circuit breaker X805 at Sellindge 400kV substation to open. The fault was incorrectly interpreted as a fault on UKPN Services' SGT5B by SGT5B protection, and caused the banked SGT5A/5B circuit to trip. SGT5B auto-isolated and SGT5A was returned to service by DAR. SGT5A had been supplying UKPN South at Sellindge 132kV substation and was out of service for a total of 10 seconds.	3.7	0	0.01
04 December 2020 00:02 at Tinsley Park 275/33kV Substation SGT1A/1B and the Brinsworth – Tinsley Park 1 circuit tripped due to excess gassing of SGT1B, disconnecting the furnace bar which had only been supplied by a single SGT since the replacement (in July 2020) of the previously failed unit. SGT1A and the Brinsworth – Tinsley Park 1 circuit were returned to service, and following LV switching by the customer SGT2A was able to supply the furnace bar.	7.3	454	55.39
06 January 2021 17:40 at Tremorfa 275/33kV Substation Tremorfa SGT1 tripped as it was being switched out of service due to low oil levels. This caused a trip of Tremorfa SGT2 and the Tremorfa – Uskmouth – Whitson circuit. At the time of the trip the steelworks were not taking load. The circuit and SGT2 were made available for service 26 minutes later.	0.0	26	0.00
10 February 2021 20:39 at Culham Jet 400/33kV Substation A transient fault on the Bramley – Didcot 2 circuit caused it to trip, and DAR returned the circuit to service. However, the fault caused a temporary voltage dip (which was within defined limits), leading to Culham Jet SGT1B tripping on undervoltage protection, as per agreed customer protection settings. 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	96	0.00
11 March 2021 05:39 at Heysham 400kV Substation Reserve Busbar 3/4/5 tripped due to building cladding being dislodged during a severe storm and blown onto the busbars. Subsequently Main Busbar 4 tripped as a consequence of the initial fault. Heysham Generator Unit 7 circuit was not generating at the time but was taking site supplies. The lost load was picked up by Station Transformer 7 (which is connected at Heysham 132kV substation) after switching by the User on their 11kV system. Station Transformer 7 was available for load at all times without the need for further action to be taken by NGET.	1.7	0	0.00
Total			**74.36**

Scottish Power Transmission System

System Description

The SPTL Transmission System comprises approximately 4,000 circuit kilometres of overhead line and cable and 156 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 14.8 GVA of installed transformer capacity. There is approximately 6.6GW of directly connected and Large Embedded generation capacity connected in the SP Transmission area, including 39 power stations directly connected to the SP Transmission system. In 2020–21 the maximum recorded demand on the network was 3.4GW.

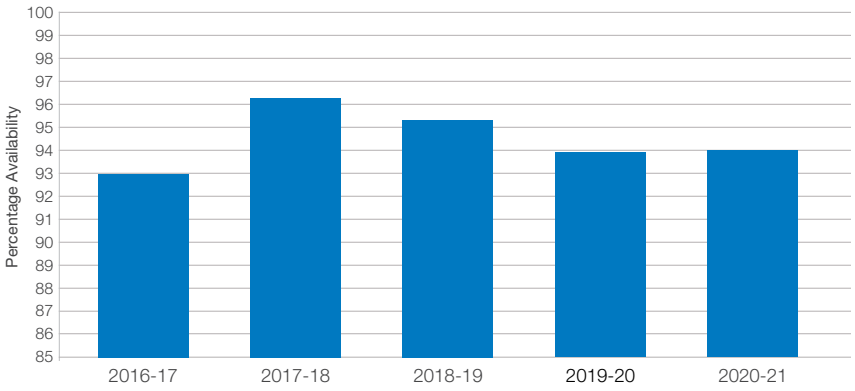
Availability

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

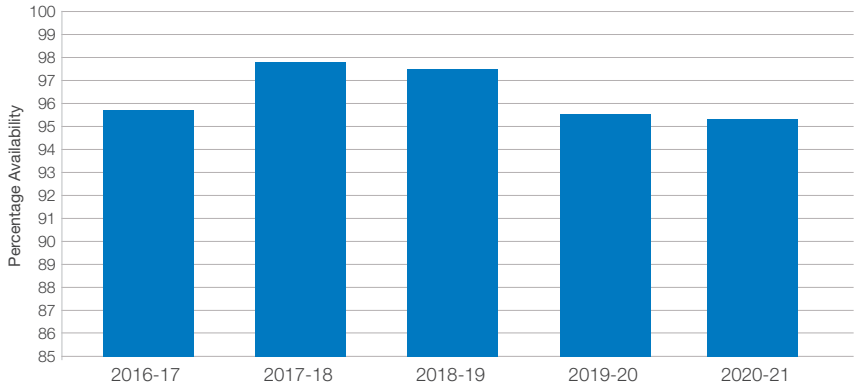
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

% Annual System Availability

SPT % Annual System Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
93.01	96.29	95.31	93.90	94.00

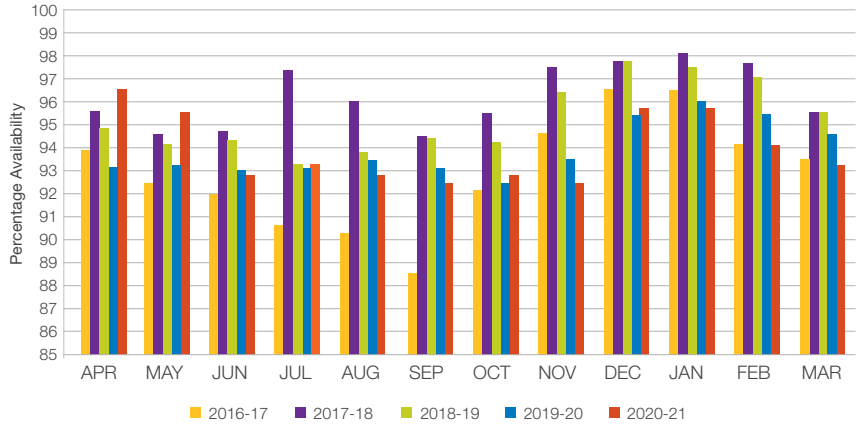


% Winter Peak System Availability



SPT % Winter Peak System Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
95.82	97.88	97.55	95.64	95.24

% Monthly System Availability

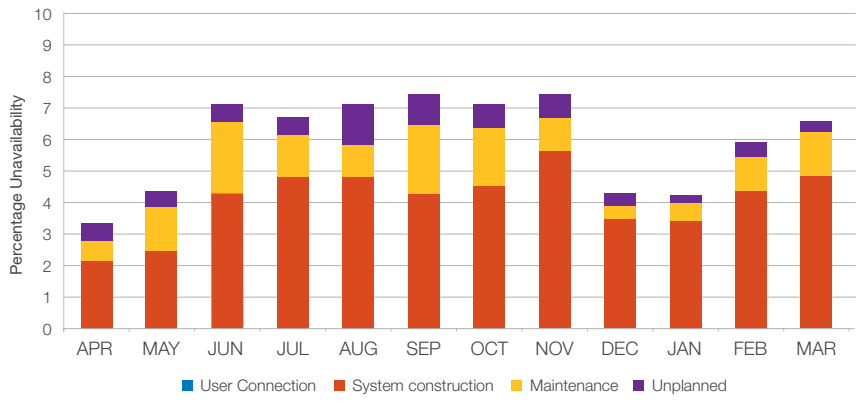


SPT % Monthly System Availability					
	2016-17	2017-18	2018-19	2019-20	2020-21
Apr	93.94	95.64	94.80	93.21	96.61
May	92.45	94.63	94.16	93.29	95.61
Jun	91.99	94.73	94.35	93.01	92.82
Jul	90.69	97.38	93.24	93.15	93.27
Aug	90.24	96.09	93.79	93.43	92.81
Sep	88.59	94.65	94.41	93.12	92.51
Oct	92.21	95.55	94.27	92.40	92.81
Nov	94.67	97.59	96.36	93.56	92.53
Dec	96.60	97.87	97.87	95.39	95.75
Jan	96.54	98.14	97.58	96.08	95.77
Feb	94.17	97.78	97.17	95.44	94.09
Mar	93.51	95.65	95.69	94.69	93.39

Planned and Unplanned System Unavailability

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

Unavailability is defined as (100 – Availability) %



Planned and Unplanned Unavailability (%) for SP Transmission System					
	User Connection	System Construction	Maintenance	Unplanned	Total
Apr	0.00	2.21	0.56	0.62	3.39
May	0.00	2.50	1.38	0.50	4.39
Jun	0.00	4.34	2.27	0.58	7.18
Jul	0.00	4.80	1.34	0.59	6.73
Aug	0.00	4.76	1.07	1.35	7.19
Sep	0.00	4.27	2.27	0.95	7.49
Oct	0.00	4.59	1.84	0.77	7.19
Nov	0.00	5.65	1.08	0.74	7.47
Dec	0.00	3.43	0.46	0.37	4.25
Jan	0.00	3.43	0.57	0.23	4.23
Feb	0.00	4.42	1.08	0.41	5.91
Mar	0.00	4.84	1.47	0.29	6.61

Security

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

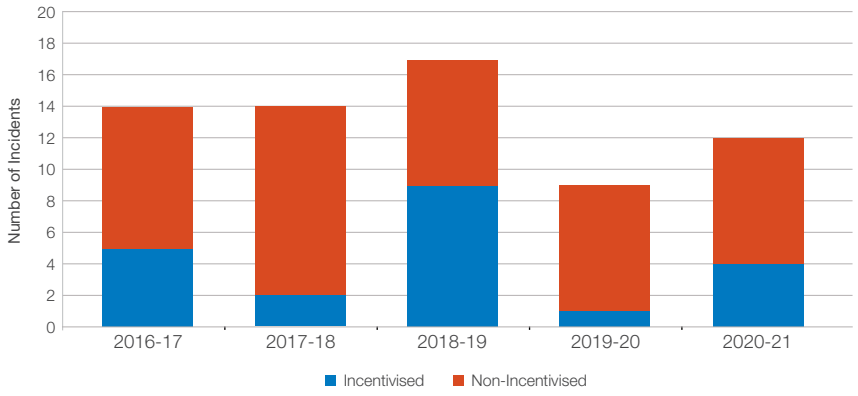
System performance is monitored by the estimated unsupplied energy from the SP Transmission System for each incident.

During 2020–21 there were 138 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 12 resulting in loss of supply to customers.

Number of Loss of Supply Incidents

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

SPT System – Number of incidents					
	2016-17	2017-18	2018-19	2019-20	2020-21
Incentivised	5	2	9	1	4
Non-Incentivised	9	12	8	8	8

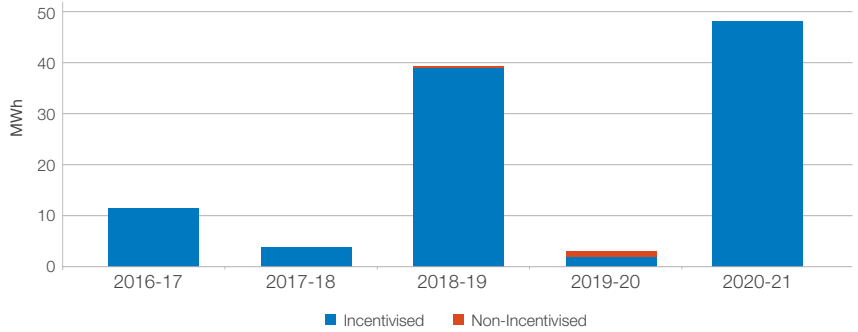


Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SP Transmission System during 2020–21 was: **47.98 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)					
	2016-17	2017-18	2018-19	2019-20	2020-21
Incentivised	11.31	3.04	39.08	1.99	47.98
Non-Incentivised	0.04	0.00	0.35	1.22	0.0



Reliability of Supply

The Overall Reliability of Supply for the SP Transmission System during 2020–21 was: **99.999688%**

compared with 99.999981% in 2019–20 and 99.999772% in 2018–19.

Loss of Supply Incident Details

SPT Loss of Supply Incidents – Incentivised

SPT Loss of Supply Incidents – Incentivised	MW Lost	Mins	MWh Unsupplied
20 April 2020 17:44 at Ravenscraig 33kV Substation Cable fault on the Wishaw – Ravenscraig No.2 circuit, the Wishaw – Ravenscraig No1 circuit was out due to major project works at Wishaw GSP. This resulted in the loss of supplies to 1 customer at Ravenscraig for 88 minutes, with demand subsequently restored via distribution system backfeeds.	0.1	88	0.10
22 October 2020 07:25 at Hawick 132kV Substation Transient fault, due to lightning, on the Gretna – Hawick circuit. Auto reclosed at Gretna but no auto reclose available at Hawick. This resulted in all customers off supply at Hawick due to the running arrangement applied by National Grid at Hawick and planned outage on the Gretna-Harker-Hawick circuit. Supplies lost to Hawick GSP for 10 minutes, with the Hawick Circuit Breakers T1 & T2 having to be manually closed via telecontrol.	6.3	10	1.04
07 November 2020 07:43 at Kilmarnock South 275kV Substation Kilmarnock South – Kilmarnock Town No.2 circuit & Kilmarnock SGT2 tripped after Kilmarnock South – Kilmarnock Town No.1 circuit & Kilmarnock Town SGT1 was switched out of service for planned works. Fault was due to a potential Transformer fault, which resulted in the loss of supplies at Kilmarnock Town GSP for 43 minutes, with demand subsequently restored via restoring the Kilmarnock South – Kilmarnock Town No.1 circuit.	25.8	43	6.44
07 February 2021 21:11 at Whitehouse 275kV Substation Kaimes – Whitehouse – Dewar Place No.1 circuit tripped, the Kaimes – Whitehouse – Dewar Place No.2 circuit was out due to major project works at Kaimes, following a distribution fault at Oxgangs primary. This resulted in the loss of supplies at Kaimes GSP for 20 minutes and Whitehouse GSP for 44 minutes, with demand subsequently restored via restoring the Kaimes GSP and Whitehouse via distribution system backfeeds.	91.6	44	40.39
Total			**47.98**

SPT Loss of Supply Incidents – Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
16 April 2020 20:30 at Cruachan 275kV Substation Dalmally – Cruachan No.1 circuit tripped, following an intertip being received from Cruachan Power Station. Cruachan Power Station were completing internal switching at the time. Supplies lost to Cruachan Power Station for 22 minutes, with the Dalmally Circuit Breaker having to be manually closed via telecontrol.	0.0	22	0.00
24 April 2020 18:35 at Clyde North 33kV Substation Clyde North SGT1A & SGT1B switched out of service to top up SF6 Gas in SGT1A following low alarm being received, supplies removed to Clyde North Wind Farm for investigation and repair.	0.0	69	0.00
31 July 2020 18:04 at Glenluce, Glenlee & Newton Stewart 132kV Substation Transient fault, due to lightning, on the Glenluce – Newton Stewart No.1 circuit, and at the same time Main Protection operated on the Glenluce – Newton Stewart No.2 circuit, and coincidentally Glenluce T2 was out of service due to planned works. This resulted in loss of supplies to Glenluce, Glenlee & Newton Stewart GSP's for 36 minutes. A total of -30.4MW of power was being transferred through Transmission at the time of the fault due to the level of embedded generation around the area.	-30.4	36	0.00
31 July 2020 19:05 at Glenlee, Newton Stewart, Glenluce 132kV Substations Transient fault, due to lightning, on the Glenluce – Newton Stewart No.1 circuit, and at the same time Main Protection operated on the Glenluce – Newton Stewart No.2 circuit, and coincidentally Glenluce T2 was out of service due to planned works. This resulted in loss of supplies to Glenluce, Glenlee & Newton Stewart GSP's for 9 minutes. A total of -0.4MW of power was being transferred through Transmission at the time of the fault due to the level of embedded generation around the area.	-0.4	9	0.00
30 September 2020 02:23 at Glenluce 132kV Substation Glenluce T1 tripped following thermal overload, as a pump had seized and restricted the cooling system, with Glenluce T2 out for to planned works this resulted in the loss of supplies to Glenluce GSP for 38 minutes. A total of -59.9MW of power was being transferred through Transmission at the time of the fault due to the level of embedded generation around the area.	-59.9	38	0.00
14 February 2021 07:07 at Blackcraig 132kV Substation Transient fault on the New Cumnock - Blackcraig Windfarm circuit following adverse weather, however no auto reclosing equipment installed on the circuit. Supplies lost to Blackcraig Windfarm GSP for 299 minutes, with the New Cumnock Circuit Breaker having to be manually closed via telecontrol.	0.0	299	0.00
16 March 2021 14:30 at Clyde North 33kV Substation Clyde North SGT1A & SGT1B switched out of service due to hanging LV cables in proximity of the 33kV Busbars. Fault was due to wind and gales. Supplies removed to Clyde North Wind Farm for 239 minutes, for investigation and repair.	0.0	239	0.00
24 March 2021 23:31 at Ewehill 132kV Substation Crossdykes & Ewehill Windfarm switched out of service due to Oil temperature alarm at Ewehill T1, and no cooling available. Supplies removed to Crossdykes & Ewehill Farms for 17hrs and 15 minutes, for investigation and repair.	0.0	1041	0.00
Total			**0.00**

Scottish Hydro Electric Transmission System

System Description

The SHE Transmission system, hereafter referred to as SSEN Transmission, comprises of 199km of 400kV, 1936km of 275kV and 2735km of 132kV overhead line and over 293km of mainly 132kV AC high voltage underground transmission cables, interconnecting 146 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 2020-21 the maximum recorded demand on the network was 1.28GW. Mostly the demand is taken by approximately 0.78 million customers connected to the Scottish Hydro Electric Power Distribution network via more than 12GVA of installed transformer capacity, with 1 other major customer also supplied directly from the SSEN Transmission system. There are a growing number of large generators, with over 45 directly connected to the SSEN Transmission system and many smaller units combining to produce more that 8GW capacity, of which 6.75GW is renewable.

The unreliability of supply figure can be distorted when compared against other systems at 275kV and 400kV due to the higher proportion of 132kV Transmission network and the consequent reduced power flows, however unreliability remains low in our network across all voltages.

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.

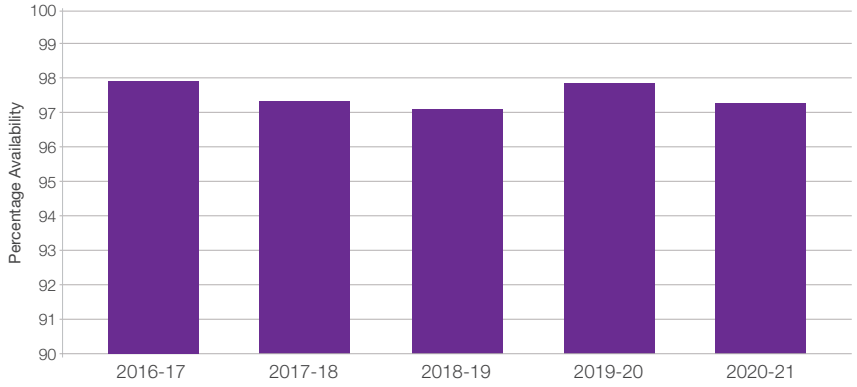
Availability

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

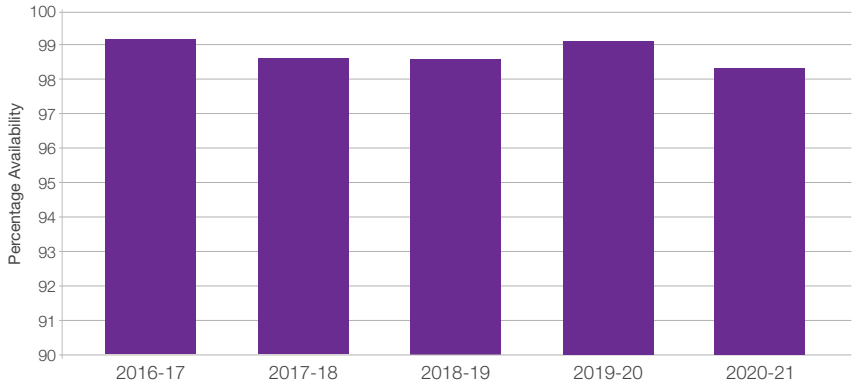
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

SHE Transmission % Annual System Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
97.92	97.29	97.09	97.83	97.17

% Annual System Availability

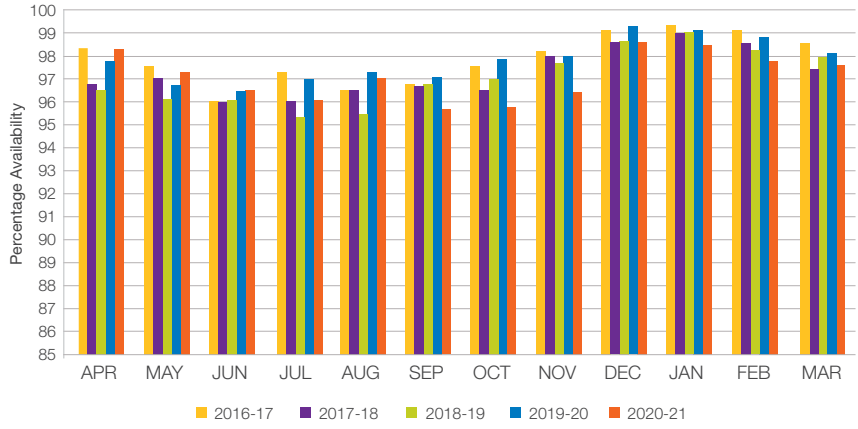


% Winter Peak System Availability



SHE Transmission % Winter Peak System Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
99.22	98.68	98.61	99.10	98.30

% Monthly System Availability

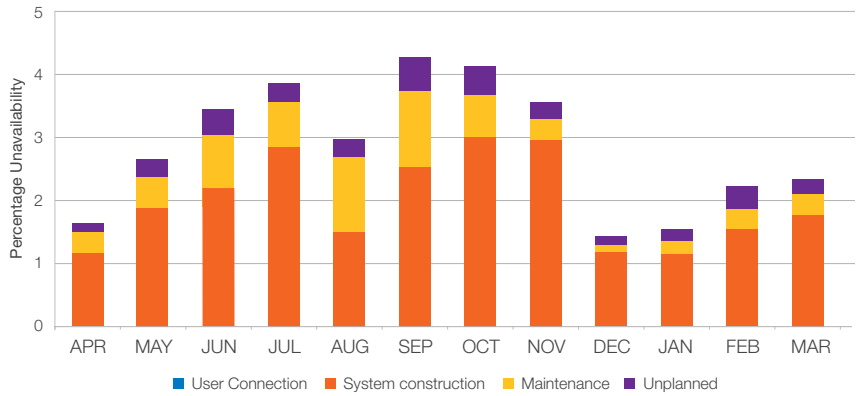


SHE Transmission % Monthly System Availability					
	2016-17	2017-18	2018-19	2019-20	2020-21
Apr	98.41	96.73	96.48	97.87	98.35
May	97.62	97.06	96.19	96.72	97.33
Jun	96.08	96.01	96.14	96.48	96.56
Jul	97.33	96.03	95.39	96.95	96.13
Aug	96.66	96.67	95.42	97.28	97.04
Sep	96.81	96.69	96.81	97.10	95.72
Oct	97.67	96.61	97.07	97.94	95.88
Nov	98.25	98.04	97.72	98.07	96.44
Dec	99.19	98.58	98.62	99.29	98.58
Jan	99.34	98.93	98.99	99.18	98.48
Feb	99.12	98.53	98.17	98.82	97.80
Mar	98.58	97.44	97.99	98.13	97.69

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 SHE Transmission System for 2018-19					
	User Connection	System Construction	Maintenance	Unplanned	Total
Apr	0.00	1.15	0.35	0.15	1.65
May	0.00	1.87	0.52	0.28	2.67
Jun	0.00	2.19	0.82	0.43	3.44
Jul	0.00	2.86	0.71	0.30	3.87
Aug	0.00	1.49	1.18	0.29	2.96
Sep	0.00	2.53	1.22	0.53	4.28
Oct	0.00	3.02	0.64	0.46	4.12
Nov	0.00	2.97	0.33	0.26	3.56
Dec	0.00	1.19	0.08	0.15	1.42
Jan	0.00	1.15	0.20	0.17	1.52
Feb	0.00	1.55	0.30	0.35	2.20
Mar	0.00	1.75	0.32	0.24	2.31

Security

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

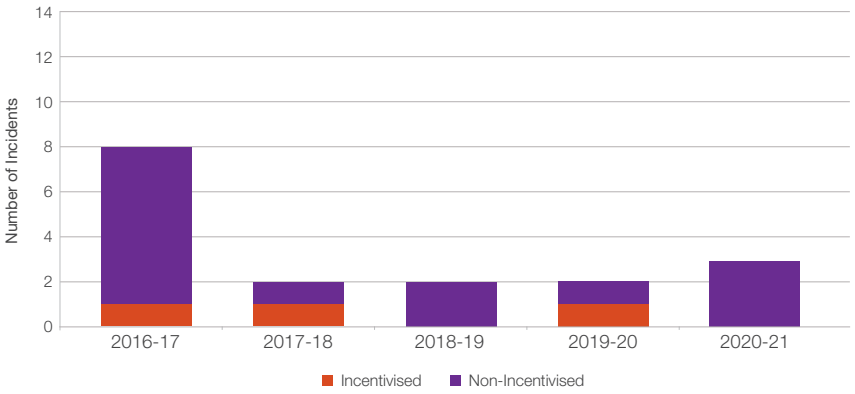
System performance is monitored by the Estimated Unsupplied Energy from the SHE Transmission System for each incident.

During 2020–21 there were 113 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 3 resulting in loss of supplies to customers.

Number of Loss of Supply Incidents

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

SHE Transmission System – Number of Incidents					
	2016-17	2017-18	2018-19	2019-20	2020-21
Incentivised	1	1	0	1	0
Non-Incentivised	7	1	2	1	3

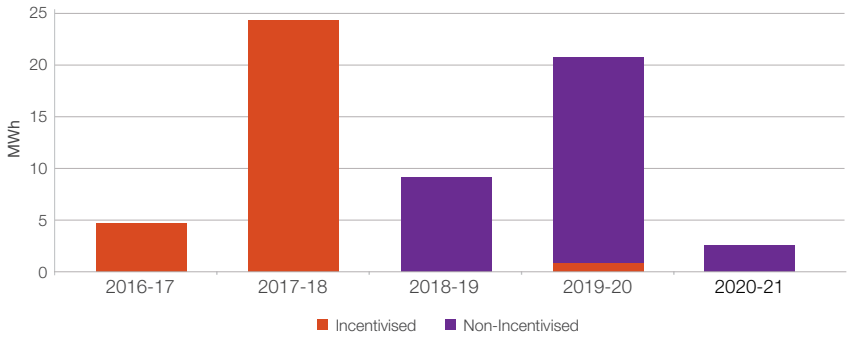


Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SHE Transmission System during 2020–21 was: **2.49 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)					
	2016-17	2017-18	2018-19	2019-20	2020-21
Incentivised	4.40	24.33	0.00	1.15	0.00
Non-Incentivised	0.00	0.00	8.80	19.90	2.49



Reliability of Supply

The Overall Reliability of Supply for the SHE Transmission System during 2020–21 was: **99.999948%**

compared with 99.999612% in 2019–20 and 99.999837% in 2018–19.

Loss of Supply Incident Details

SHE Transmission Loss of Supply Incidents – Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
None	0.0	0	0.00
Total			**0.00**

SHE Transmission Loss of Supply Incidents – Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
05 February 2021 – Shin – Lairg – Cassley 132kV Circuit During a period of severe winds, gales and heavy snow caused several overhead line trips & DARs. During this event the Lairg 33kV Grid Transformer circuit breaker failed to auto reclose. The circuit breaker was manually closed and all customers were restored.	1.2	26	0.52
23 February 2021 – Broadford – Edinbane – Dunvegan – Ardmore 132kV Circuit Severe winds and gales caused damage on the Broadford – Edinbane – Dunvegan – Ardmore 132kV circuit resulting in several OHL trips & DARs before finally locking out. Demand was restored in stages by the DNO.	3.6	106	0.24
09 March 2021 – Fort Augustus – Quoich – Broadford 132kV Circuit During a severe storm, damage was caused to the Fort Augustus – Quoich – Broadford 132kV circuit resulting in the circuit tripping and remaining out of service. Demand was restored in stages by DNO.	5.7	1539	1.73
Total			**2.49**

Interconnectors

England – France Interconnector

System Description

The NGET transmission system is interconnected with France between Sellindge and Les Mandarins, 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 and is called IFA.

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.

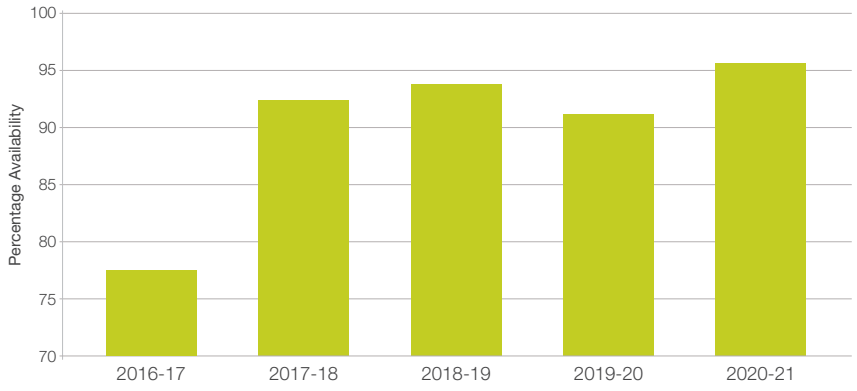
Annual Availability

Annual Availability of England – France Interconnector: **95.40%**

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

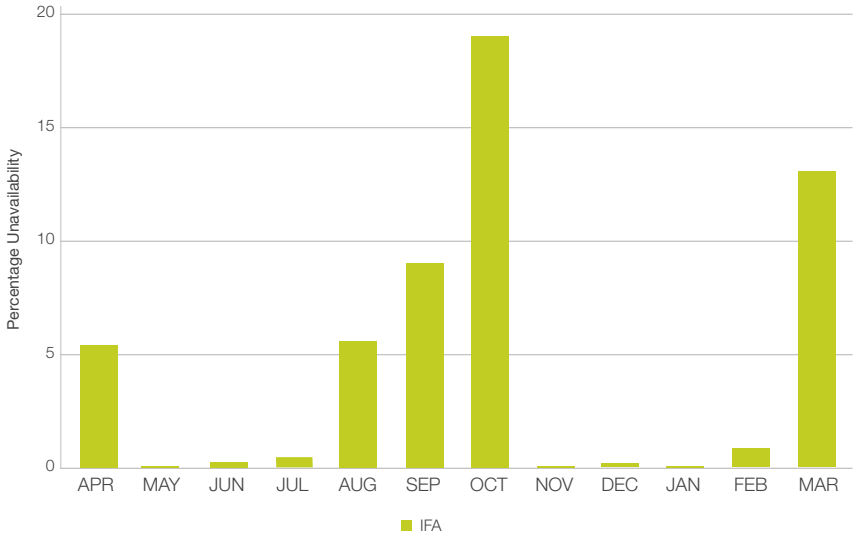
England – France Interconnector % Annual Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
77.54	92.61	93.86	91.45	95.40

% Annual System Availability



Monthly Unavailability

% England – France Interconnector Monthly Unavailability

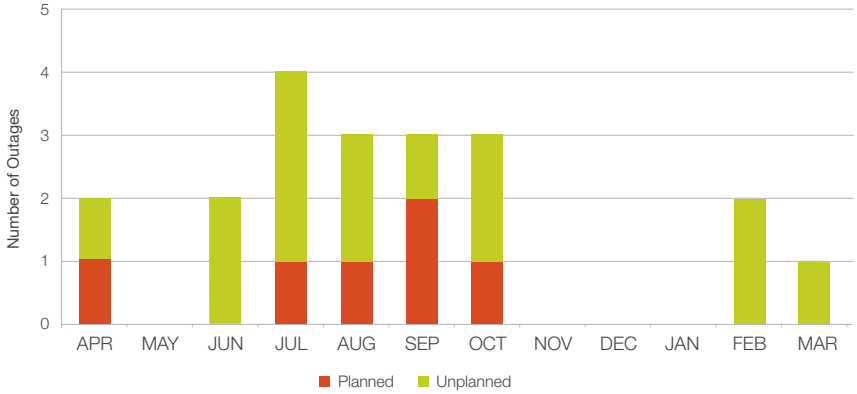


England – France Interconnector % Monthly Unavailability	
	IFA
April	5.63
May	0.03
June	0.27
July	0.56
August	5.79
September	9.10
October	18.77
November	0.03
December	0.23
January	0.09
February	1.06
March	13.16
Average	4.60

Outages 2020–21 (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	0
June	0	2
July	1	3
August	1	2
September	2	1
October	1	2
November	0	0
December	0	0
January	0	0
February	0	2
March	0	1
Total	6	14

England – Netherlands Interconnector

System Description

The NGET transmission system is interconnected with The Netherlands between Isle of Grain and Maasvlakte, 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.

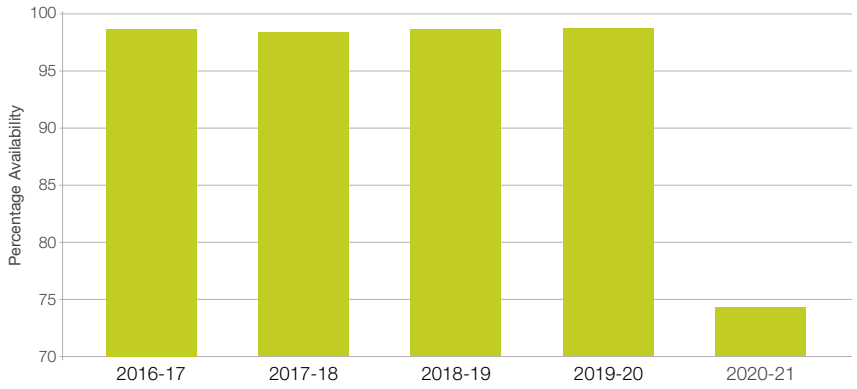
Annual Availability

Annual Availability of England – Netherlands Interconnector: **74.48%**

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

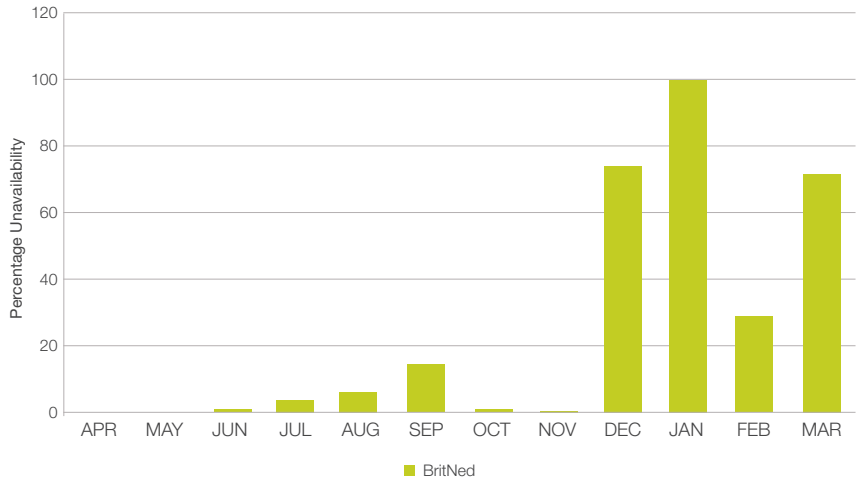
England – Netherlands Interconnector % Annual Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
98.20	97.78	98.22	98.52	74.48

% Annual System Availability



Monthly Unavailability

% England – Netherlands Interconnector Monthly Unavailability

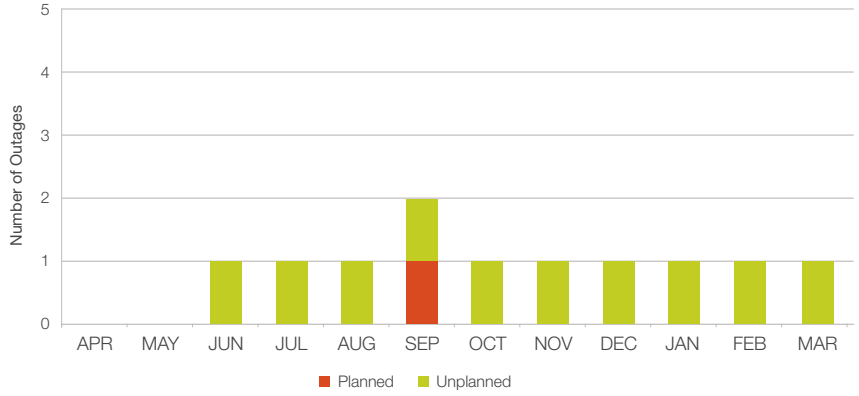


England – Netherlands Interconnector % Monthly Unavailability	
	BritNed
April	0.00
May	0.00
June	0.69
July	3.15
August	6.18
September	15.56
October	0.69
November	0.12
December	75.53
January	100.00
February	28.57
March	73.31
Average	25.52

Outages 2020–21 (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	0	0
June	0	1
July	0	1
August	0	1
September	1	1
October	0	1
November	0	1
December	0	1
January	0	1
February	0	1
March	0	1
Total	1	10

England – Belgium Interconnector

System Description

The NGET transmission system is interconnected with Belgium between Richborough and Zeebrugge, 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.

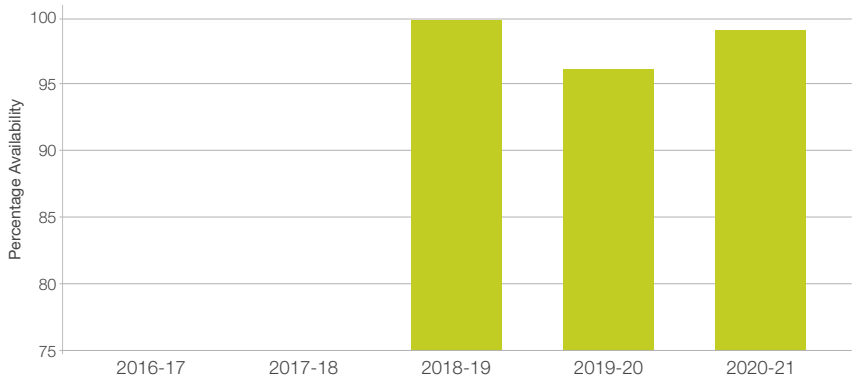
Annual Availability

Annual Availability of England – Belgium Interconnector: **99.22%**

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

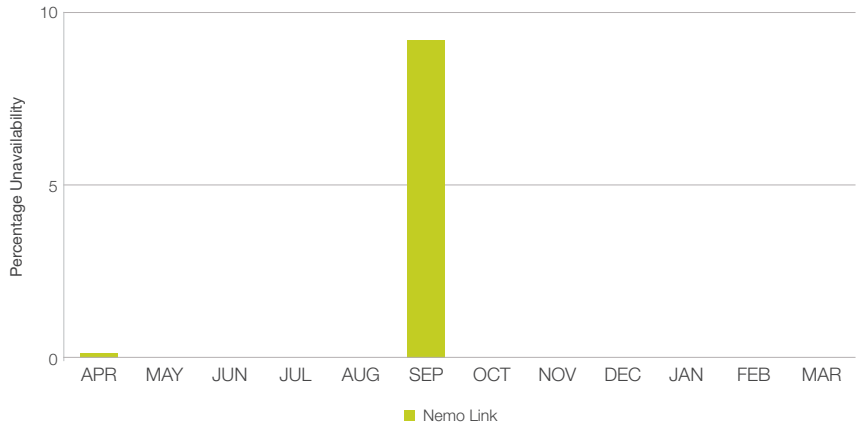
England – Belgium Interconnector % Annual Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
N/A	N/A	99.86	96.14	99.22

% Annual System Availability



Monthly Unavailability

% England – Belgium Interconnector Monthly Unavailability

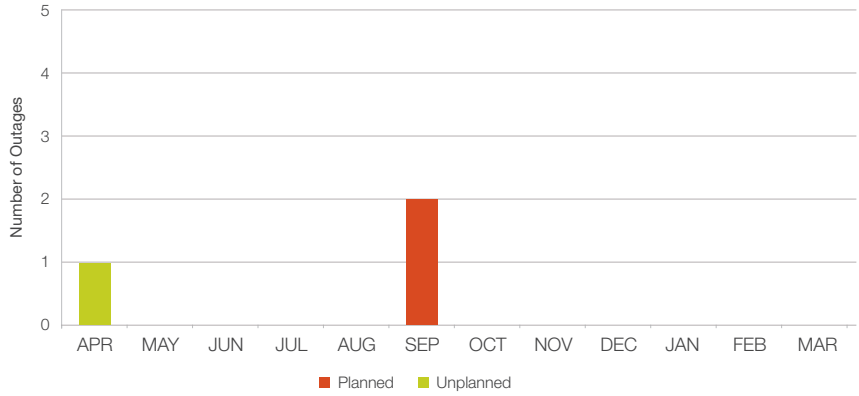


England – Belgium Interconnector % Monthly Unavailability	
	Nemo Link
April	0.14
May	0.00
June	0.00
July	0.00
August	0.00
September	9.31
October	0.00
November	0.00
December	0.00
January	0.00
February	0.00
March	0.00
Average	0.78

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	1
May	0	0
June	0	0
July	0	0
August	0	0
September	2	0
October	0	0
November	0	0
December	0	0
January	0	0
February	0	0
March	0	0
Total	2	1

England – France Interconnector 2

System Description

The NGET transmission system is interconnected with France between Lee-on-the-Solent and Tourbe, via a 240km HVDC link owned and operated jointly by National Grid and Réseau de Transport d'Electricité (RTE); the French transmission system owner since January 2021 and is called IFA2.

The total capability of the Interconnector is 1000MW and is of a single 1000MW monopole design.

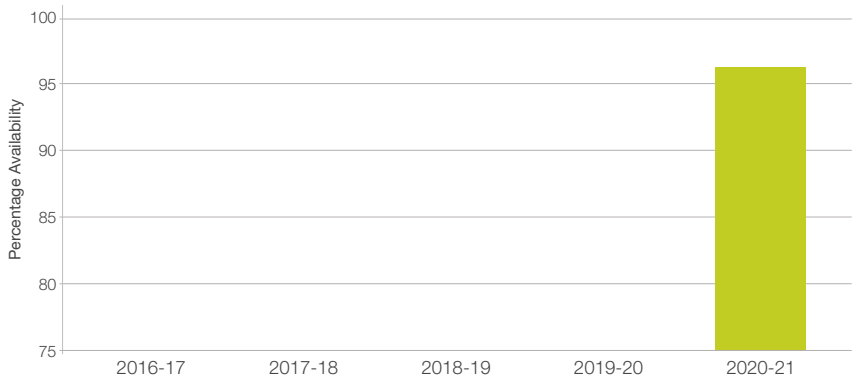
Annual Availability

Annual Availability of England – France Interconnector 2: **96.55%**

The chart below shows the annual comparison of availability of the England – France Interconnector 2.

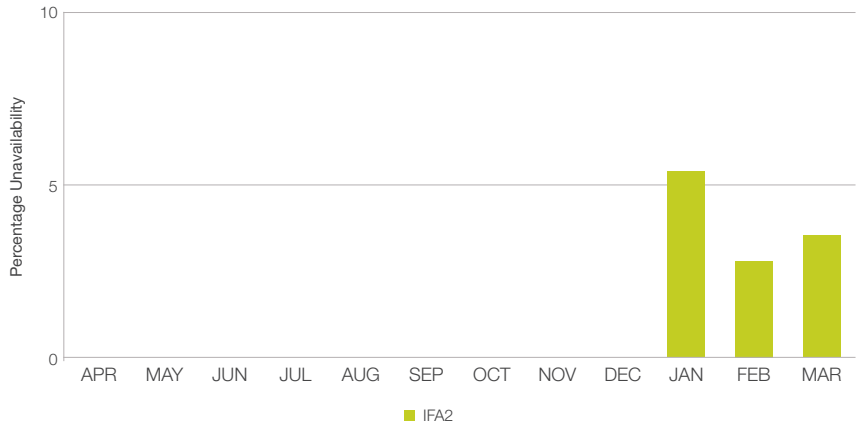
England – France Interconnector 2 % Annual Availability				
2016-17	2017-18	2018-19	2019-20	2020-21
N/A	N/A	N/A	N/A	96.55

% Annual System Availability



Monthly Unavailability

% England – France Interconnector 2 Monthly Unavailability

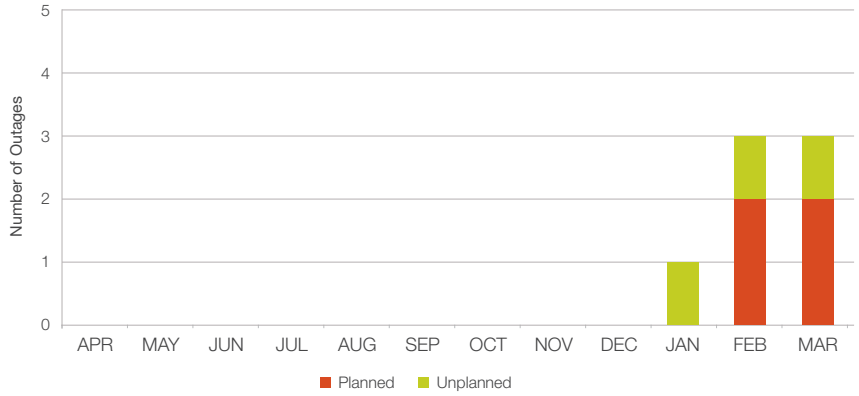


England – France Interconnector 2 % Monthly Unavailability	
	Nemo Link
April	N/A
May	N/A
June	N/A
July	N/A
August	N/A
September	N/A
October	N/A
November	N/A
December	N/A
January	5.22
February	2.80
March	3.45
Average	3.45

Outages 2020–21 (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	0	0
June	0	0
July	0	0
August	0	0
September	0	0
October	0	0
November	0	0
December	0	0
January	0	1
February	2	1
March	2	1
Total	4	3

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), Galloper OFTO (DTP), Walney Extension OFTO (DTP) and Hornsea One OFTO (DTP). The offshore network consists of 2287 kilometres of circuit, connecting to 21 offshore substations totalling over 7.7GW 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	576	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
DTP Walney Extension	04/06/2020	2	139	659	400kV	Transmission
DTP Hornsea One	12/03/2021	2	533	1134	400kV	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 2020–21 was **98.81%**

% Annual System Availability

Offshore Transmission Networks % Annual System Availability

	2016-17	2017-18	2018-19	2019-20	2020-21
TC Robin Rigg	99.99	100	100	99.87	99.95
TC Gunfleet Sands	99.95	99.81	99.97	100	99.66
TC Barrow	100	99.99	100	100	100
TC Ormonde	99.59	100	100	100	100
TC Lincs	99.93	99.78	100	99.56	99.44
TC Westermost Rough	100	100	99.73	100	100
TC Dudgeon	N/A	N/A	100	99.31	99.83
BT Walney 1	99.62	99.70	100	99.95	100
BT Walney 2	100	100	91.42	100	100
BT Sheringham Shoal	99.95	99.23	99.40	100	100
BT London Array	98.88	99.80	99.94	99.88	99.77
EQ Greater Gabbard	98.78	99.61	99.82	99.78	99.78
BBE Gwynt Y Mor	99.71*	100	99.93*	96.10	86.31
BBE Thanet	100*	100	100	100	99.84
BBE Humber Gateway	100	100*	100	99.83	99.76
West of Duddon Sands	99.64	99.45	100	95.42	99.50
DTP Burbo Bank Extension	N/A	N/A	98.15	99.67	99.99
DTP Race Bank	N/A	N/A	N/A	100	99.26
DTP Galloper	N/A	N/A	N/A	100	99.95
DTP Walney Extension	N/A	N/A	N/A	N/A	99.97
DTP Hornsea One	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					
	2016-17	2017-18	2018-19	2019-20	2020-21
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	99.87	100	100	100
TC Westermost Rough	100	100	100	100	100
TC Dudgeon	N/A	N/A	100	100	100
BT Walney 1	100	100	100	100	100
BT Walney 2	100	100	100	100	100
BT Sheringham Shoal	100	99.99	100	100	100
BT London Array	100	100	99.99	99.89	100
EQ Greater Gabbard	100	99.79	99.68	100	100
BBE Gwynt Y Mor	99.94	100	99.61	100	72.84
BBE Thanet	100	100	100	100	100
BBE Humber Gateway	100	100*	100	99.82	100
West of Duddon Sands	100	100	100	100	100
DTP Burbo Bank Extension	N/A	N/A	100	100	100
DTP Race Bank	N/A	N/A	N/A	100	100
DTP Galloper	N/A	N/A	N/A	100	100
DTP Walney Extension	N/A	N/A	N/A	N/A	99.91
DTP Hornsea One	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	99.45	100	100	100	100	100	100	100	100	100
TC Gunfleet Sands	100	100	100	96.01	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	98.34	100	94.93	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	100	98.04	100	100	100	100	100	100	100	100
BT Walney 1	100	100	100	100	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	100	100	100	100	100	100	100	100	100
BT London Array	100	100	100	98.93	98.55	99.77	100	100	100	100	100	100
EQ Greater Gabbard	100	100	100	100	97.41	100	100	100	100	100	100	100
BBE Gwynt Y Mor	100	100	99.65	70.81	100	100	86.75	75	74.65	74.39	69.49	85
BBE Thanet	100	100	98.09	100	100	100	100	100	100	100	100	100
BBE Humber Gateway	100	100	100	100	97.08	100	100	100	100	100	100	100
West of Duddon Sands	93.87	100	100	100	100	100	100	100	100	100	100	100
DTP Burbo Bank Extension	100	100	100	100	100	99.93	100	100	100	100	100	100
DTP Race Bank	100	100	100	91.09	100	100	100	100	100	100	100	100
DTP Galloper	100	100	100	100	100	99.65	100	99.74	100	100	100	100
DTP Walney Extension	N/A	N/A	100	100	100	100	100	100	100	99.84	99.88	99.95
DTP Hornsea One	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	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	0.55	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	0.18	0	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	3.99	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	0.37	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	65.03	0	0	0	0	0	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	0	0	0	14.31	0	0	0	0	0.30
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
TC Lincs	OFTO Planned	0	0	0	1.66	0	5.07	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	0	1.96	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 1	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 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	10.71	0	0	0	0	0.76	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	0	0	0	0	0	0	0	0
	Non-OFTO	0	0.21	0	0	0	0	0	0	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
BT London Array	OFTO Planned	0	0	0	0	1.45	0.23	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	1.07	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	1.34	0.25	0	0	0	0	0	0

% Monthly Planned and Unplanned Unavailability

		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
EQ Greater Gabbard	OFTO Planned	0	0	0	0	2.59	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	0.35	29.19	0	0	0	0	0.35	0.71	5.51	0
	OFTO Unplanned	0	0	0	0	0	0	13.25	25	25	25	25	15
	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	0.14	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	1.77	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	2.92	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
West of Duddon Sands	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	6.13	0	0	0	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	0	0	0	0	5.97
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
DTP Burbo Bank Extension	OFTO Planned	0	0	0	0	0	0.7	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	8.91	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	0.35	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	0.26	0	0	0	0
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
DTP Walney Extension	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	0.16	0.12	0.05
	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 Hornsea One	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
10 June 2020 08:03 Robin Rigg West 132kV. OFTO protection repairs & fibre earthing	OFTO	4hr 41min	431
10 June 2020 10:01 Robin Rigg East 132kV. Export cable fibre earthing.	OFTO	3hr 14min	278
10 August 2020 23:54 Robin Rigg West 132kV. Fault on ENW OHL during thunderstorm.	Non-OFTO	1hr 23min	127
11 August 2020 00:06 Robin Rigg East 132kV. Fault on ENW OHL during thunderstorm.	Non-OFTO	1hr 17min	110
Total			**947**

TC Gunfleet Sands

Outage Date and Time	Reason	Days, Hours and Mins	MWh
07 July 2020 07:48 DNO Restriction due to work on Clacton – Lawford circuit.	Non-OFTO	6hr 58min	452.14
07 July 2020 07:48 OFTO full outage nested with DNO outage.	OFTO	6hr 58min	689.70
07 July 2020 14:46 Continuing OFTO full outage - CSE inspections.	OFTO	1day 1hr 27min	4171.26
Total			**5313.09**

TC Barrow

Outage Date and Time	Reason	Days, Hours and Mins	MWh
10 August 2020 10:26 ENW outage for maintenance and protection work on Trimpell 1 circuit.	Non-OFTO	20days 3hr 48min	43542
Total			**43542**

TC Ormonde

Outage Date and Time	Reason	Days, Hours and Mins	MWh
09 October 2020 09:05 ENW Outage on Trimpell 2 circuit	Non-OFTO	4days 10hr 27min	15968
11 March 2021 14:47 Trip from NGET due to operation of HOPS scheme during severe weather.	Non-OFTO	2hr 12min	330
Total			**16298**

TC Lincs

Outage Date and Time	Reason	Days, Hours and Mins	MWh
01 July 2020 07:38 OFTO Planned maintenance – full system for 400kV BB Disc Repairs.	OFTO	12hr 23min	3170
02 September 2020 08:59 Switching time outage to release offshore GT1.	OFTO	53min	97
09 September 2020 07:23 OFTO Planned maintenance – full system for 400kV BB Disc repairs.	OFTO	12hr 40min	3243
09 September 2020 20:03 Repairs to CB drive mechanism on onshore CB 205.	OFTO	2days 16hr 36min	6008
Total			**9348**

TC Westermost Rough

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			
Total			**0**

TC Dudgeon

Outage Date and Time	Reason	Days, Hours and Mins	MWh
09 July 2020 06:30 OFTO planned routine maintenance. Offshore circuit 1.	OFTO	15hr 28min	3093
10 July 2020 06:18 OFTO planned routine maintenance. Offshore circuit 2.	OFTO	13hr 42min	2740
Total			**5833**

BT Walney 1

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			
Total			**0**

BT Walney 2

Outage Date and Time	Reason	Days, Hours and Mins	MWh
05 July 2020 09:36 Planned outage by DNO for maintenance of their equipment.	Non-OFTO	3days 7hr 42min	13390
16 December 2020 10:36 Planned outage by DNO for investigation into fault on their equipment.	Non-OFTO	5hr 39min	949
Total			**14339**

BT Sheringham Shoal

Outage Date and Time	Reason	Days, Hours and Mins	MWh
26 May 2020 07:37 Switching time to allow DNO to carry out work	Non-OFTO	2hr 18min	362
29 May 2020 11:31 Switching time to allow DNO to carry out work	Non-OFTO	49min	129
Total			**491**

BT London Array

Outage Date and Time	Reason	Days, Hours and Mins	MWh
29 July 2020 06:33 Mechanism change outage	OFTO	17hr 28min	5018
03 August 2020 08:49 GT3 bellows replacement, scaffolding erection (generator led outage)	Non-OFTO	1day 12hr 9min	5206
06 August 2020 08:51 GT3 bellows replacement (generator led outage)	Non-OFTO	7hr 34min	1090
06 August 2020 09:36 Switching time outage	OFTO	16min	38
06 August 2020 16:25 SGT1B maintenance and CT secondary wiring inspections	OFTO	1day 22hr 39min	6718
08 August 2020 14:51 Switching time outage	OFTO	13min	31
10 September 2020 07:31 33kV busbar viewsafe window replacement (generator led outage)	Non-OFTO	7hr 45min	1116
10 September 2020 08:12 Switching time outage	OFTO	6min	14
10 September 2020 15:16 SGT1A maintenance and CT secondary wiring inspections	OFTO	7hrs 1min	1010
10 September 2020 21:14 Switching time outage	OFTO	10min	24
Total			**20265**

Equitix Greater Gabbard

Outage Date and Time	Reason	Days, Hours and Mins	MWh
24 August 2020 06:49 Cable Sealing End (CSE)	OFTO	58hrs 14min	166
Total			**166**

BBE Gwynt-Y-Mor

Outage Date and Time	Reason	Days, Hours and Mins	MWh
04 June 2020 07:38 LIRA test on SSEC3	OFTO	10hr	1435
13 July 2020 08:58 CSE repair.	OFTO	18days 3hr 46min	124670
14 October 2020 12:26 SVC2 trip of SGT2	OFTO	1hr 25min	203
15 October 2020 16:54 SSEC3 cable fault	OFTO	143days 22hr 39mins	492302
10 December 2020 10:28 GT8 SF6 leak top up	OFTO	6hr 3min	868
19 December 2020 09:08 SGT1 oil top-up	OFTO	2hr	335
28 December 2020 09:09 GT8 SF6 leak top up	OFTO	2hr 19min	332
05 January 2021 07:56 SGT1 oil top-up	OFTO	12hr 58min	1574
18 January 2021 08:03 SGT1 oil top-up	OFTO	8hr 15min	1184
22 February 2021 08:55 SGT1 repair	OFTO	6days 4hr 7min	42509
03 March 2021 07:42 GT8 SF6 leak top up	OFTO	5hr 56min	851
Total			**666263**

BBE Thanet

Outage Date and Time	Reason	Days, Hours and Mins	MWh
16 June 2020 12:00 G59 relay commissioning	OFTO	2hr	300
16 June 2020 14:00 G59 relay commissioning, extended due to Covid restrictions	OFTO	25hr 27min	3817
Total			**4117**

BBE Humber Gateway

Outage Date and Time	Reason	Days, Hours and Mins	MWh
20 August 2020 15:36 33kV fault	OFTO	43hr 26min	4778
Total			**4778**

West of Duddon Sands

Outage Date and Time	Reason	Days, Hours and Mins	MWh
21 April 2020 08:30 Repair SF6 leaks and top up oil leaks	OFTO	4days 6hr 7min	16870
11 March 2021 05:39 Fault on the National Grid Heysham 400kV busbar caused WoDS protection systems to activate, de-energising WoDS circuit No.1	Non-OFTO	4days 6hr 46min	16977
Total			**33847**

DTP Burbo Bank Extension

Outage Date and Time	Reason	Days, Hours and Mins	MWh
29 September 2020 10:10 Switchgear outage	OFTO	5hr 4min	1272
Total			**1272**

DTP Race Bank

Outage Date and Time	Reason	Days, Hours and Mins	MWh
21 July 2020 09:17 Transfer Agreement Orsted snagging works	OFTO	3days 7hr 50min	22353
25 July 2020 09:08 Transfer Agreement Orsted snagging works	OFTO	2days 4hr 45min	14770
Total			**37123**

DTP Galloper

Outage Date and Time	Reason	Days, Hours and Mins	MWh
25 September 2020 16:47 A fire protection maloperation caused a HV trip of GT2	OFTO	5hr 4min	882
11 November 2020 10:11 Generator outage on generator owned equipment resulting OFTO outage	Non-OFTO	2hr 55min	507
23 November 2020 09:47 Generator outage on generator owned equipment resulting OFTO outage	Non-OFTO	30min	73
23 November 2020 11:24 Generator outage on generator owned equipment resulting OFTO outage	Non-OFTO	21min	61
Total			**1523**

DTP Walney Extension

Outage Date and Time	Reason	Days, Hours and Mins	MWh
30 January 2021 15:27 WOW 03 Grid Transformer trip	OFTO	1day 8hr 32min	1401
01 February 2021 00:00 WOW 03 Grid Transformer trip	OFTO	21hr 11min	912
11 March 2021 05:39 WOW 03 Grid Transformer trip	OFTO	11hr 45min	506
Total			**2819**

DTP Hornsea One

Outage Date and Time	Reason	Days, Hours and Mins	MWh
None			
Total			**0**

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 is 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.