National Electricity Transmission System Performance Report

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

2021 – 22

nationalgridESO

Introduction

This report details the performance of the National Electricity Transmission System in Great Britain for 2021-22, 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 Ltd 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, TC Beatrice OFTO Ltd, TC Rampion OFTO Ltd, 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, Belgium and Norway.

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), Belgium (Nemo Link) and Norway (North Sea 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.

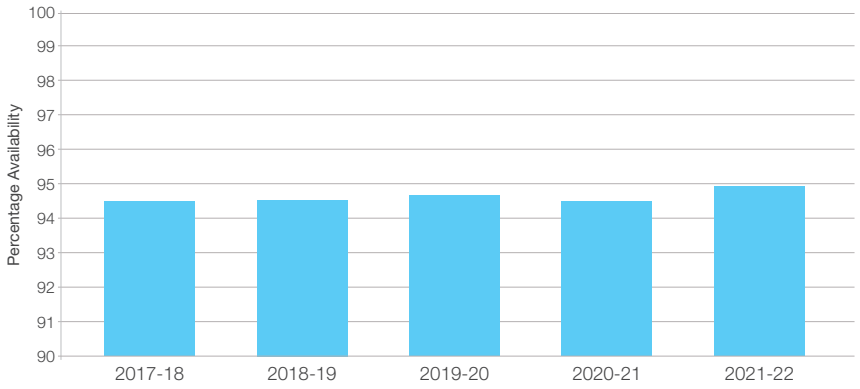
National Electricity Transmission System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability.

Annual System Availability

Annual System Availability of the National Electricity Transmission System for 2021–22 was: 94.99%

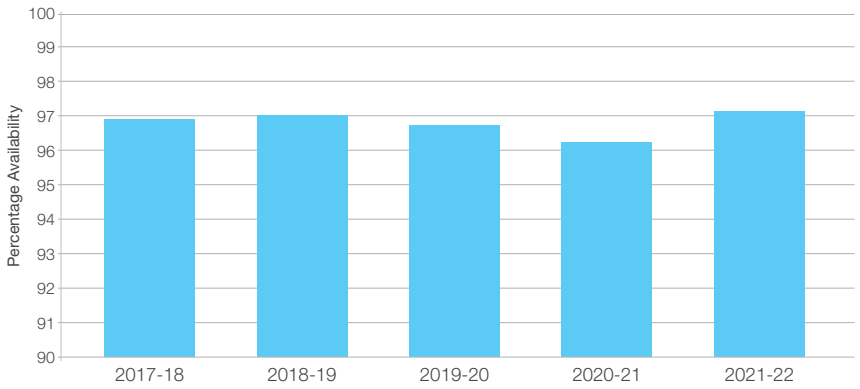
% Annual System Availability

GB % Annual System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
94.44	94.55	94.69	94.50	94.99

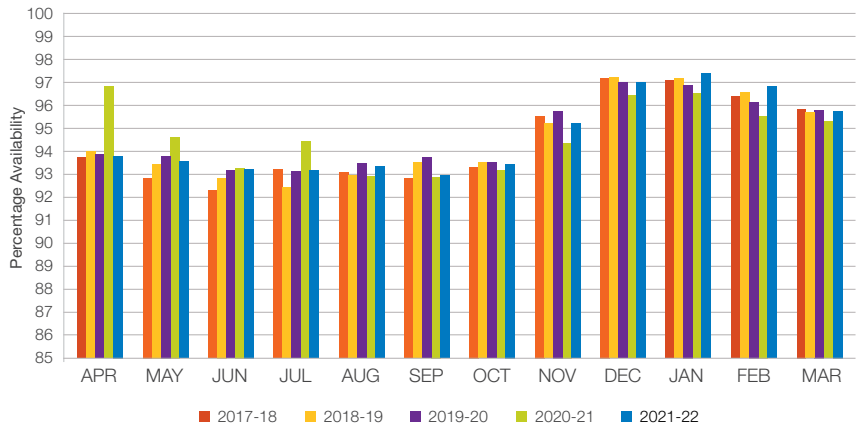


% Winter Peak System Availability

GB % Winter Peak System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
96.92	97.05	96.72	96.22	97.19



% Monthly System Availability



GB % Monthly System Availability					
	2017-18	2018-19	2019-20	2020-21	2021-22
Apr	93.77	94.00	93.88	96.84	93.83
May	92.78	93.39	93.77	94.68	93.55
Jun	92.35	92.80	93.16	93.24	93.22
Jul	93.27	92.39	93.11	94.43	93.16
Aug	93.16	92.97	93.51	92.92	93.31
Sep	92.83	93.55	93.71	92.90	92.96
Oct	93.35	93.52	93.52	93.10	93.40
Nov	95.55	95.26	95.70	94.32	95.21
Dec	97.23	97.24	97.05	96.45	97.01
Jan	97.14	97.29	96.89	96.58	97.39
Feb	96.37	96.58	96.17	95.57	96.78
Mar	95.82	95.74	95.80	95.30	95.73

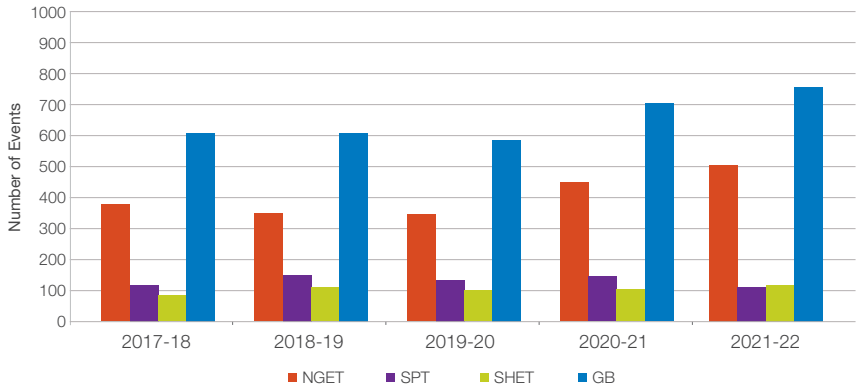
Security

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 2021-22 there were 751 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 18 resulting in loss of supplies to customers.

GB System Events

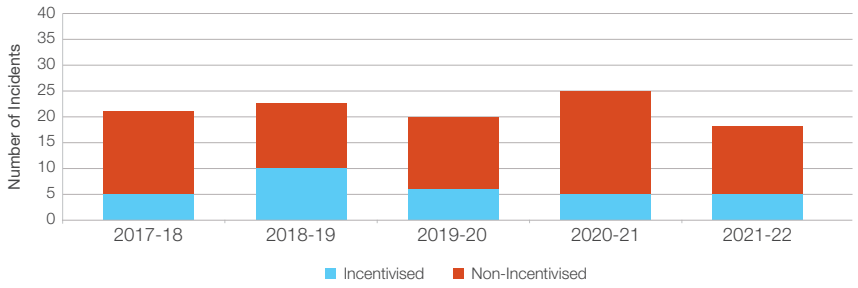


GB System Events					
	2017-18	2018-19	2019-20	2020-21	2021-22
NGET	398	347	355	455	517
SPT	124	157	131	138	115
SHET	85	108	100	113	119
GB	607	612	586	706	751

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					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	5	10	6	5	5
Non-Incentivised	16	12	14	20	13

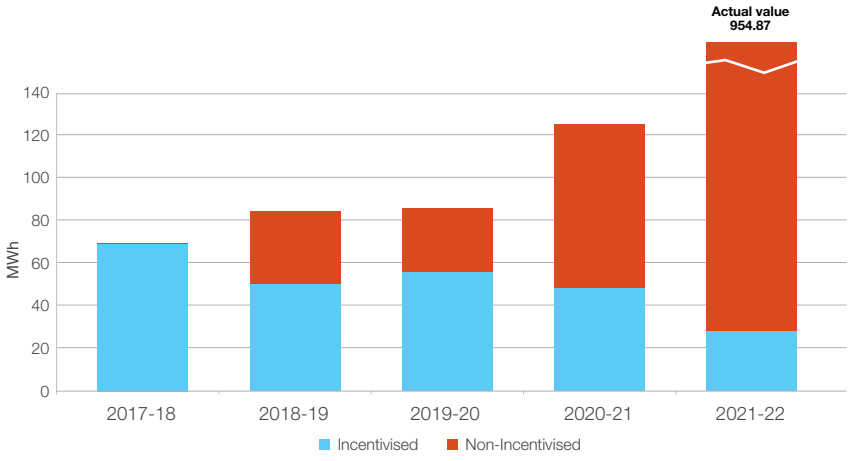


Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the National Electricity Transmission System during 2021-22 was: **954.87 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)					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	67.07	51.14	57.59	47.98	26.84
Non-Incentivised	0.23	34.31	26.10	76.85	928.03



Reliability of Supply

The Overall Reliability of Supply for the National Electricity Transmission System during 2021-22 was: **99.999612%**

compared with 99.999948% in 2020-21 and 99.999967% in 2019-20.

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.

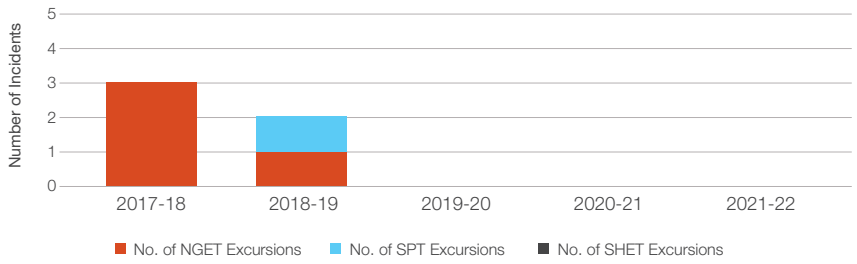
Voltage Excursions

During 2021-22 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 Excursons					
	2017-18	2018-19	2019-20	2020-21	2021-22
Number of NGET Excursions	3	1	0	0	0
Number of SPT Excursions	0	1	0	0	0
Number of SHET Excursions	0	0	0	0	0



GB System Voltage Excursion

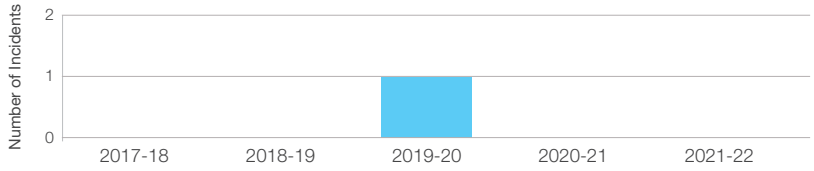
Incident Date, Time and Location	Nominal Voltage	Max Voltage	Duration
None			

Frequency Excursions

During 2021-22, 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 Excursons					
	2017-18	2018-19	2019-20	2020-21	2021-22
Number of Excursions	0	0	1	0	0



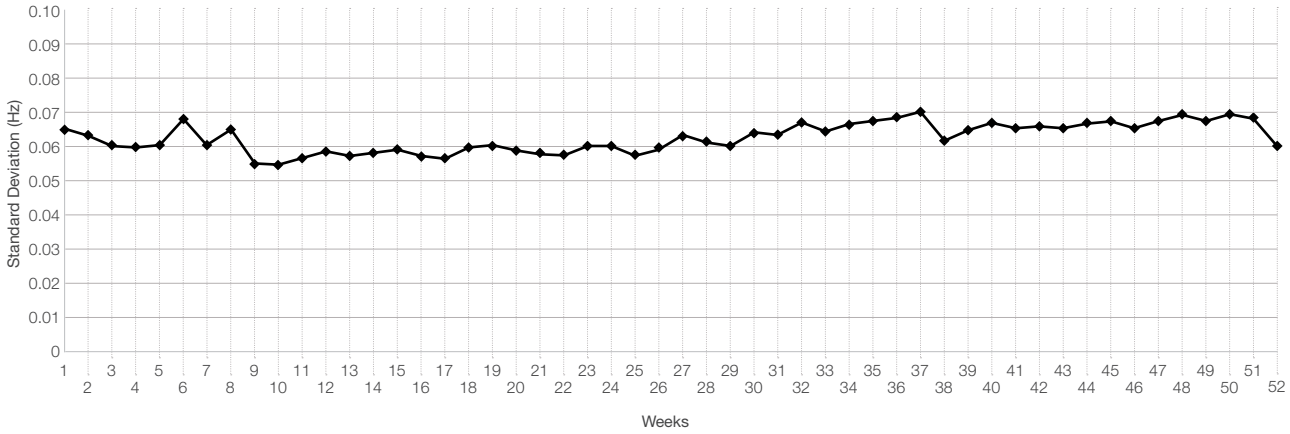
GB System Frequency Excursion

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 2021-22.

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 over 14,000 circuit kilometres of overhead line and over 650 kilometres of underground transmission cable routes interconnecting over 300 substations.

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

There are 54 large power stations totalling 55GW 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 2021-22 the maximum recorded demand on the network was 42.46GW.

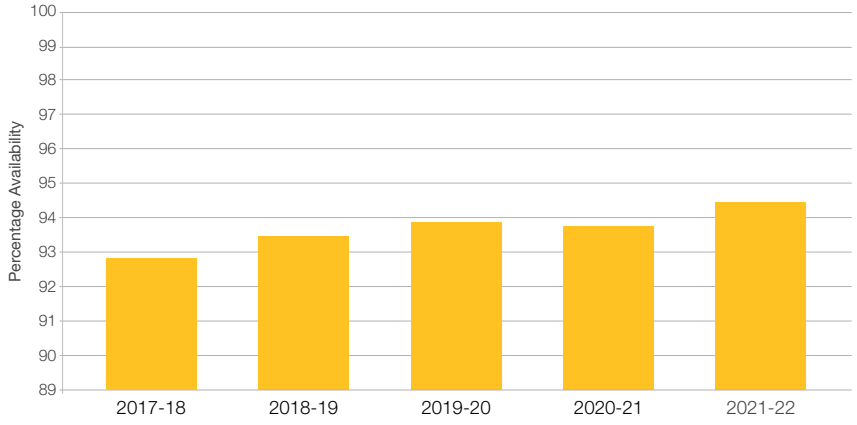
Availability

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

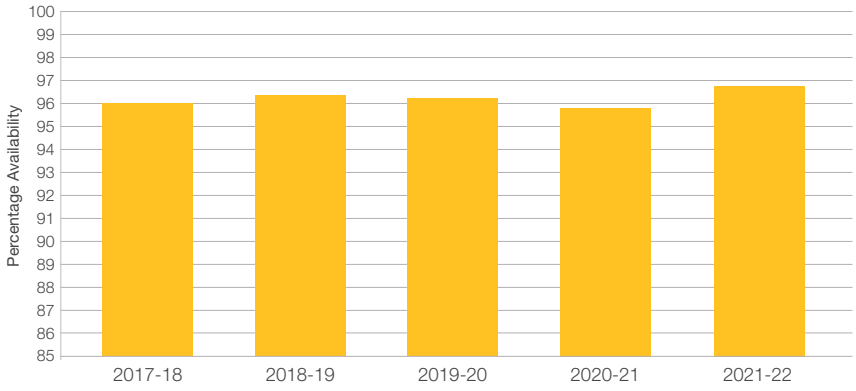
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

NGET % Annual System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
92.89	93.45	93.88	93.76	94.38

% Annual System Availability

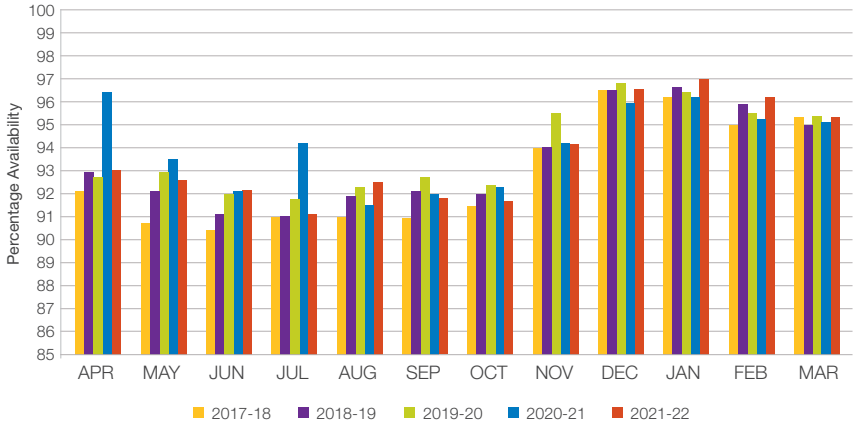


% Winter Peak System Availability



NGET % Winter Peak System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
96.02	96.37	96.26	95.84	96.86

% Monthly System Availability

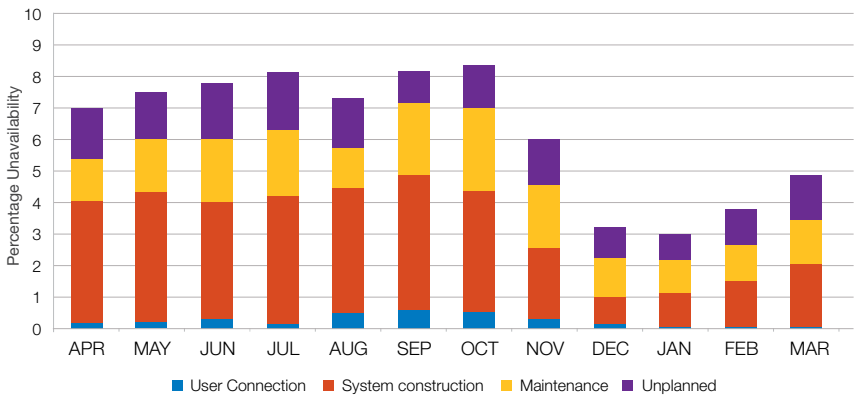


NGET % Monthly System Availability					
	2017-18	2018-19	2019-20	2020-21	2021-22
Apr	92.18	92.91	92.73	96.41	93.04
May	90.75	92.19	92.92	93.49	92.56
Jun	90.36	91.16	92.08	92.25	92.25
Jul	91.03	91.09	91.78	94.24	91.91
Aug	91.05	91.88	92.25	91.56	92.58
Sep	90.95	92.17	92.74	92.08	91.85
Oct	91.54	92.07	92.39	92.26	91.68
Nov	94.07	94.08	95.60	94.19	94.11
Dec	96.57	96.57	96.84	95.95	96.65
Jan	96.22	96.63	96.38	96.21	97.05
Feb	95.20	95.85	95.51	95.31	96.22
Mar	95.33	95.00	95.38	95.12	95.32

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	0.10	3.87	1.39	1.60	6.96
May	0.13	4.27	1.59	1.46	7.44
Jun	0.19	3.80	1.96	1.81	7.75
Jul	0.17	4.12	1.99	1.81	8.09
Aug	0.48	3.98	1.19	1.77	7.42
Sep	0.55	4.26	2.38	0.95	8.15
Oct	0.46	3.97	2.59	1.30	8.32
Nov	0.39	2.22	1.92	1.36	5.89
Dec	0.12	0.81	1.29	1.13	3.35
Jan	0.00	1.06	1.19	0.70	2.95
Feb	0.00	1.51	1.13	1.14	3.78
Mar	0.03	2.05	1.33	1.26	4.68

Security

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

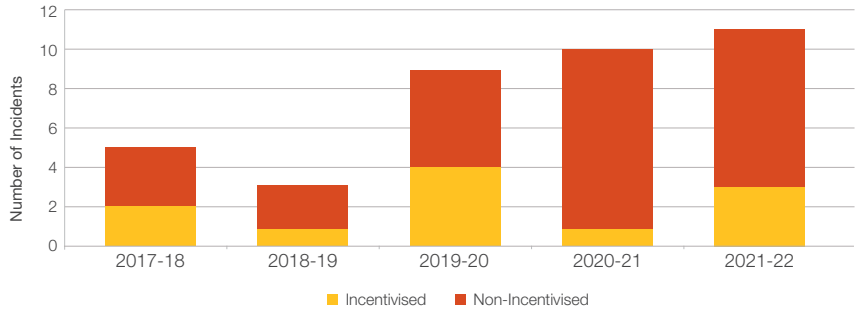
System performance is monitored by the Estimated Unsupplied Energy from the NGET Transmission System for each incident.

During 2021-22 there were 517 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 11 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					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	2	1	4	1	3
Non-Incentivised	3	2	5	9	8

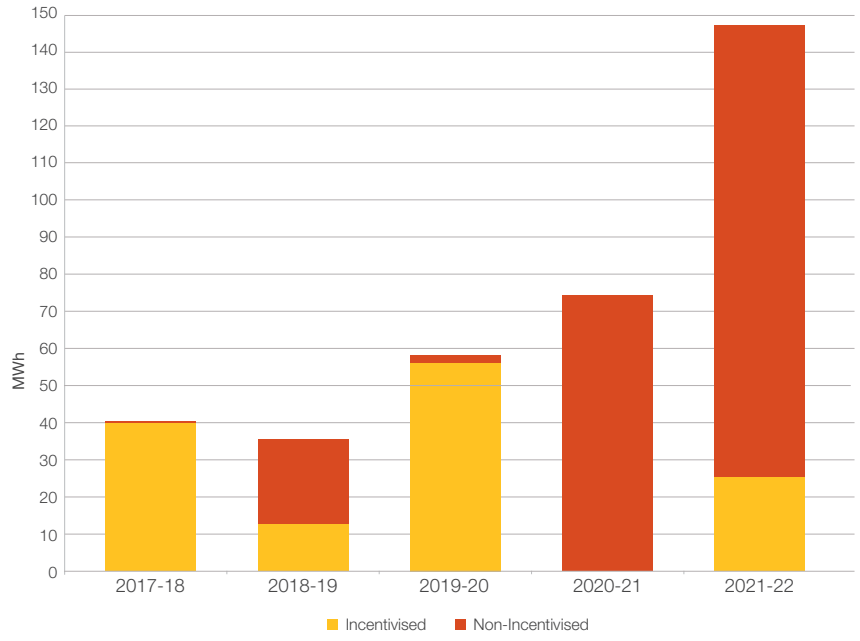


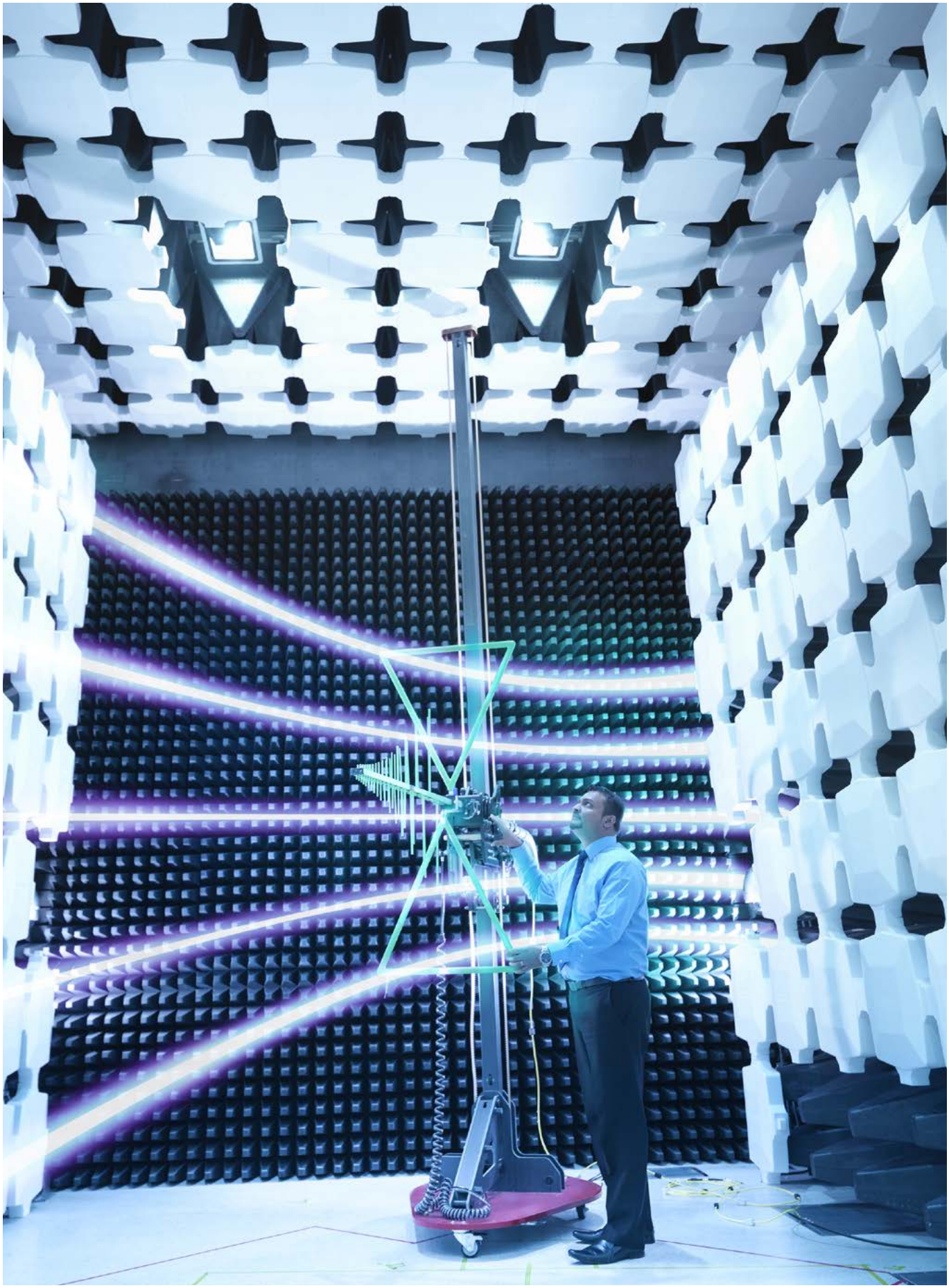
Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the NGET Transmission System during 2021-22 was: **143.40 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)					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	39.70	12.06	54.45	0.00	26.70
Non-Incentivised	0.23	25.16	4.98	74.36	116.70





Reliability of Supply

The Overall Reliability of Supply for the NGET Transmission System during 2021-22 was: **99.999936%**

compared with 99.999966% in 2020-21 and 99.999974% in 2019-20.

Loss of Supply Incident Details

NGET Loss of Supply Incidents – Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
13 February 2022 18:02 at Elstree 275/132kV Substation Protection operated on SGT3A at Elstree 275kV substation and tripped the transformer feeder circuit to Stanmore. Due to reconfiguration works ongoing at Elstree 132kV substation, this was the only circuit supplying Stanmore demand at the time. All demand was restored via UKPN lower voltage networks. A portion of demand was restored within 3 minutes and therefore 0.5MWh relating to this incident is not incentivised.	49.7	300*	25.7
28 February 2022 18:09 at Imperial Park 400/25kV Substation Planned switching was being undertaken to release the Cilfynydd - Imperial Park 400kV circuit from service, when circuit breaker X605 at Cilfynydd failed to operate. Whilst attempting to open X605, tripping of Mesh Corner 2 at Imperial Park was inadvertently initiated, causing SGT2B to trip and supply to Network Rail (NR) at St Brides was lost. Demand was restored by switching on the NR network.	4.0	10	0.70
17 March 2022 11:51 at Ryhall 400/25kV Substation A transient trip of the Cottam - Ryhall/Ryhall SGT1 circuit was caused by a contractor working on the OHL route. Although the circuit returned to service automatically there is no automatic reclose equipment which would restore Ryhall SGT1 to service. At the time of the fault Ryhall SGT2 was out of service. Network Rail carried out switching on their network to restore the demand.	4.0	5	0.30
Total			**26.70**

NGET Loss of Supply Incidents – Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
22 July 2021 14:58 at Hutton 400/25kV Substation At Heysham 400kV substation, a Current Transformer failure caused a busbar fault which was cleared by busbar protection correctly on one side only. Circuits that were selected to the uncleared side (including the Heysham - Hutton 400kV circuit) were disconnected via the operation of back up protection. Due to the mesh configuration of the equipment at Hutton 400kV substation, this also tripped SGT 3A and 3B, disconnecting supplies to Network Rail, this is a customer choice connection site.	2.0	3	0.10
09 August 2021 12:03 at Rugeley 400/25kV Substation One of the 25kV cables supplying Network Rail at Brereton was damaged by a contractor clearing debris from the old power station site, causing Rugeley SGT3 circuit to trip and disconnect some demand until Network Rail switched on their network. SGT4 circuit was available to supply demand at all times without the need for further action to be taken by NGET, this is a customer choice connection site.	18.7	1	0.30
27 September 2021 06:38 at Culham Jet 400kV Substation The failure of a post insulator at Walham 400kV substation resulted in a mesh corner fault which tripped the Rassau - Walham 400kV circuit. Coincident with this Culham Jet SGT1C residual overvoltage protection operated and sent an intertrip to Culham Jet 400kV circuit breaker X110 which opened to disconnect the UK Atomic Energy Authority (UKAEA) facility (who were not taking load at the time) from the system. The operation of the UKAEA protection is unexplained.	0.0	321	0.00
31 October 2021 18:07 at Tremorfa 275/33kV Substation During storm conditions, substation building cladding came loose and fell onto the HV connections of SGT3 at Whitson 275kV substation. SGT3 HV connections protection did not operate in expected timescales and backup protection was initiated to clear the fault, which tripped a number of circuits connected to Whitson 27kV substation. At Tremorfa 275kV substation, the distance protection operated on the Whitson - Uskmouth - Tremorfa circuit and also sent a cascade trip signal to the Aberthaw - Tremorfa protection due to the configuration at Tremorfa substation. The tripping of these two circuits disconnected Celsa Steel who were taking 85.7MW at the time. The circuits and Tremorfa SGT1 returned to service automatically by DAR because Whitson SGT3 protection had operated. Celsa Steel demand was lost for a total of 26 seconds. This is a customer choice connection site.	85.7	0	0.60
02 November 2021 18:31 at Culham Jet 400kV Substation The Cowley - Culham Jet - Didcot 400kV circuit tripped and did not automatically return to service. When the circuit tripped, UKAEA (who were not taking load at the time) were disconnected from the system. Upon investigation it was found that a power unit associated with the distance protection at Cowley 400kV substation had failed.	0.0	292	0.00
06 January 2022 08:23 at Oldbury 275/132kV Substation A member of the public (MOP) accessed Oldbury 275kV substation and climbed onto one of the concrete structures associated with the Kitwell - Oldbury 275kV circuit. Due to the risk to life, the circuit and associated mesh corners and SGTs were switched out of service as soon as possible. Oldbury SGT2 was already out of service for maintenance, therefore switching out SGT1 resulted in a loss of demand to WPD. WPD were able to restore some of their customers by switching on their 11kV network, but the remainder were restored when the circuit and SGTs were returned to service after the MOP had been removed from proximity of NGET equipment.	80.6	20	25.30
13 February 2022 18:02 at Elstree 275/132kV Substation Protection operated on SGT3A at Elstree 275kV substation and tripped the transformer feeder circuit to Stanmore. Due to reconfiguration works ongoing at Elstree 132kV substation, this was the only circuit supplying Stanmore demand at the time. All demand was restored via UKPN lower voltage networks. This figure relates to the MWh restored during the first 3 minutes of the incident which is not incentivised.	-	-	0.50
20 February 2022 18:07 at Culham Jet 400kV Substation A fault on Cowley SGT2 caused it to trip and coincident with this, circuit breaker X110 at Culham Jet 400kV substation received a persistant intertrip and opened to disconnect the UK Atomic Energy Authority (UKAEA) facility (who were not taking load at the time) from the system. The operation of the UKAEA protection is unexplained.	0.0	143	0.00
24 March 2022 18:41 at Elstree 275/132kV Substation The failure of circuit breaker W20 at Elstree 275kV substation caused two 275kV busbars and all associated circuits to trip. All demand should have been picked up from other Grid Supply points via interconnections, but the two 132kV UKPN owned interconnecting circuits to Rye House also tripped unexpectedly. 76.9MW was lost and UKPN restored demand in stages via the 33kV network prior to Elstree SGT3B being made available for reconnection.	76.9	104*	89.90
Total			**116.70**

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

Scottish Power Transmission System

System Description

The SPTL Transmission System comprises approximately 4,000 circuit kilometres of overhead line and cable and 157 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 14.8GVA of installed transformer capacity. There is approximately 5.8GW of directly connected and Large Embedded generation capacity connected in the SP Transmission area, including 42 power stations directly connected to the SP Transmission system. In 2021-22 the maximum recorded demand on the network was 3.3GW.

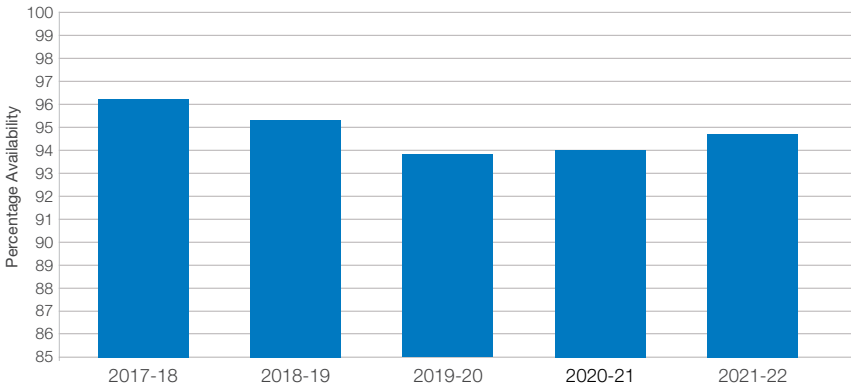
Availability

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

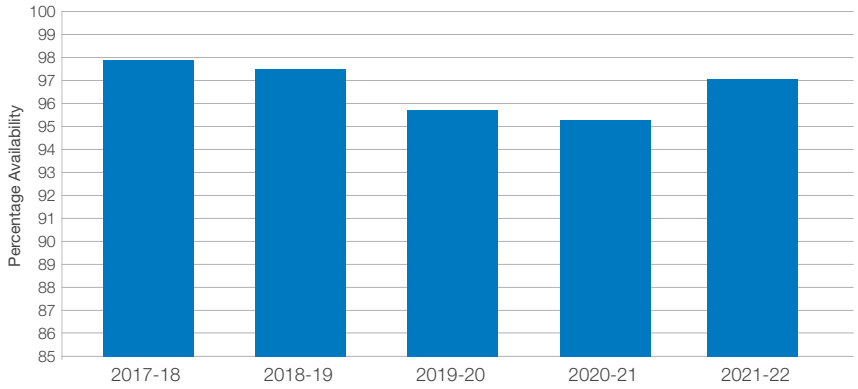
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

% Annual System Availability

SPT % Annual System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
96.29	95.31	93.90	94.00	94.67

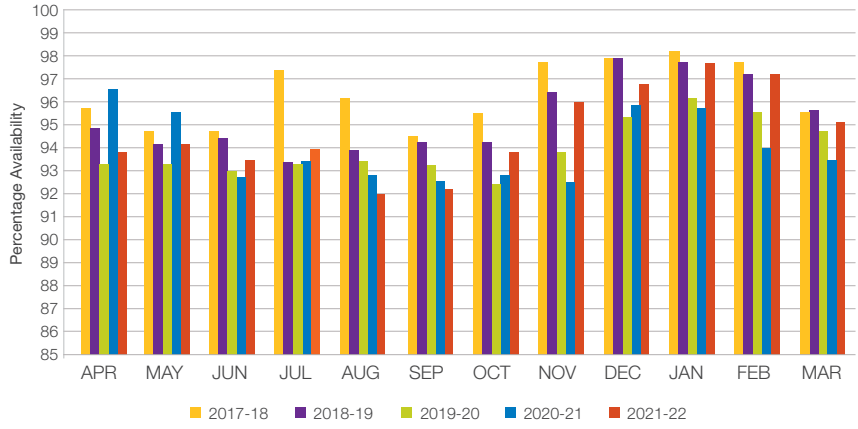


% Winter Peak System Availability



SPT % Winter Peak System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
97.88	97.55	95.64	95.24	97.11

% Monthly System Availability

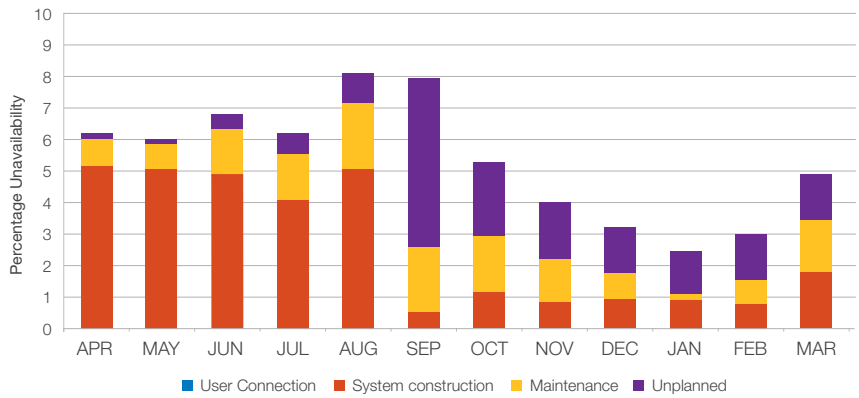


SPT % Monthly System Availability					
	2017-18	2018-19	2019-20	2020-21	2021-22
Apr	95.64	94.80	93.21	96.61	93.81
May	94.63	94.16	93.29	95.61	94.06
Jun	94.73	94.35	93.01	92.82	93.31
Jul	97.38	93.24	93.15	93.27	93.81
Aug	96.09	93.79	93.43	92.81	91.95
Sep	94.65	94.41	93.12	92.51	92.07
Oct	95.55	94.27	92.40	92.81	94.68
Nov	97.59	96.36	93.56	92.53	96.04
Dec	97.87	97.87	95.39	95.75	96.67
Jan	98.14	97.58	96.08	95.77	97.57
Feb	97.78	97.17	95.44	94.09	97.08
Mar	95.65	95.69	94.69	93.39	95.11

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	5.24	0.75	0.20	6.19
May	0.00	5.07	0.61	0.26	5.94
Jun	0.00	4.78	1.53	0.37	6.69
Jul	0.00	4.18	1.31	0.71	6.19
Aug	0.00	4.95	2.16	0.94	8.05
Sep	0.00	0.50	2.06	5.37	7.93
Oct	0.00	1.21	1.62	2.49	5.32
Nov	0.00	0.64	1.57	1.75	3.96
Dec	0.00	0.85	0.86	1.63	3.33
Jan	0.00	0.85	0.27	1.30	2.43
Feb	0.00	0.77	0.74	1.41	2.92
Mar	0.00	1.73	1.85	1.31	4.89

Security

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

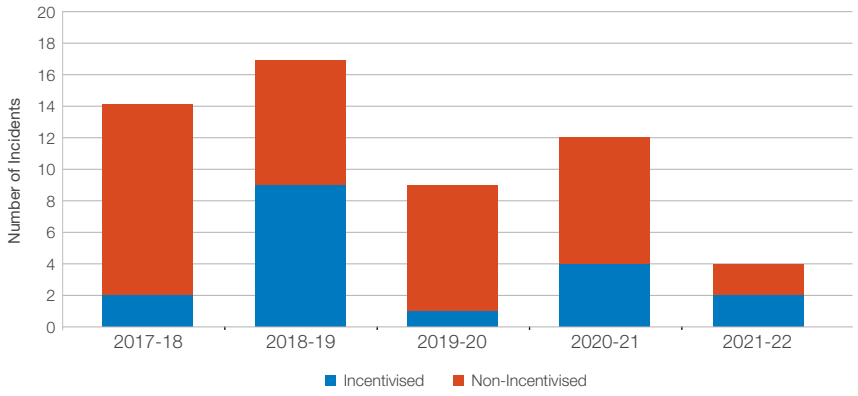
System performance is monitored by the estimated unsupplied energy from the SP Transmission System for each incident.

During 2021-22 there were 115 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 4 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					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	2	9	1	4	2
Non-Incentivised	12	8	8	8	2

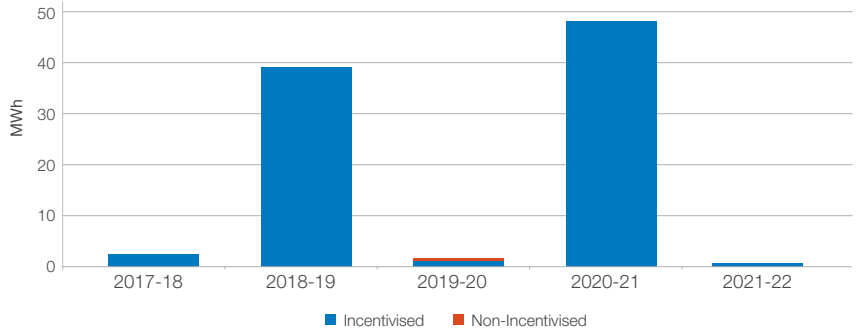


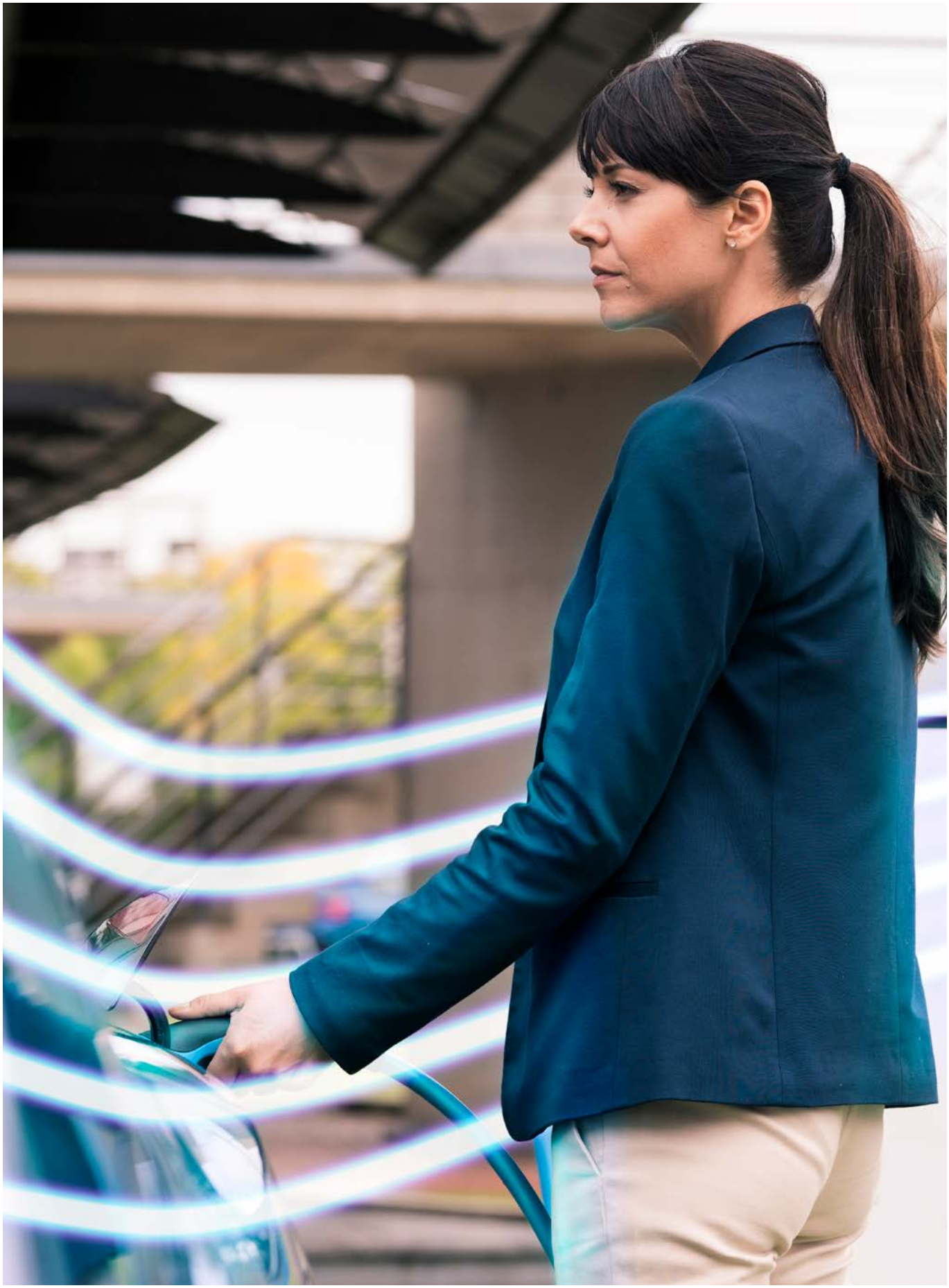
Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SP Transmission System during 2021-22 was: **0.14 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)					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	3.04	39.08	1.99	47.98	0.14
Non-Incentivised	0.00	0.35	1.22	0.00	0.00





Reliability of Supply

The Overall Reliability of Supply for the SP Transmission System during 2021-22 was: **99.999999%**

compared with 99.999688% in 2020-21 and 99.999981% in 2019-20.

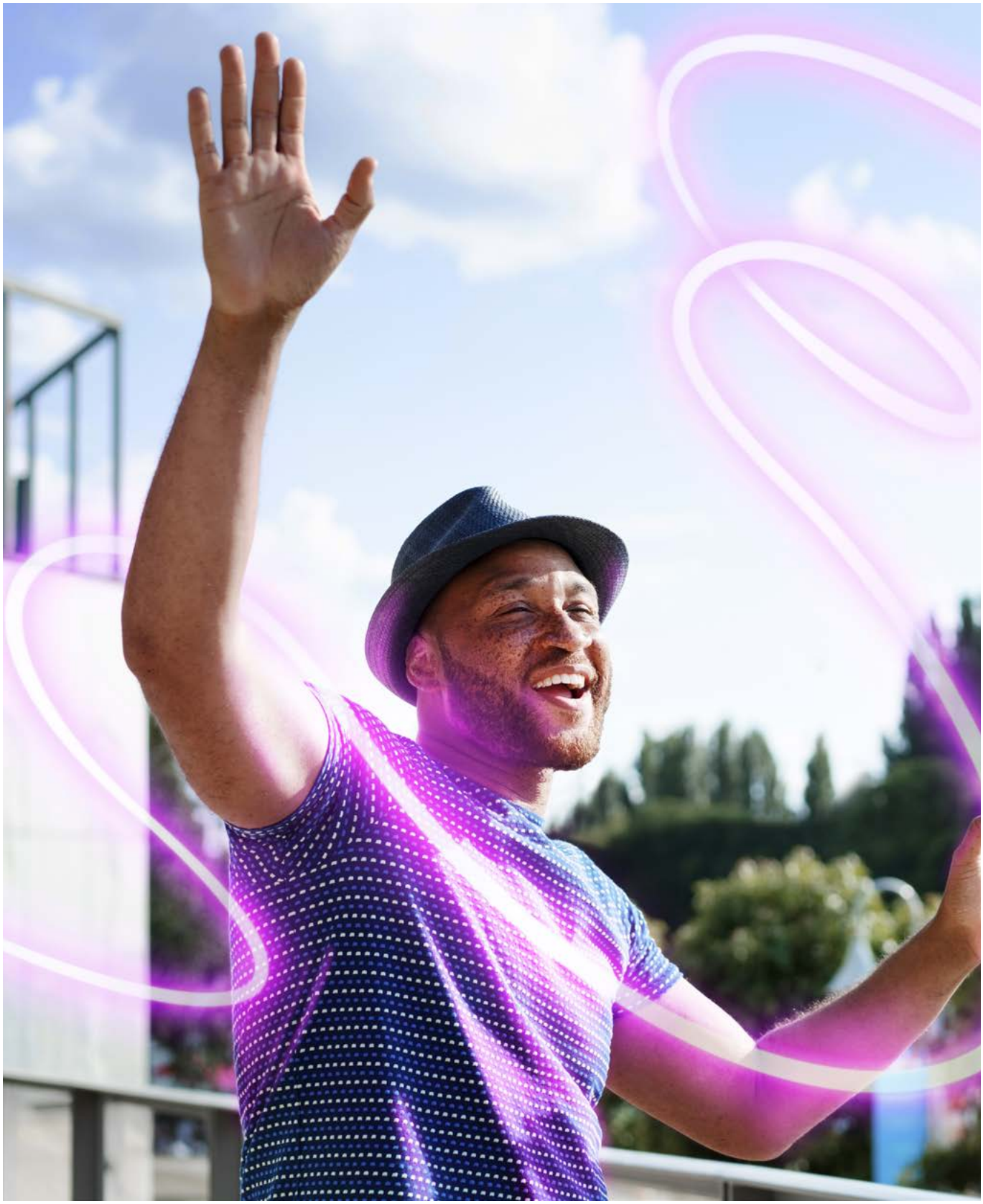
Loss of Supply Incident Details

SPT Loss of Supply Incidents – Incentivised

SPT Loss of Supply Incidents – Incentivised	MW Lost	Mins	MWh Unsupplied
02 September 2021 21:15 at Dunoon, Sloy, Whistlefield and Windyhill Trip and partial reclose on the Windyhill-Whistlefield-Dunoon-Sloy W2 cct. Whistlefield 132kV Circuit Breaker 205 did not auto reclose. 2 customers affected and restored after 3 minutes.	1.00	3	0.05
28 October 2021 13:12 at Glenluce, Glenlee & Newton Stewart 132kV Substation Main Protection operated, Circuit trip and auto-reclosed. Glenlee T1 loaded via telecontrol after agreement with National Grid. Glenlee circuit ratio set incorrectly. 1,069 customers affected and restored after 5 minutes.	1.00	5	0.09
Total			**0.14**

SPT Loss of Supply Incidents – Non-Incentivised

Incident Date, Time and Location	MW Lost	Mins	MWh Unsupplied
12 April 2021 13:08 at Glenluce, Glenlee & Newton Stewart 132kV Substation Trip and Auto-Reclose on the Glenluce, Glenlee & Newton Stewart Number 1 circuit affecting 16,862 customers. Circuit was made available again in under a minute to restore supplies but SPD delayed restoration to 7,007 customers, but as SPT only affected for 1 minute, not incentivised.	2.81	1	0.00
28 April 2021 05:09 at Glenluce 132kV Substation Crow on Grid T1 at Glenluce caused the operation of duobias and bus zone protection, affecting 20,943 customers. The customers were restored in groups with the final customers being restored after 14 minutes. Net transfer of -12.57MW from Glenlee / Newton Stewart / Glenluce at time of fault, not incentivised.	-12.57	14	0.00
Total			**0.00**



Scottish Hydro Electric Transmission System

System Description

The SHE Transmission system comprises of over 199km of 400kV, 1805km of 275kV and 2778km of 132kV overhead line and approximately 941km of AC high voltage underground transmission cables, interconnecting 149 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 2021-22 the maximum recorded demand on the network was 1.37GW (provisional). 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 SHE Transmission system. There are a growing number of large generators, with over 45 directly connected to the SHE Transmission system and many smaller units combining to produce more that 9GW capacity, of which 7.8GW 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.

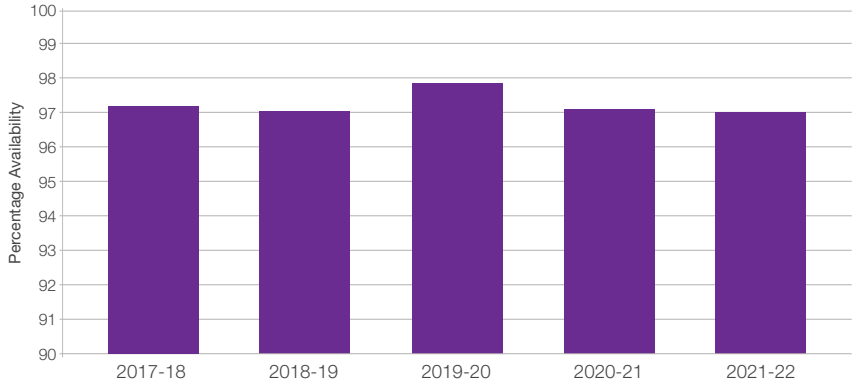
Availability

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

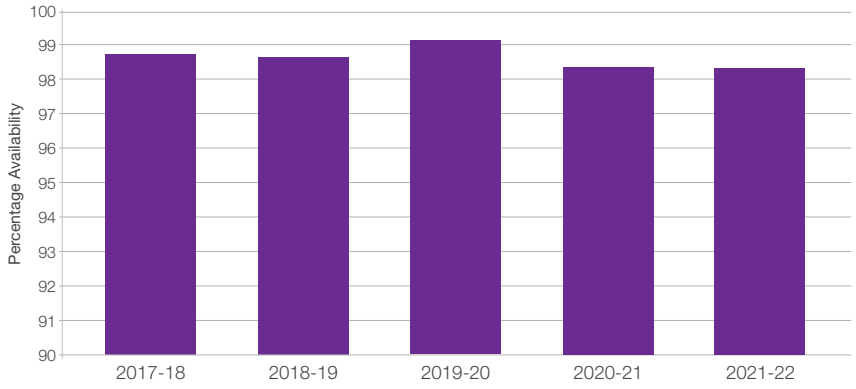
System performance is monitored by reporting variations in Annual System Availability, Winter Peak System Availability and Monthly System Availability. There is also a breakdown of Planned and Unplanned System Unavailability.

SHE Transmission % Annual System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
97.29	97.09	97.83	97.17	97.07

% Annual System Availability

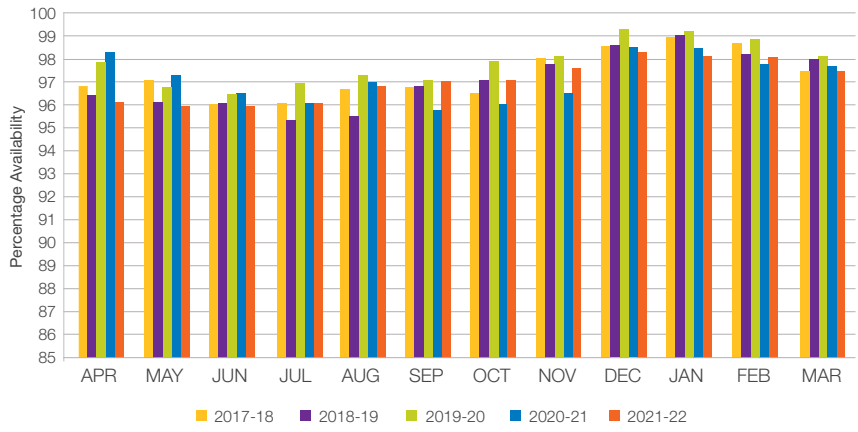


% Winter Peak System Availability



SHE Transmission % Winter Peak System Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
98.68	98.61	99.10	98.30	98.22

% Monthly System Availability

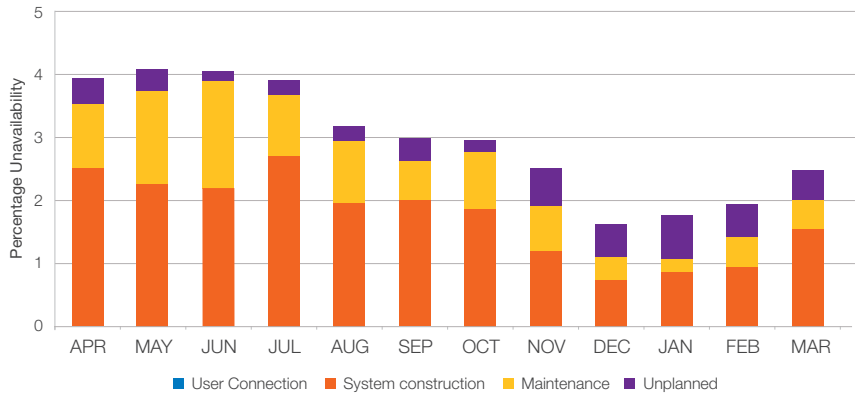


SHE Transmission % Monthly System Availability					
	2017-18	2018-19	2019-20	2020-21	2021-22
Apr	96.73	96.48	97.87	98.35	96.10
May	97.06	96.19	96.72	97.33	95.90
Jun	96.01	96.14	96.48	96.56	95.93
Jul	96.03	95.39	96.95	96.13	96.12
Aug	96.67	95.42	97.28	97.04	96.78
Sep	96.69	96.81	97.10	95.72	97.05
Oct	96.61	97.07	97.94	95.88	97.09
Nov	98.04	97.72	98.07	96.44	97.55
Dec	98.58	98.62	99.29	98.58	98.37
Jan	98.93	98.99	99.18	98.48	98.22
Feb	98.53	98.17	98.82	97.80	98.07
Mar	97.44	97.99	98.13	97.69	97.51

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	2.58	0.94	0.39	3.90
May	0.00	2.33	1.43	0.33	4.10
Jun	0.00	3.05	0.84	0.19	4.07
Jul	0.00	2.65	0.98	0.25	3.88
Aug	0.00	1.94	1.01	0.27	3.22
Sep	0.00	1.99	0.59	0.38	2.96
Oct	0.00	2.18	0.51	0.22	2.91
Nov	0.00	1.21	0.66	0.58	2.45
Dec	0.00	0.74	0.37	0.52	1.63
Jan	0.00	0.84	0.26	0.68	1.78
Feb	0.00	0.92	0.50	0.50	1.93
Mar	0.02	1.53	0.47	0.47	2.49

Security

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

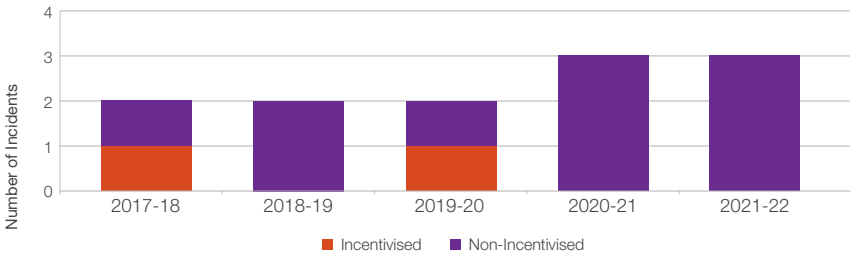
System performance is monitored by the Estimated Unsupplied Energy from the SHE Transmission System for each incident.

During 2021-22 there were 119 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					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	1	0	1	0	0
Non-Incentivised	1	2	1	3	3

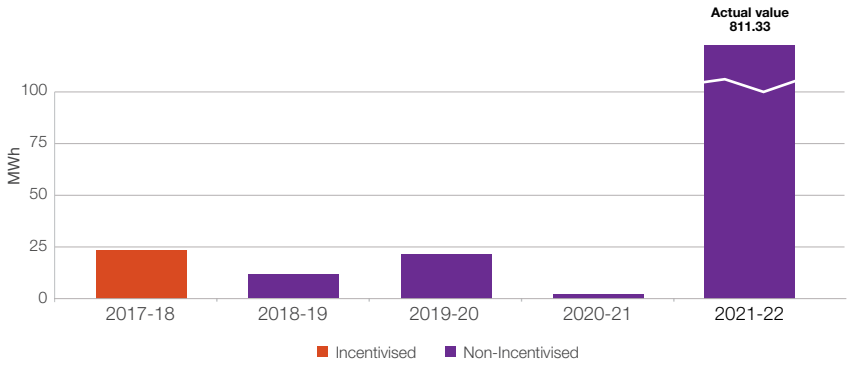


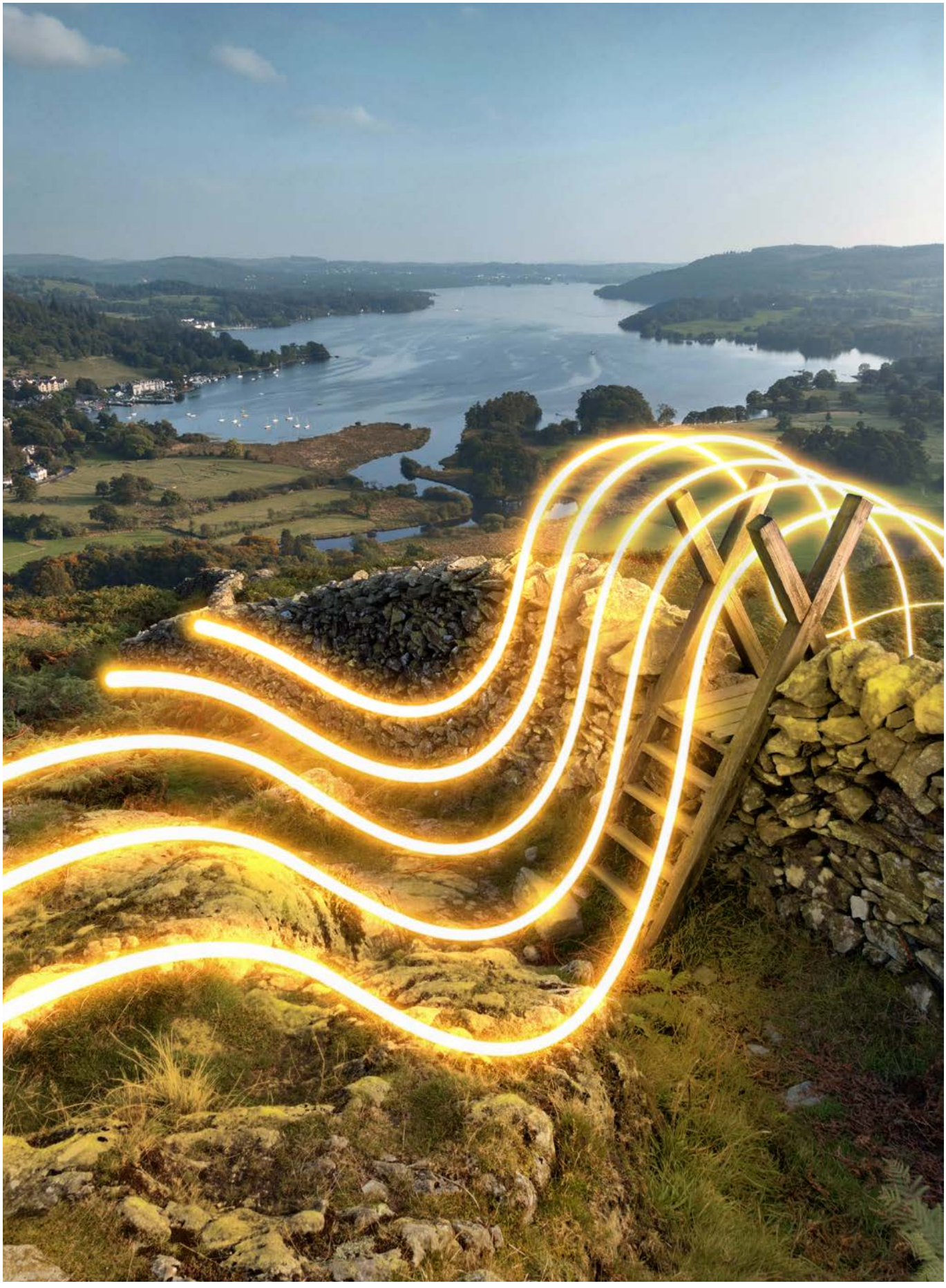
Total Estimated Unsupplied Energy

The total Estimated Unsupplied Energy from the SHE Transmission System during 2021-22 was: **811.33 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)					
	2017-18	2018-19	2019-20	2020-21	2021-22
Incentivised	24.33	0.00	1.15	0.00	0.00
Non-Incentivised	0.00	8.80	19.90	2.49	811.33





Reliability of Supply

The Overall Reliability of Supply for the SHE Transmission System during 2021-22 was: **99.983546%**

compared with 99.999948% in 2020-21 and 99.999612% in 2019-20.

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
29 November 2021 - Tarland During Storm Arwen - a period of severe winds and snow caused damage on overhead lines near Tarland 132/33kV S/S at multiple locations. Fault repairs were hampered by the exceptional weather conditions and difficulties in gaining safe access due to extensive damage across the region. This was deemed as an Exceptional Event.	11	4630	689.81
30 January 2022 - Tarland During Storm Corrie - a period of severe winds & gales - several trees were uprooted and found in contact with overhead lines near Tarland 132/33kV S/S causing multiple areas of damage. Fault repairs were hampered by the exceptional weather conditions and difficulties in gaining safe access due to extensive damage across the region. This was deemed as an Exceptional Event.	4.1	1061	71.69
30 January 2022 - Fiddes During Storm Corrie - a period of severe winds & gales - several trees were uprooted and found in contact with overhead lines near Fiddes132/33kV S/S causing multiple areas of damage. Fault repairs were hampered by the exceptional weather conditions and difficulties in gaining safe access due to extensive damage across the region. This was deemed as an Exceptional Event.	3.1	1035	49.83
Total			**811.33**

Note - these were Exceptional Events and therefore excluded from Incentivised values.

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.

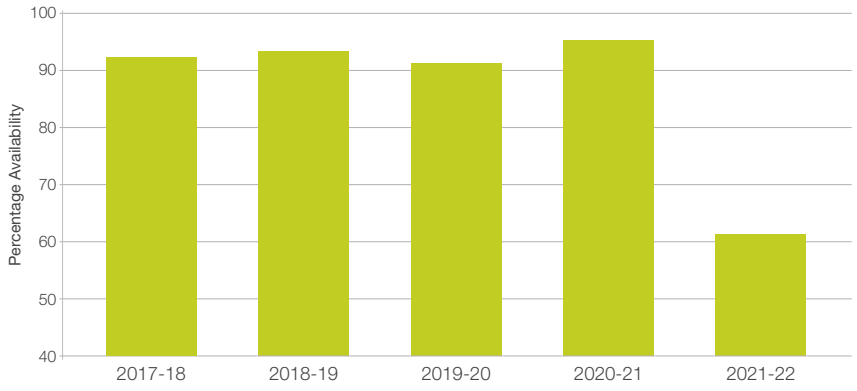
Annual Availability

Annual Availability of England – France Interconnector: **61.22%**

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

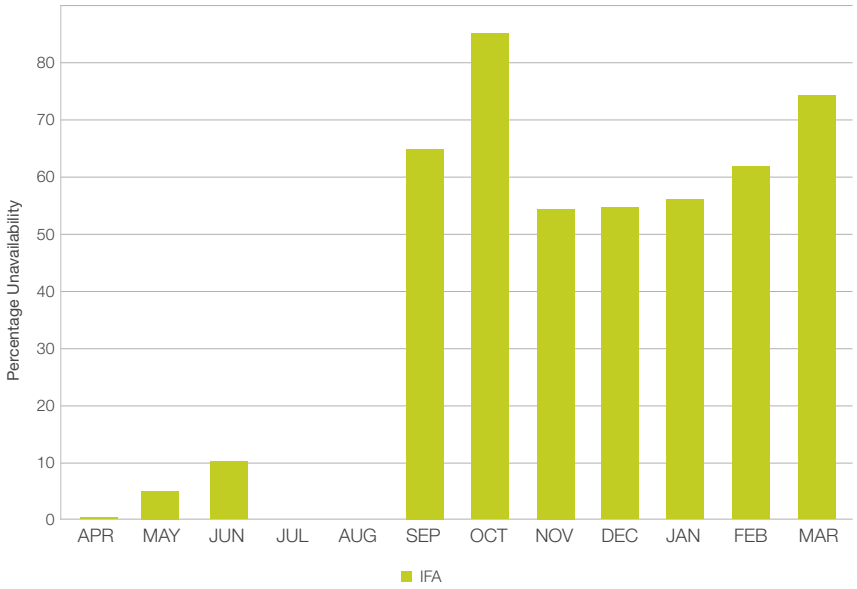
England – France Interconnector % Annual Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
92.61	93.86	91.45	95.40	61.22

% Annual System Availability



Monthly Unavailability

% England – France Interconnector Monthly Unavailability

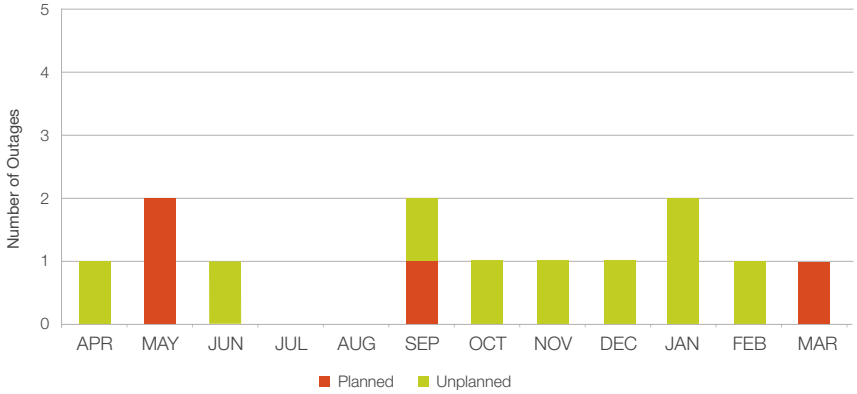


England – France Interconnector % Monthly Unavailability	
	IFA
April	0.13
May	4.02
June	10.31
July	0
August	0
September	64.58
October	86.31
November	53.62
December	53.77
January	57.54
February	61.52
March	73.51
Average	38.78

Outages 2021–22 (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	2	0
June	0	1
July	0	0
August	0	0
September	1	1
October	0	1
November	0	1
December	0	1
January	0	2
February	0	1
March	1	0
Total	4	9

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.

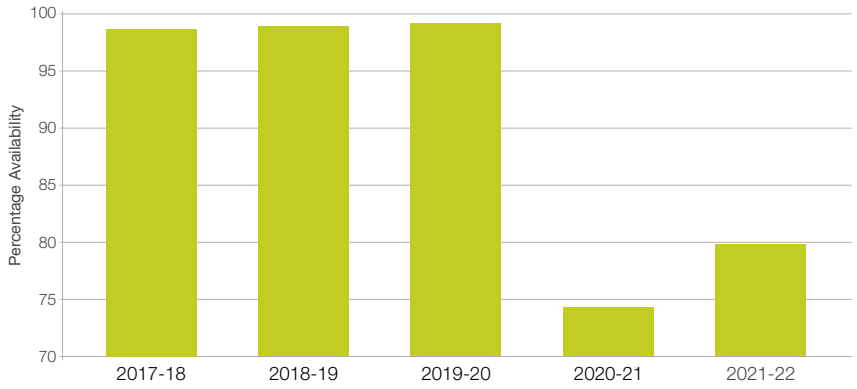
Annual Availability

Annual Availability of England – Netherlands Interconnector: **79.91%**

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

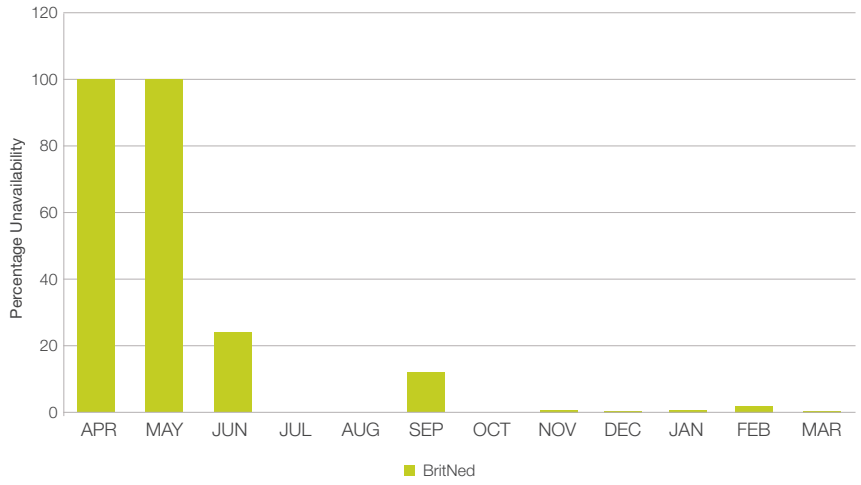
England – Netherlands Interconnector % Annual Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
97.78	98.22	98.52	74.48	79.91

% Annual System Availability



Monthly Unavailability

% England – Netherlands Interconnector Monthly Unavailability

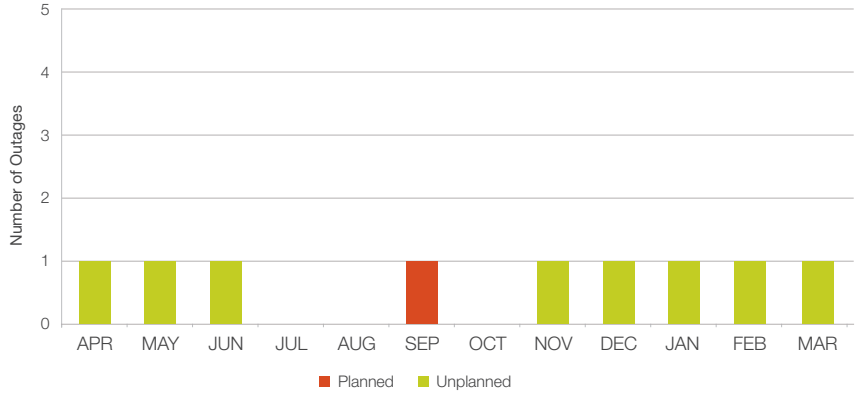


England – Netherlands Interconnector % Monthly Unavailability	
	BritNed
April	100
May	100
June	24.29
July	0
August	0
September	12.50
October	0
November	0.39
December	0.27
January	0.40
February	3.03
March	0.38
Average	20.09

Outages 2021–22 (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	1
June	0	1
July	0	0
August	0	0
September	1	0
October	0	0
November	0	1
December	0	1
January	0	1
February	0	1
March	0	1
Total	1	8

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.

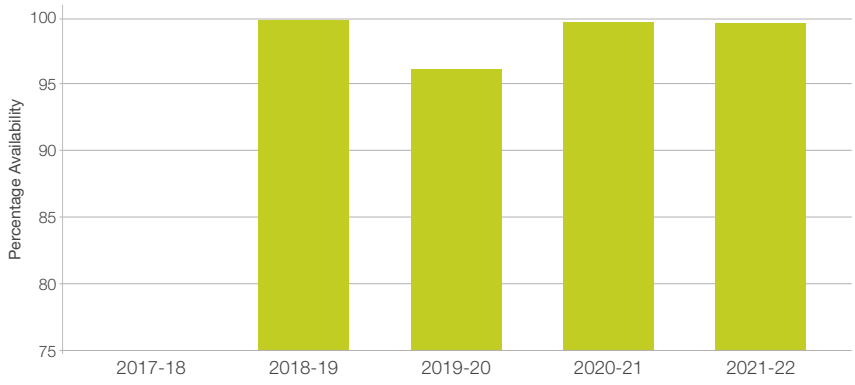
Annual Availability

Annual Availability of England – Belgium Interconnector: **99.00%**

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

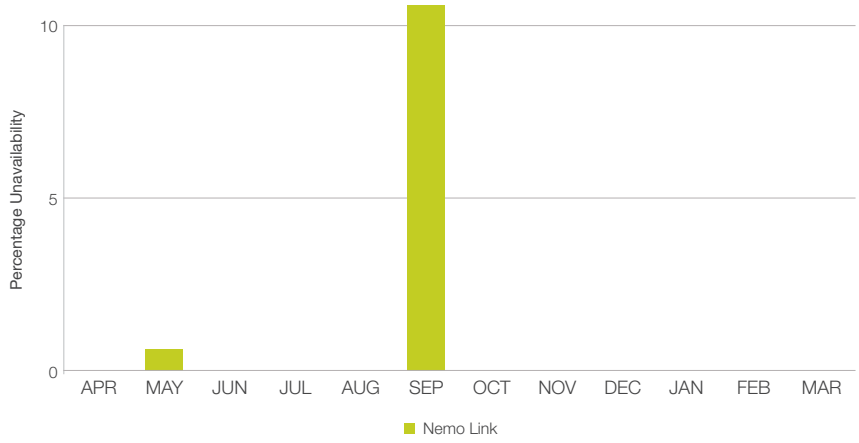
England – Belgium Interconnector % Annual Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
N/A	99.86	96.14	99.22	99.00

% Annual System Availability



Monthly Unavailability

% England – Belgium Interconnector Monthly Unavailability

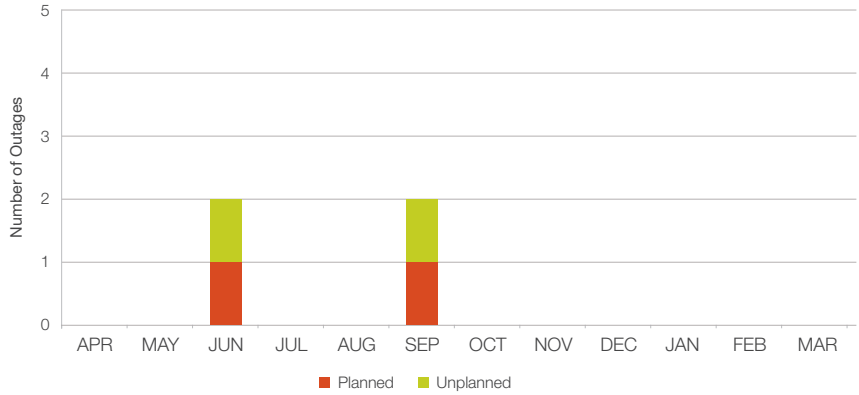


England – Belgium Interconnector % Monthly Unavailability	
	Nemo Link
April	0
May	0.69
June	0
July	0
August	0
September	11.46
October	0
November	0
December	0
January	0
February	0
March	0
Average	1.00

Outages 2021–22 (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	1	1
July	0	0
August	0	0
September	1	1
October	0	0
November	0	0
December	0	0
January	0	0
February	0	0
March	0	0
Total	2	2

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.

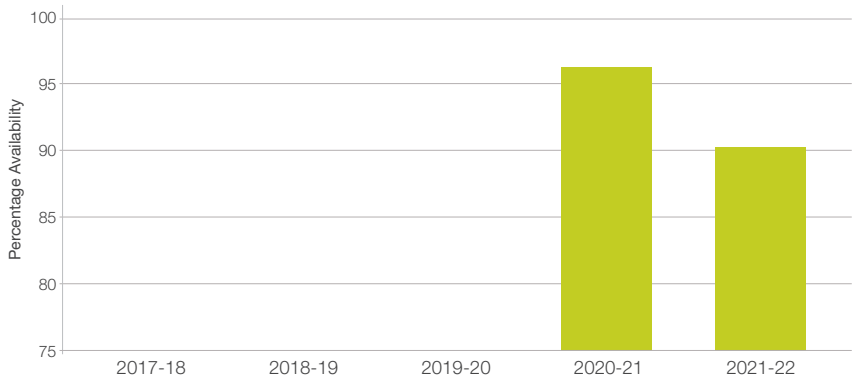
Annual Availability

Annual Availability of England – France Interconnector 2: **90.34%**

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

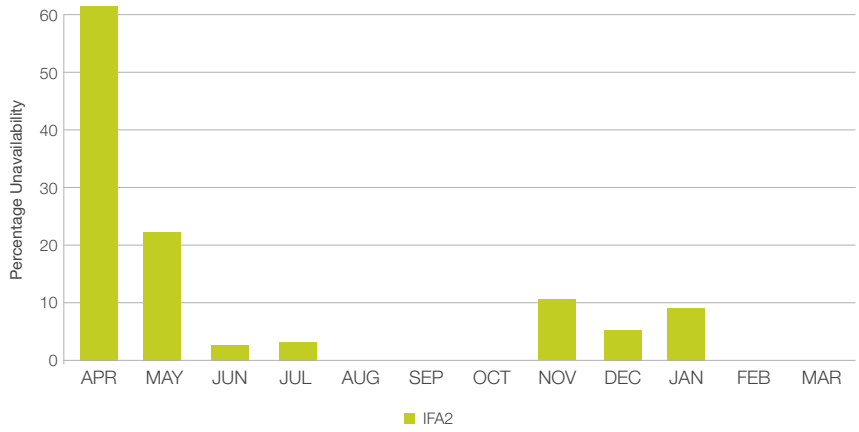
England – France Interconnector 2 % Annual Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
N/A	N/A	N/A	96.55	90.34

% Annual System Availability



Monthly Unavailability

% England – France Interconnector 2 Monthly Unavailability

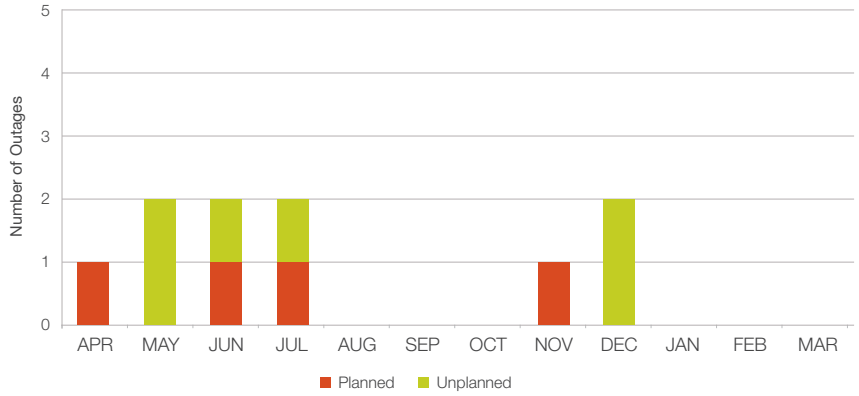


England – France Interconnector 2 % Monthly Unavailability	
	IFA2
April	62.50
May	22.67
June	2.36
July	2.65
August	0
September	0
October	0
November	11.25
December	5.91
January	8.63
February	0
March	0
Average	9.66

Outages 2021–22 (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	0
May	0	2
June	1	1
July	1	1
August	0	0
September	0	0
October	0	0
November	1	0
December	0	2
January	0	0
February	0	0
March	0	0
Total	4	6

England – Norway Interconnector

System Description

The NGET transmission system is interconnected with Norway between Blyth, Northumberland and Kvilldal, Rogland via a 720km HVDC link owned and operated jointly by National Grid Ventures and Statnett, the Norwegian transmission system owner.

The interconnector is called Northsealink and is a bipole design with a total capacity of 1400MW.

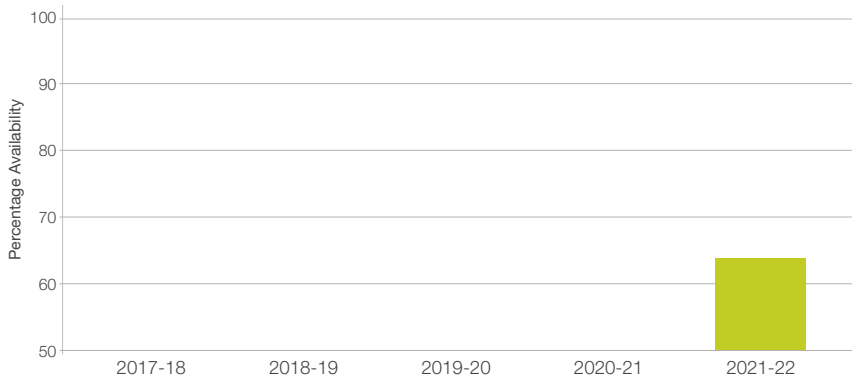
Annual Availability

Annual Availability of England – Norway: **63.61%**

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

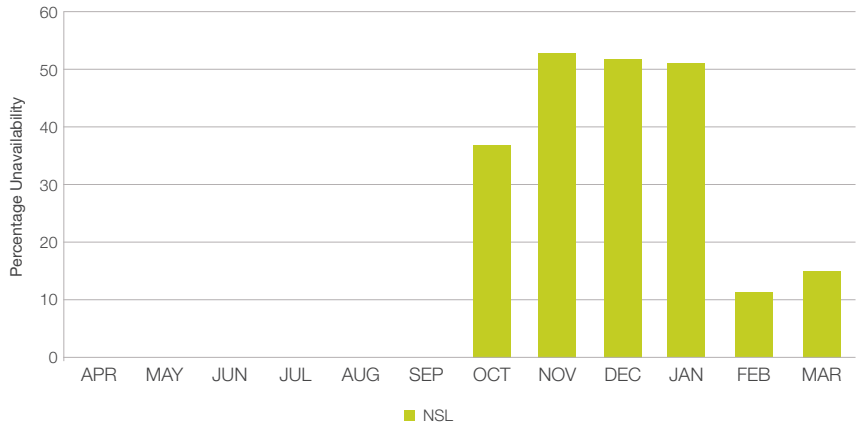
England - Norway Interconnector % Annual Availability				
2017-18	2018-19	2019-20	2020-21	2021-22
N/A	N/A	N/A	N/A	63.61

% Annual System Availability



Monthly Unavailability

% England – Norway Interconnector Monthly Unavailability

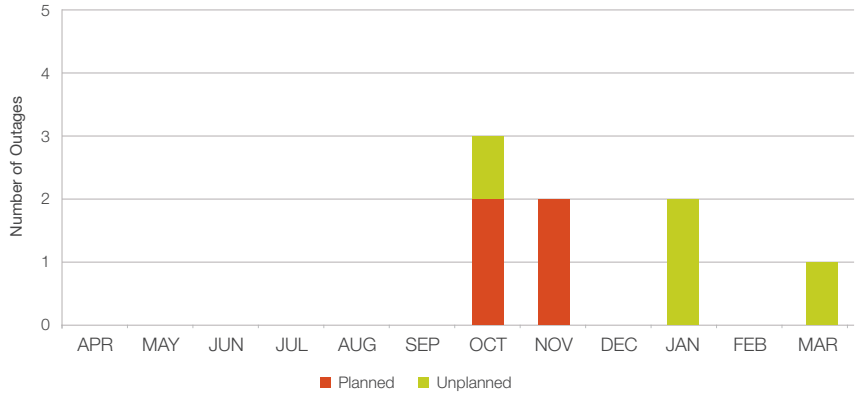


England - Norway Interconnector % Monthly Unavailability	
	NSL
April	N/A
May	N/A
June	N/A
July	N/A
August	N/A
September	N/A
October	37.33
November	52.30
December	51.14
January	50.61
February	11.83
March	15.10
Average	36.39

Outages 2021–22 (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	-	-
May	-	-
June	-	-
July	-	-
August	-	-
September	-	-
October	2	1
November	2	0
December	0	0
January	0	2
February	0	0
March	0	1
Total	4	4

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), Beatrice OFTO (TC), Rampion 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 2554 kilometres of circuit, connecting to 23 offshore substations totalling over 8.7GW 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
TC Beatrice	04/08/2021	2	181	588	400kV	Transmission
TC Rampion	17/11/2021	2	86	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 2021-22 was **98.99%**

% Annual System Availability

Offshore Transmission Networks % Annual System Availability

	2017-18	2018-19	2019-20	2020-21	2021-22
TC Robin Rigg	100	100	99.87	99.95	100
TC Gunfleet Sands	99.81	99.97	100	99.66	100
TC Barrow	99.99	100	100	100	100
TC Ormonde	100	100	100	100	99.93
TC Lincs	99.78	100	99.56	99.44	99.98
TC Westermost Rough	100	99.73	100	100	99.93
TC Dudgeon	N/A	100	99.31	99.83	99.92
TC Beatrice	N/A	N/A	N/A	N/A	99.16
TC Rampion	N/A	N/A	N/A	N/A	100
BT Walney 1	99.70	100	99.95	100	98.90
BT Walney 2	100	91.42	100	100	100
BT Sheringham Shoal	99.23	99.40	100	100	99.69
BT London Array	99.86*	99.94	99.95*	99.77	99.82
EQ Greater Gabbard	99.61	99.82	99.78	99.78	99.98
BBE Gwynt Y Mor	100	99.93*	96.10	86.31	87.62
BBE Thanet	100	100	100	99.84	100
BBE Humber Gateway	100*	100	99.83	99.76	98.73
West of Duddon Sands	99.45	100	100*	99.50	99.19
DTP Burbo Bank Extension	N/A	98.15	99.67	99.99	100
DTP Race Bank	N/A	N/A	100	99.26	100
DTP Galloper	N/A	N/A	100	99.95	100
DTP Walney Extension	N/A	N/A	N/A	99.97	100
DTP Hornsea One	N/A	N/A	N/A	100	99.93

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

% Winter Peak System Availability

Offshore Transmission Networks % Winter Peak System Availability					
	2017-18	2018-19	2019-20	2020-21	2021-22
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	99.87	100	100	100	100
TC Westermost Rough	100	100	100	100	100
TC Dudgeon	N/A	100	100	100	99.88
TC Beatrice	N/A	N/A	N/A	N/A	100
TC Rampion	N/A	N/A	N/A	N/A	100
BT Walney 1	100	100	100	100	99.07
BT Walney 2	100	100	100	100	100
BT Sheringham Shoal	99.99	100	100	100	100
BT London Array	100	99.99	99.89	100	99.64
EQ Greater Gabbard	99.79	99.68	100	100	100
BBE Gwynt Y Mor	100	99.61	100	72.84	88.02
BBE Thanet	100	100	100	100	100
BBE Humber Gateway	100*	100	99.82	100	99.17
West of Duddon Sands	100	100	100	100	100
DTP Burbo Bank Extension	N/A	100	100	100	100
DTP Race Bank	N/A	N/A	100	100	100
DTP Galloper	N/A	N/A	100	100	100
DTP Walney Extension	N/A	N/A	N/A	99.91	100
DTP Hornsea One	N/A	N/A	N/A	100	99.92

* 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	100	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	99.18	100	100	100	100	100	100	100	100	100	100	100
TC Lincs	99.74	100	100	100	100	100	100	100	100	100	100	100
TC Westermost Rough	100	100	100	99.13	100	100	100	100	100	100	100	100
TC Dudgeon	99.40	100	100	100	100	100	100	100	100	100	99.62	100
TC Beatrice	100	100	100	100	100	91.31	100	99.06	100	100	100	99.46
TC Rampion	100	100	100	100	100	100	100	100	100	100	100	100
BT Walney 1	100	100	92.29	100	100	100	100	100	94.56	100	100	100
BT Walney 2	100	100	100	100	100	100	100	100	100	100	100	100
BT Sheringham Shoal	100	100	96.20	100	100	100	100	100	100	100	100	100
BT London Array	100	100	100	100	100	100	100	100	100	100	97.65	100
EQ Greater Gabbard	100	100	100	100	99.73	100	100	100	100	100	100	100
BBE Gwynt Y Mor	84.05	88.20	88.20	88.20	85.89	88.20	88.20	88.20	88.20	88.20	87.66	88.20
BBE Thanet	100	100	100	100	100	100	100	100	100	100	100	100
BBE Humber Gateway	100	87.80	100	99.40	100	100	100	100	100	100	97.50	100
West of Duddon Sands	99.52	99.83	99.71	91.40	100	100	100	100	100	100	100	100
DTP Burbo Bank Extension	100	100	100	100	100	100	100	100	100	100	100	100
DTP Race Bank	100	100	100	100	100	100	100	100	100	100	100	100
DTP Galloper	100	100	100	100	100	100	100	100	100	100	100	100
DTP Walney Extension	100	100	100	100	100	100	100	100	100	100	100	100
DTP Hornsea One	100	100	100	100	99.70	99.72	100	100	100	99.76	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	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	0.47	1.95	1.04	0	0	0	0.35	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	0.30	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	0	0.28
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Ormonde	**OFTO Planned**	0.82	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	0.66	0	0.20	0	0	27.10	0	0	0	0	0
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Lincs	**OFTO Planned**	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0.26	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	0.87	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	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0.60	0	0	0	0	0	0	0	0	0	0.38	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 Beatrice	**OFTO Planned**	0	0	0	0	0	8.69	0	0	0	0	0	0.54
	OFTO Unplanned	0	0	0	0	0	0	0	0.94	0	0	0	0
	Non-OFTO	0	0	0	0	0	0	0	1.40	0	0	3.94	2.56
		Apr	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**
TC Rampion	**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 1	**OFTO Planned**	0	0	7.71	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0	0	0	0	0	0	0	0	5.44	0	0	0
	Non-OFTO	0	0	0	0.71	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	7.88	0	0	0.83	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 Sheringham Shoal	OFTO Planned	0	0	3.80	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 London Array	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	2.35	0
	Non-OFTO	0	0	2.51	0	3.63	5.09	16.83	0.60	0	0	0	0.61
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
EQ Greater Gabbard	OFTO Planned	0	0	0	0	0.27	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	15.95	11.80	11.80	11.80	12.67	11.80	11.80	11.80	11.80	11.80	11.80	11.80
	OFTO Unplanned	0	0	0	0	1.44	0	0	0	0	0	0.54	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	2.38	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	12.20	0	0.60	0	0	0	0	0	0	2.50	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
West of Duddon Sands	OFTO Planned	0	0	0	0	0	0	0	0	0	0	0	0
	OFTO Unplanned	0.48	0.17	0.29	8.60	0	0	0	0	0	0	0	0
	Non-OFTO	0	0	0	1.70	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	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 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
		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	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 Hornsea One	OFTO Planned	0	0	0	0	0.30	0.28	0	0	0	0.24	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
19 May 2021 08:01 Robin Rigg West 132kV. ENW outage on Hark-Stainburn 2 – Sellafield - Seaton.	Non-OFTO	6h 43m	618
06 June 2021 09:11 Robin Rigg East 132kV. ENW outage on Harker - Sellafield – Siddick 1 132kV circuit.	Non-OFTO	6h 40m	573
07 June 2021 08:11 Robin Rigg West 132kV. RWE planned outage for Offshore Substation 132kV maintenance and protection testing.	Non-OFTO	10h 36m	975
17 June 2021 07:58 Robin Rigg East 132kV. RWE planned outage for Offshore Substation 132kV maintenance and protection testing.	Non-OFTO	9h 11m	790
18 June 2021 14:15 Robin Rigg East 132kV. ENW outage to reconfigure network on completion of OHL works on Harker - Sellafield – Siddick 1 132kV circuit.	Non-OFTO	1h 53m	162
14 July 2021 08:52 Robin Rigg West 132kV. ENW outage to conduct OHL maintenance on Harker – Robin Rigg West – Sellafield – Stainburn 2 132kV circuit.	Non-OFTO	6h 52m	632
30 July 2021 09:15 Robin Rigg West 132kV. ENW outage for restoration on completion of OHL maintenance on Harker – Robin Rigg West – Sellafield – Stainburn 2 132kV circuit.	Non-OFTO	8h 07m	747
08 November 2021 12:54 Robin Rigg West 132kV. ENW Emergency outage due to a fire at another location.	Non-OFTO	4h 52m	448
Total			**4944**

TC Gunfleet Sands

Outage Date and Time	Reason	Days, Hours and Mins	MWh
20 September 2021 22:46 Offshore transformer (T1) outage. Generator requested, due to depletion of Generator protection and control following network switch failure.	Non-OFTO	11h 47m	354
Total			**354**

TC Barrow

Outage Date and Time	Reason	Days, Hours and Mins	MWh
22 July 2021 14:57 As a result of a slow cleared 400kV fault at NGET Heysham 400kV substation, the Barrow offshore network tripped.	Non-OFTO	4h 20m	390
29 March 2022 22:45 Loss of offshore protection and control DC supplies. Emergency de-energisation or disconnection of User's equipment necessary to ensure compliance with the Electricity Safety, Quality and Continuity Regulations 2002.	Non-OFTO	18h 25m	1658
31 March 2022 15:05 Stuck circuit breakers on Users equipment. Emergency de-energisation or disconnection of a User's equipment necessary to ensure compliance with the Electricity Safety, Quality and Continuity Regulations 2002.	Non-OFTO	2h 05m	188
Total			**2235**

TC Ormonde

Outage Date and Time	Reason	Days, Hours and Mins	MWh
23 April 2021 10:07 Site outage to allow crane on site for SRB14 replacement.	OFTO	5h 53m	883
10 May 2021 13:55 Removal of crane used on SRB14 repair works.	Non-OFTO	4h 55m	738
22 July 2021 14:57 As a result of a slow cleared 400kV fault at NGET Heysham 400kV substation, offshore T2 tripped.	Non-OFTO	3h 18m	218
04 October 2021 09:18 Full site outage by ENW. OFTO maintenance activities aligned.	Non-OFTO	8d 9h 36m	30240
Total			**32078**

TC Lincs

Outage Date and Time	Reason	Days, Hours and Mins	MWh
20 April 2021 12:55 Bird strike on the Harmonic Filter 3 capacitor bank. Trip of 132kV export cable of circuit 1.	OFTO	4h 04m	491
Total			**491**

TC Westermost Rough

Outage Date and Time	Reason	Days, Hours and Mins	MWh
02 July 2021 10:12 Planned maintenance of offshore HV equipment and replacement of faulty offshore BB protection relay.	OFTO	6h 28m	1335
Total			**1335**

TC Dudgeon

Outage Date and Time	Reason	Days, Hours and Mins	MWh
05 April 2021 07:06 Removal of shunt reactor of circuit 2 for repair.	OFTO	8h 40m	1733
22 February 2022 10:15 Maintenance of Dudgeon export cable circuit 1.	OFTO	5h 05m	1017
Total			**2750**

TC Beatrice

Outage Date and Time	Reason	Days, Hours and Mins	MWh
03 September 2021 13:47 Snagging and maintenance works on OFTO network. Impacts on GT2, Interconnector, HTR2, SGT2, Beatrice Onshore- OTM2 220kV circuit.	OFTO	5d 5h 10m	36799
12 November 2021 08:19 Onshore TO maintenance on HTR2 circuit at Blackhillock.	Non-OFTO	6h 17m	1847
17 November 2021 08:12 Onshore TO maintenance on HTR1 circuit at Blackhillock 400kV substation.	Non-OFTO	4h 58m	1460
25 November 2021 08:16 Onshore TO maintenance on HTR2 circuit at Blackhillock 400kV substation.	Non-OFTO	8h 54m	2617
26 November 2021 16:53 A trip during storm Arwen. Outage of circuit 1	OFTO	6h 39m	1955
26 November 2021 16:53 A trip during storm Arwen. Outage of circuit 2.	OFTO	6h 53m	2024
18 February 2022 10:00 Circuit 2 restriction due to generator managed issue.	Non-OFTO	25d 23h 24m	15579
15 March 2022 10:15 Onshore TO maintenance on HTR1 circuit.	Non-OFTO	6h 55m	2034
16 March 2022 09:24 Maintenance works on OFTO network. GT2 oil top-up.	OFTO	8h 05m	2377
16 March 2022 17:29 Circuit 2 restriction due to generator managed issue.	Non-OFTO	8h 05m	9159
Total			**75850**

TC Rampion

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

BT Walney 1

Outage Date and Time	Reason	Days, Hours and Mins	MWh
15 June 2021 08:30 6 yearly planned maintenance.	OFTO	2d 7h 31m	9327
22 July 2021 14:59 Trip caused by fault on National Grid system at Heysham	Non-OFTO	5h 15m	882
20 December 2021 07:52 Fibre optic cable repair.	OFTO	1d 16h 28m	6798
Total			**17007**

BT Walney 2

Outage Date and Time	Reason	Days, Hours and Mins	MWh
19 April 2021 08:45 Planned outage by DNO for maintenance of their equipment.	Non-OFTO	2d 8h 45m	9534
27 July 2021 09:26 Planned outage by DNO for asset investigation.	Non-OFTO	6h 09m	1033
Total			**10567**

BT Sheringham Shoal

Outage Date and Time	Reason	Days, Hours and Mins	MWh
09 June 2021 07:35 Maintenance of Salle onshore 2 and OS2 offshore circuits.	OFTO	2d 6h 47m	8628
Total			**8628**

BT London Array

Outage Date and Time	Reason	Days, Hours and Mins	MWh
08 June 2021 05:14 X190 Mechanism change outage (SGT1A/GT1 leg).	Non-OFTO	21h 23m	3079
08 June 2021 05:43 X190 Mechanism change outage (SGT1B/GT3 leg).	Non-OFTO	21h 04m	3034
15 June 2021 05:37 X290 Mechanism change outage (SGT2A/GT2 leg).	Non-OFTO	18h 17m	2633
15 June 2021 06:07 X290 Mechanism change outage (SGT2B/GT4 leg).	Non-OFTO	18h 14m	2626
19 August 2021 07:03 Generator park pilot replacement SGT1A.	Non-OFTO	1d 3h 33m	4339
19 August 2021 07:05 Generator park pilot replacement SGT2A.	Non-OFTO	1d 3h 32m	4336
19 August 2021 07:35 Generator park pilot replacement SGT1B.	Non-OFTO	1d 3h 05m	4266
19 August 2021 08:54 Generator park pilot replacement SGT2B.	Non-OFTO	1d 1h 47m	4061
24 September 2021 07:38 GT2 trip due to 33kV bus-duct failure inside the 33kV termination box.	Non-OFTO	29d 12h 22m	101990
03 November 2021 10:27 Post busduct fault GT2 bushing bleed.	Non-OFTO	4h 53m	703
23 November 2021 10:09 GT1 LV inspection.	Non-OFTO	4h 50m	696
24 November 2021 09:03 GT3 LV inspection.	Non-OFTO	5h 35m	804
24 November 2021 15:40 GT4 LV inspection.	Non-OFTO	3h 36m	518
18 February 2022 12:20 SGT2B circuit trip following National Grid disturbance.	OFTO	8h 29m	1220
18 February 2022 12:20 SGT2A circuit trip following National Grid disturbance.	OFTO	2d 11h 45m	8604
20 February 2022 23:09 SGT2B circuit trip following National Grid disturbance for post switching reconfiguration	OFTO	57m	135
16 March 2022 09:10 Generator requested outage for 33kV GT4 bus can inspection.	Non-OFTO	12h 11m	1754
18 March 2022 09:22 Generator requested outage for 33kV GT3 bus can inspection.	Non-OFTO	7h 47m	1121
Total			**145919**

Equitix Greater Gabbard

Outage Date and Time	Reason	Days, Hours and Mins	MWh
August 2021 Main protection testing.	OFTO	7h 11m	999
Total			**999**

BBE Gwynt-Y-Mor

Outage Date and Time	Reason	Days, Hours and Mins	MWh
01 April 2021 00:01 52.8% Export cap on SSEC3.	OFTO	365d	595400
21 April 2021 13:10 GT8 GIB repair.	OFTO	5d 3h 32m	17789
26 August 2021 09:04 SGT1 bladder repair.	OFTO	1d 5h 01m	8357
29 August 2021 00:01 PoW relay failure.	OFTO	1d 18h 59m	6190
26 February 2022 14:42 Voltage control relay failure.	OFTO	1d 3h 16m	3926
Total			**631661**

BBE Thanet

Outage Date and Time	Reason	Days, Hours and Mins	MWh
02 August 2021 14:02 UKPN outage of EC1**.**	Non-OFTO	8h 53m	1332
20 August 2021 09:28 UKPN outage of EC1.	Non-OFTO	1d 2h 32m	3830
23 February 2022 09:33 UKPN outage of EC2.	Non-OFTO	2d 9h 15m	8588
Total			**13750**

BBE Humber Gateway

Outage Date and Time	Reason	Days, Hours and Mins	MWh
10 May 2021 09:36 Circuit 1, 6 Year Maintenance.	OFTO	4d 7h 38m	11400
24 May 2021 08:42 Circuit 2, 6 Year Maintenance.	OFTO	3d 6h 24m	8624
14 July 2021 10:51 Circuit 2, LB6 investigation.	OFTO	6h 19m	695
08 February 2022 06:47 Circuit 2, CSE repair.	OFTO	1d 11h 23m	3892
Total			**24611**

West of Duddon Sands

Outage Date and Time	Reason	Days, Hours and Mins	MWh
09 April 2021 10:04 Investigation into Harmonic Filter 1 fault.	OFTO	7h 57m	1313
05 May 2021 11:08 Circuit 1 cable inspection	OFTO	2h 54m	479
14 June 2021 09:41 Reinstatement of Harmonic Filter 1.	OFTO	54m	149
17 June 2021 09:49 Harmonic Filter 2 investigation and repair.	OFTO	3h 56m	650
22 July 2021 14:57 Tripping as a result of 3rd party fault - excluded under E4-J12 para 8 (d).	Non-OFTO	1d 1hr 16m	4826
22 July 2021 14:57 Tripping as a result of protection maloperation following 3rd party fault - subject to EE claim.	OFTO	5d 23h 57m	24432
Total			**31849**

DTP Burbo Bank Extension

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

DTP Race Bank

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

DTP Galloper

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

DTP Walney Extension

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

DTP Hornsea One

Outage Date and Time	Reason	Days, Hours and Mins	MWh
31 August 2021 08:03 Transfer Agreement Orsted snagging works.	OFTO	9h 18m	2095
01 September 2021 08:21 Transfer Agreement Orsted snagging works.	OFTO	8h 23m	1888
25 January 2022 09:26 Protection relay replacement.	OFTO	7h 24m	1663
Total			**5646**

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.

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