Pelectricity

Bringing energy to your door

書圖重合書

Distributed Generation HV & EHV London Workshop 21 November 2019

Pelectricity north west

Bringing energy to your door

書冊書命書

Introduction Mark Williamson

Stay connected... F III O in www.enwl.co.uk



書書書



- One word Feedback!
- Use the feedback forms and give us your honest opinion
- Contact the ICE team or your usual contacts in ENWL at any time to give us feedback
- ice@enwl.co.uk



- Don't forget to sign in!
- Toilets situated outside of Morris Suite
- No Fire Alarms planned for the day
- Floor plans highlight evacuation point
- Emergency Assembly Point Tavistock Square (right hand side of venue)
- Mobile Phones
- Photography will be taken during the event
- Reminder we have a delegate with a severe nut allergy





Meet the Team

Mark Williamson



Energy Solutions Director

Mark is a chartered engineer with over 30 years experience in the electricity supply industry. He is responsible for all new connections to the Electricity North West network in the North West of England. In addition, via our ENWL Construction and Maintenance Ltd division provides control, operation, maintenance and construction services for customer's with private high and low voltage networks.

Brian Hoy



Brian has over 30 years of experience working in the electricity industry. He has an engineering background but has worked in the regulatory aspects of new connections for a number of years. Brian represents Electricity North West on connections related matters and leads a number of national industry groups.

Victoria Brown



Bid Engineer

Victoria joined Electricity North West in 2014 after graduating from university. As a Bid Engineer within the Grid and Primary Bid Team, Victoria is responsible for estimating and quoting Generation connections >1MW.

Steffan Jones



Infrastructure Solutions Manager

Steffan joined Electricity North West in 2014 as the Infrastructure Solutions Manager, heading up both the Grid and Primary Connections team and the Asset Diversions team. During his 24 year career he has worked in both heavy industry and commercial contracting roles as well as the electrical utility sector. Steffan looks to bring this experience to enhance the customer journey throughout the delivery of Infrastructure Solutions projects.

Meet the Team

John Carlisle



Infrastructure Solutions Programme Manager

John is the Delivery Programme Manager for our Grid and Primary Connections team. John is an Incorporated Engineer with the Institute of Engineering and Technology (IET) and a registered member of the Association of Project Management (APM). John and his team are responsible for the delivery of all new connections on the 33KV and 132KV networks, inclusive of all demand and generation projects.

Hannah Sharratt



Connections Stakeholder Engagement and Regulation Manager

Hannah has 20+ years experience in the Utility industry in programme, project and change management roles. Hannah is currently focusing on our Connections stakeholder engagement activity and is committed to delivering real and lasting enhancements to our stakeholder experience.

Tracey Taylor



Business Connections Lakes

Tracey joined Electricity North West 31 years ago and currently works within the Business Connections Team as Construction and Delivery Manager responsible for delivering DG and Demand Connections at LV And HV within the North area. Her focus is ensuring the team are effectively managing the construction and energisation of connections in line with customer expectations during the delivery stage.

Peter Barlow



Programme Manager-Grid and Primary

Peter joined Electricity North West in 2017 as a Programme Manager for Infrastructure Solutions. He leads the Bid Team within Grid and Primary connections. His background is in Mechanical Engineering, previously working in Energy Markets as a Sales Manager, predominately in Oil & Gas, and Offshore Renewables (Wind, Wave, and Tidal Power).

Pelectricity

Bringing energy to your door

書圖正書合書

Getting DG Connected in the North West

Victoria Brown

Stay connected... **F III III** www.enwl.co.uk

An Overview of the DG Connection Process



Application Types



for the formal offer if pursued within 7 days

Distribution Constraints



There are common constraints that can be encountered across the ENWL network, which can have an impact on Connection Applications, either through Reinforcement or on the Point of Connection.

Fault Level	Thermal	Voltage Drop or Rise	Voltage Step Change	Power Swing
 All generation has some FL contribution – Synchronous generation will contribute more than Asynchronous Can potentially be mitigated by ENWL or by the Generator POC will be discounted if the proposed DG causes a FL exceedance 	 Thermal constraints arise where the Network has insufficient capacity to accommodate the requested generation. Thermal constraints can sometimes be mitigated with network reinforcement eg overhead line restringing Thermal constraints can sometimes be mitigated with export limitation 	 Occurs when connecting into a heavily/lightly loaded circuit or for connections with a long cable route. POCs that exceed acceptable levels will be discounted 	 Distribution Code / P28 highlight acceptable limits. If a proposed connection causes a voltage step change outside these limits, the POC will be discounted 	 Encountered in areas of the Network where there are a large number of connected and/or proposed battery storage connections Caused when 'swinging' from import to export and vice versa A swing of >3% on ENWL switchgear will be discounted. A swing >3% at Generator's node can be offered subject to the Generator's agreement

Blackburn BSP

 Capability for battery storage, synchronous and asynchronous generation
 Connections trigger 132kV OHL overloading and therefore are contingent on reinforcement being completed

Macclesfield Grid

 Fault Level constraints make synchronous generation unviable
 Headroom to connect ~10MW battery / asynchronous generation

Penrith BSP

 Constraints on demand capacity – no headroom for battery storage
 Headroom for both asynchronous and synchronous generation

Lancaster BSP

• Headroom for asynchronous, synchronous and battery storage generation



In addition to Distribution level constraints, Transmission constraints must also be considered.

Appendix G All 20 GSP sites within	Materiality Headroom We have assigned 3 materiality statuses to determine the materiality headroom for each GSP.						
the ENWL area are now using the Appendix G process. This process aims to	A – Latest return indicates spare capacity at this location	 B – Insufficient capacity to accommodate further connections without a Modification Application 	C – Insufficient capacity to accommodate further connections without completing identified transmission work				
of Works process and	GSPs with 'A' Status	GSPs with 'B' Status	GSPs with 'C' Status				
provide greater clarity. • • •	 Bredbury Carrington Macclesfield Padiham Penwortham 	 Bold Kearsley Kirkby Rochdale Stalybridge 	 Harker – replacement of 4 SGTs and 132kV switchboard Hutton - replacement of 4 SGTs and 132kV switchboard 				
	South ManchesterWashway Farm	StannahWhitegate	 Heysham – HOPS scheme (to be confirmed) 				

Potential POCs





 Sufficient capacity for all three generation types at the substation 	 Sufficient capacity for all three generation types at the substation
 Transmission works required to connect at Heysham 	 Bredbury GSP has 'A' status – no need for a Modification
 Significant impact on timescales for connection and a potential need to securitise against the works 	

There are a number of factors which can influence the viability of a new DG connection. We actively encourage you to engage with us pre-application in order to help you understand potential difficulties for proposed projects.









1) Is there anything you find particularly helpful?

2) What improvements do you think we could make?

3) Is there anything more that you think we can do to help you secure a connection offer?

Pelectricity

Bringing energy to your door

Heat Map Tool Demonstration

Victoria Brown

Heat Map Tool





Heat Map Tool – Primary & BSP Headroom

NITHER Durage Laboration Name Notice Name Notice	Bringing energy to your door	droom												
Nume Appl Grap GO Grap Cond Junce Nume Num Nume Nume Num	rimary Substation Hea	adroom				Primary Subst	ation Location	Demand Hea	adroom (MW)	Gener	ration Headroom N	I-0 -(MW)		_
ALEON ET 6.5 AUDRET 15 AUDRET 15 15 10 10 11 ALSON ET 11 MOSS MOS MARKER 50015 MARKER (HUTON 17223 5444 11 20 15 11 11 ENABLER (HUTON 17223 5449 0.0 10 17 17 12 0.0 AMELSION 11 ENABLER (HUTON 37222 59505 7.5 16.7 0.0	Primary Substation	Voltage (kV)	BSP Group	GSP (Group	Easting	Northing	Firm	N-0	Inverter Based	Synchronous - LV	Synchronous - HV	Battery Storage Headroom N-0 -(MW	/)
AUCRUY 11 Wash book SUPPL MARCH 11 3200 24 14.4 11.2 2.0 1.4 11.2 1.1 AUTION 11.1 FPRINTIN System 321.2 546.9 0.0	ALBION ST	6.6	LOWER DARWEN	ROCH	IDALE	367434	426087	0.0	13.7	0.0	0.0	0.0	0.0	
Add 000 11 PR0111111 SP0 MARKE / NUTION 17223 59990 0.0 0.7<	ALDERLEY	11	MOSS NOOK	SOUTH MA	NCHESTER	385044	379026	7.8	14.8	11.2	2.0	1.4	11.2	
Addition 11 KENCL (PARSIDE RD) PARKER / NUTTON 33762 93956 7.5 1.2 0.0 0.0 0.0 0.0 AKKOTS NOTT-174 6.5 RED BANK WHTTGATE 38503 39886 0.0 5.1 2.0 3.0 0.0 0.0 0.0 0.0 0.0 AKKOTS NOTT-174 6.5 RED BANK WHTTGATE 38503 39886 0.0 5.1 2.0 2.0 0.0 0.0 0.0 0.0 AKKOTS NOTT-174 6.5 REDAL PARSIDE PD STATEBIOGE 387763 97745 0.0	ALSTON	11	PENRITH & SHAP	HARKER /	HUTTON	372125	546499	0.0	0.0	3.7	3.7	3.7	0.0	
AKOATS NOTH T1 & 12 12 6.6 810 BAK WHITGATE 35022 98830 6.0 1.2 9.2 6.9 5.0 1.2 AKOATS NOTH T14 6.6 810 BAK WHITGATE 35022 98830 6.0 5.1 0.0 6.0 6.1 6.0 6.1 6.0 6.1 6.0 <th6< td=""><td>AMBLESIDE</td><td>11</td><td>KENDAL (PARKSIDE RD)</td><td>HARKER /</td><td>HUTTON</td><td>337602</td><td>503506</td><td>7.5</td><td>16.7</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td></td></th6<>	AMBLESIDE	11	KENDAL (PARKSIDE RD)	HARKER /	HUTTON	337602	503506	7.5	16.7	0.0	0.0	0.0	0.0	
AMCORT 114 6.6 BED SMK WrittGATE 380021 028840 0.0 0.0 0.0 0.0 0.0 AMIRE T 11 TANLEMAS SUDOIC PHONON MARCE HINTON 380021 5272.0 1.0 <	ANCOATS NORTH T11 & T12	6.6	RED BANK	WHIT	EGATE	385022	398830	0.0	1.2	32.2	6.9	5.0	1.2	
ANNE FIT 11 STARLES NUCL NAMEE A FUNTTON 300011 57820 2.4 6.9 0.0 0.0 0.0 0.0 0.0 ANDOLL 6.6 UTMAN 30001 57820 71 10.1 10.1 10.1 10.1 10.1 10.1 10.1 10.0<	ANCOATS NORTH T14	6.6	RED BANK	WHIT	EGATE	385032	398840	0.0	5.1	20.0	20.0	16.0	5.1	
Abenul, 6.6 Urrend Werkolfick Werkolice 334/16 422/23 7.1 10.1 12.6 10.2 7.4 10.1 Advituto 6.6 STLAATS TE	ANNIE PIT	11	STAINBURN & SIDDICK	HARKER /	HUTTON	300011	527810	2.4	6.9	0.0	0.0	0.0	0.0	
matrix as statust is end istatust istatus istatust istatust istatust istatust istatus istatust	ANSDELL	6.6	LYTHAM	PENWORTHAM	WEST / STANAH	334416	428229	7.1	10.1	21.6	10.2	7.4	10.1	
Antmono. 1 Numes (1000) 1 Numes (1000) 1 <th< td=""><td>ARDWICK</td><td>0.0</td><td>STUART ST</td><td>STALYE HADKED</td><td></td><td>384/53</td><td>39/415</td><td>0.0</td><td>1.5</td><td>24.2</td><td>14.1</td><td>10.3</td><td>1.3</td><td></td></th<>	ARDWICK	0.0	STUART ST	STALYE HADKED		384/53	39/415	0.0	1.5	24.2	14.1	10.3	1.3	
Display 26 Reset: Revolution 2002 </td <td>ASHTON (GOLBORNE)</td> <td>6.6</td> <td>GOLBORNE</td> <td>HARNER /</td> <td></td> <td>357056</td> <td>400663</td> <td>9.7</td> <td>7.8</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td></td>	ASHTON (GOLBORNE)	6.6	GOLBORNE	HARNER /		357056	400663	9.7	7.8	0.0	0.0	0.0	0.0	
Astronovi Messey 6.6 SALE Dirac Astronovico Unice 377388 922322 9.9 14.0 28.8 9.2 6.7 14.0 Astronovico Unice Trial 6.0 Statusendo Unice 39319 4.4 8.5 7.0 2.0 1.4 7.0 Astronovico Unice Trial 6.0 Statusendo Unice 56 39375 399319 4.4 8.5 7.0 2.0 1.4 7.0 Astronovico Carlie Differinge energy to your door Statemon Carlie Statemon Carlie <t< td=""><td>ASHTON (RIBBLE)</td><td>6.6</td><td>RIBBLE</td><td>PENWORTHAM F</td><td>AST / ROCHDALF</td><td>350275</td><td>430526</td><td>3.1</td><td>3.1</td><td>10.5</td><td>2.0</td><td>1.4</td><td>3.1</td><td></td></t<>	ASHTON (RIBBLE)	6.6	RIBBLE	PENWORTHAM F	AST / ROCHDALF	350275	430526	3.1	3.1	10.5	2.0	1.4	3.1	
SAFTOR UNDER LYNE T13 6.6 HARTSHEAD-HEYROD STALYBRIDGE 39319 4.4 8.5 7.0 2.0 1.4 7.0 ASHTON UNDER LYNE T13 6.6 ASHTON UNDER LYNE T13 6.6 ASHTON UNDER LYNE T13 6.6 ASKAM 11 ASKATSHLERGE 11 ASKATSHLE	ASHTON ON MERSEY	6.6	SALE	CARRIN	NGTON	377188	392252	9.9	14.0	28.8	9.2	6.7	14.0	
ASHYON UNDER LIVE T13 6.6 ASWAD 11 ASWAD 11 ASKAD 11 ASKAD 11 ASKAD 11 ASKAD 11 ASKATIR 11 ATRICTO TOWIC EVITE 6.6 AMULTY 61 BABRON AST 6.6 BABRON T 11 BARON SAST 6.6 BARON SAST 6.6 BARON T 11 BARON SAST 6.6 ASTON CORD 6.6 ASTON CORD 6.6 Addition State Bettry State BETORER 11 BARON SI BETORER Demand Headroom (MW) Generation Headroom - 10-4(MW) Bettry State BARON SI 33 BARON SIST State Stat	ASHTON UNDER LYNE T11 & T12	6.6	HARTSHEAD-HEYROD	STALYE	BRIDGE	393275	399319	4.4	8.5	7.0	2.0	1.4	7.0	
ABYWOOD DALE 66 A ASKAM 11 ASKETTON CASTLE 11 ASKETTON CASTLE 11 ASKETTON CASTLE 11 ASKETTON CASTLE 11 ASKETTON CONVECTIVE 11 ASKETTON CONVECTIVE <td>ASHTON UNDER LYNE T13</td> <td>6.6</td> <td></td>	ASHTON UNDER LYNE T13	6.6												
ASXM 11 CPCCPUSE ASKETTOL CASTLE 11 ASKETTOL CASTLE 11 ATHERTON TOWN CERTRE 11 ASMARKA 66 BAGULEY 11 BASSATRA 66 BAGULEY 11 BAMBER BIDGE 11 BAMBER BIDGE 11 BASSATRA 66 BSP Voltage (V) GSP Group Eaching Firm Non Firm Inverter Based Synchronoso BABDER BIDGE 11 ADSWOOD 33 BRECOURT 38918 38310 55.6 7.5 15.1 54.4 BENCHLL 11 ATTRNOHAM 33 CARRINOTON 37580 38912 47.5 65.5 151.5 46.4 BENCHLL 11 ATTRNOHAM 33 CARRINOTON 3757.8 392.12 7.2 94.5 27.1 - BENCHLL 13 BAROW 33 PREVORDIN 3757.8 3927.14 46.7 7.6	ASHWOOD DALE	6.6												
Assertion CASITE 11 Incriti UESC AATHERION TOWINGENTRE 11 ATHERION TOWINGENTRE 11 AATHERION TOWINGENTRE 11 AATHERION TOWINGENTRE 11 AATHERION TOWINGENTRE 11 AATHERION TOWINGENTRE 11 BABBARA ST 6.6 BARRON DOCK RD 6.6 BARRON DOCK RD 6.6 ADSWOODD 33 BREDBURY 38918 38810 55.6 73.6 150.1 54.1 BEBCFORD 11 ALTINOTAM 35.8 73.6 150.1 54.1 54.4 BEBCFORD 11 ALTINOTAM 35.8 73.6 151.5 46.4 54.4 BEBCFORD 11 ALTINOTAM 35.8 155.6 402.2 14.3 54.4 54.4 BEBCFORD 13 CARAINGTON 375.6 371.4 54.5 151.5 46.4 54.6 BEBCFORD 13 PENNORTHAM WEST / TANAH 357.5 7.7 1.0 1.0	ASKAM	11	l 'electr	ricity										
Ab2M RIA ATHERION TOWN CENTRE ATHERION TOWN CENTRE ATHERION TOWN CENTRE BGUILS I Bringing energy to your door ATHERION TOWN CENTRE AVENAMA 6.6 AVENAMA 6.6 MARCINA MARSADET 11 BSP Votage (V) GSP Group Esting Demand Headroom (MW) Centration Headroom - 1.6 - (MW) Batroy S MARSADET 6.6 BSP Votage (V) GSP Group Esting Northing Firm Non Firm Inverter Based Synchronoous Batroy S BARDON DOCK RD 6.6 ACROPT 33 READBURY 389388 383310 55.6 73.6 150.1 54.1 BENCHILL 11 ADSWOOD 33 BERDBURY 38938 383310 55.6 73.6 150.1 54.1 BENCHILL 11 ATRINCHAM 33 CARRINOTON 377.88 89012 47.5 55.5 151.5 46.4 40.6 BENCHILL 11 ARTRINON 33 CARRINOTON 377.8 927.14 46.7 76.7 6.7 19	ASKERTON CASTLE	11	north u	jest 🖌										
ArtHERION LWINGLY 11 AVENNAM 66 BG0U2F 11 BMBC 80102E 11 BSP Headroom 16 BMBC 80102E 11 BSP Headroom 10 BABC 80102E 11 BSP Headroom 16 BSP Headroom 18 BSP Headroom 1	ASPATRIA	11	Bringing energy	to your door										
Alteritizity Bits BAGULEY 11 BAGULSY 11 BAGULSY 11 BARSAR STIOGE 11 BARSAR ST 66 BARSAR ST 66 BARSAR ST 66 BARSARA ST 66 BEOPORD 11 BARTON DOCK RD 66 ACTINICHAM 33 CARRINGTON 27830 38902 475 655 191.5 464 BEROFORD 11 ACTENTCHAM 33 CARRINGTON 27830 38902 475 655 191.5 464 BENTHAM 11 ATERNON 33 KAARSHY 38013 455.5 77.6 19.1 15 BERTHAM 11 ATERNON 33 KAARSHY 3010 40208 19.4 49.4 40.5 7.1 BERTHAM 31 CARRINGTON 3765 391.74 46.7 6.7 1.5 BARTON 33 READELY 30001 430.5 432.5 453.7 1.7 1.6 BURTON<	ATHERTON TOWN CENTRE													
BAGULY 11 BAMBER BIDGE BSP Headroom BAMBER BIDGE 11 BABBRAS ST 65 BARROW 11 BABBRAS ST 65 BARROW Nortage (V) GSP Group Earling Northing Inverter Based Synchronous Battery S BARROW 65 BARROW 65 BARROW ADSWOOD 33 BREDBURY 389188 988180 55.6 73.6 150.1 54.1 BEVENDD 11 BEVENDD AAGEROFT 33 KRASELY 389188 988102 47.5 65.5 151.5 46.4 BEVENHL 11 BEVEND 33 KRASELY 366130 402.08 19.2 37.2 94.5 17.1 BARROW 33 KRASELY 35013 413945 55.3 74.9 54.7 12.9 BUFFLID 33 CARINGTON 377580 39714 46.7 76.7 6.7 1.9 BUFFLID 33 CARINGTON 377584 397.3 10.7 1.9 BUCKEND 33 PEWNORTHAM WEST / STANAH 330.8	AVENHAM	6.6			-									
BANDER BRIOGE 11 Disk PLANDER V BSP Voltage (V) GSP Group Esting Northing Firm Non Firm Inverter Based Synchronous Natery S BARDAD VOCR D0 66 66 ADSWODD 33 BBEDBURY 389188 38310 55.6 73.6 150.1 54.1 Voltage (V) No 66 56 56 56 56 151.1 54.1 Voltage (V) 33 KBARSLY 380345 401811 145. 26.5 151.5 46.4 17.1 <td>BAGULEY</td> <td>11</td> <td>BSP Headroom</td> <td></td>	BAGULEY	11	BSP Headroom											
BARBAR ST 6.6 BSP Voltage (V) GSP Group Easting Northing Firm Non Firm Inverter Based Synchronous BARTON DOCK RD 6.6 ADSWOOD 33 BERDBURY 389188 389180 55.6 73.6 15.1 54.1 BENCHILL 11 AAGEROFT 33 KKABSLEY 389182 389182 35.6 73.6 15.1 54.4 BENCHILL 11 AAGEROFT 33 KKABSLEY 389182 38912 47.5 65.5 17.1 6.4 BENCHILL 11 ATHRICHAM 33 CARINGTON 51970 470489 39.4 79.4 80.2 14.5 14.6 BENMAM 33 PARKER / HUTTON 51970 470489 39.1 13.9 5.4 7.4 19 14.6 14.6 7.6 7.1 1.9 14.6 14.6 36.6 14.5 14.6 36.6 14.5 14.6 36.6 14.5 15.7 14.6 <td< td=""><td>BAMBER BRIDGE</td><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	BAMBER BRIDGE	11												
BARROW 11 DS* Voldge(RV) GS* Object Easting Northing Firm Nor Firm Inverter Based Synchronous N BARTON DOCK RD 66 ADSWOOD 33 BREDBURW 389188 388310 55.6 73.6 130.1 54.1 BELORAVE 6.6 AGECROPT 33 KEARSLEY 38045 401831 14.5 25.5 90.4 25.4 BENTHAM 11 ATHERTON 33 KEARSLEY 36510 402088 19.2 37.2 94.5 17.1 BENTHAM 11 ATHERTON 33 KEARSLEY 36510 402088 19.2 37.2 94.5 17.1 BARCON 33 MARAKE/ HUTTON 316709 470489 39.4 79.4 86.2 14.5 BARCON 33 PENWORTHAM WEST / STANAH 330232 439711 33.9 51.9 40.6 7.4 BLOKKER MT 33 D	BARBARA ST							RSD Coord	linates	Demand He	adroom (MW/)	Generation He	adroom N.O. (MW)	
BERTON DOCK RD 6.6 ADSWOOD 33 BREDBURY 389188 38831 55.6 73.6 150.1 54.1 BELGRAVE 6.6 AGECROFT 33 KEARSLEY 380345 401831 14.5 26.5 90.4 25.4 BENCHILL 11 ALTRINCHAM 33 CARRINGTON 376550 389012 47.5 65.5 151.5 46.4 BENCHILL 11 ALTRINCHAM 33 KEARSLEY 366150 402088 19.2 37.2 94.5 17.1 BENTHAM 11 BARROW 33 HARKER / HUTTON 31970 40.67 76.7 6.7 1.9 BARROW 33 PENWORTHAM EAT / SCHAME 39123 413945 55.3 74.9 54.7 12.9 BLACEDURN 33 PENWORTHAM EAT / SCHAME 39232 43391 10.7 1.9 1.0 1.0 1.9 1.0 1.9 1.0 1.9 1.0 1.9 1.0 1.9 1.0 <t< td=""><td></td><td>6.6</td><td></td><td></td><td></td><td></td><td></td><td>BSP Coord</td><td>linates</td><td>Demand He</td><td>adroom (MW)</td><td>Generation He</td><td>adroom - N-0 -(MW)</td><td>Battery Sto</td></t<>		6.6						BSP Coord	linates	Demand He	adroom (MW)	Generation He	adroom - N-0 -(MW)	Battery Sto
BECPORD 11 ADSWOOD 33 BRECOMPY 389188 388310 55.6 73.6 150.1 94.1 BELGRANE 6.6 AGECROFT 33 KEARSLEY 380345 401831 14.5 26.5 150.1 54.1 BENCHILL 11 ATHERTON 33 CARNINGTON 376380 389012 47.5 65.5 151.5 46.4 BENTHAM 11 ATHERTON 33 CARNINGTON 37678 3971.4 67.7 6.7 1.9 BLODAM 6.6 BARROW 33 PREWORTHAM WEST / STANH 332.28 439711 33.9 51.9 40.6 7.4 BLACKBURN 33 PENWORTHAM WEST / STANH 332.88 28.6 46.6 36.9 6.7 BLACKPOOL 33 PENWORTHAM WEST / STANH 330.85 433.90 28.6 46.6 36.9 6.7 BLON 33 SCUTM MAXCHEST STANH 330.5 434.49 58.1 76.1 10.7 1.9	BARROW	6.6 11	BSP	Voltage (kV)	G	iSP Group		BSP Coord	linates Northing	Demand He Firm	adroom (MW) Non Firm	Generation He	adroom - N-O -(MW) Synchronous	Battery Stor N-0
BELGRAVE 6.6 AddCk0/FI 33 KEARLIT 340.543 401.81 1.4.3 2.6.3 30.4 2.5.4 BENCHILL 11 ALTRINCHAM 33 CARRINGTON 375.68 380.012 47.5 65.5 151.5 4.64 BENTHAM 11 ALTRINCHAM 33 KEARSLEY 366150 402088 19.2 37.2 94.5 17.1 BERTHAM 13 BARROW 33 HARKE / HUTTON 319.794 46.7 7.7 6.7 1.9 BERTHAM 33 CARRINGTON 37578 3971.7 46.7 7.7 6.7 1.9 BERTHAM 33 PENWORTHAM WEST / STANAH 332228 439711 33.9 51.9 40.6 7.4 BLACKODOL 33 PENWORTHAM WEST / STANAH 332528 439711 33.9 51.9 40.6 7.4 BLACKODOL 33 PENWORTHAM WEST / STANAH 332525 410566 18.0 7.3 10.7 1.9	BARROW BARTON DOCK RD	6.6 11 6.6	BSP	Voltage (kV)	G	GSP Group		BSP Coord Easting	linates Northing	Demand He Firm	adroom (MW) Non Firm	Generation He	adroom - N-O -(MW) Synchronous	Battery Sto N-0
BERCHILL 11 NUMBER 23 Schwart 2000 2001 2011 2011 2011 BERTHAM 11 1 ATHERTON 33 KEARSLEY 366150 400208 19.2 37.2 94.5 17.1 BERTHAM 5.6 BARTON 33 CARRINGTON 376758 39714 46.7 76.7 6.7 1.9 BERTHAM 33 PERWORTHAN WEST / STANAH 3391033 413945 55.3 74.9 54.7 12.9 1.0 BLACBURN 33 PERWORTHAN WEST / STANAH 339.05 51.9 40.6 7.4 BLACBURN 33 PERWORTHAN WEST / STANAH 33035 433951 433030 22.6 46.6 36.9 6.7 BLOM ST 33 SOUTH MANCHESTER 384221 397717 0.0 10.4 160.0 45.8 BURTN 33 KEARSLEY 330272 41184 23.9 23.9 10.7 1.9 BURTN 33	BARROW BARTON DOCK RD BEDFORD	6.6 11 6.6 11	ADSWOOD	Voltage (kV)	B	SP Group		BSP Coord Easting 389188	Northing 388310	Demand He Firm 55.6	Non Firm	Generation He Inverter Based	adroom - N-0 -(MW) Synchronous 54.1	Battery Sto N-0
DEVINAM 11 Description 25 Description 250 2500	BARROW BARTON DOCK RD BEDFORD BELGRAVE	6.6 11 6.6 11 6.6	BSP ADSWOOD AGECROFT	Voltage (kV)	G B k	REDBURY KEARSLEY		BSP Coord Easting 389188 380345	linates Northing 388310 401831 280012	Demand He Firm 55.6 14.5	adroom (MW) Non Firm 73.6 26.5	Generation Her Inverter Based 150.1 90.4	adroom - N-0 -(MW) Synchronous 54.1 25.4	Battery Sto N-0
BARTON 33 CARRINGTON 376758 397174 46.7 76.7 6.7 1.9 BELFIELD 33 RCOHDALE 39103 413945 55.3 74.9 54.7 12.9 BISPHAM 33 PENWORTHAM WEST / STANAH 333238 439711 33.9 51.9 40.6 7.4 BLACKBURN 33 PENWORTHAM WEST / STANAH 330835 435308 28.6 46.6 36.9 6.7 BLACKDOL 33 PENWORTHAM WEST / STANAH 330835 435308 28.6 46.6 36.9 6.7 BLOCOL 33 SOUTI MAXCHESTER 384221 397717 0.0 10.4 160.0 45.8 BURNEY 33 SOUTI MAXCHESTER 38559 43469 53.1 76.1 10.7 1.9 BURY 33 STALYBRIDGE 407769 375476 0.0 48.3 10.7 1.9 CARLISLE 33 HARKER / HUTON 375110 393020 21.6 51.6	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM	6.6 11 6.6 11 6.6 11	BSP ADSWOOD AGECROFT ALTRINCHAM	Voltage (kV) 33 33 33 33	G B K CA	SSP Group REDBURY KEARSLEY RRINGTON		BSP Coord Easting 389188 380345 376380 366150	Vorthing 388310 401831 389012 402088	Demand He Firm 55.6 14.5 47.5 19.2	adroom (MW) Non Firm 73.6 26.5 65.5 37.2	Generation He Inverter Based 150.1 90.4 151.5 94.5	adroom - N-0 -(MW) Synchronous 54.1 25.4 46.4 17.1	Battery Sto N-0
BELFIELD 33 ROCHDALE 39103 413945 55.3 74.9 54.7 12.9 BISPHAM 33 PENWORTHAM WEST / STANAH 332328 439711 33.9 51.9 40.6 7.4 BLACKPOOL 33 PENWORTHAM EAST / ROCHDALE 370584 422294 60.0 77.6 84.4 36.6 BLACKPOOL 33 PENWORTHAM EAST / ROCHDALE 330355 435308 28.6 46.6 36.9 6.7 BLOKNOST 33 SOUTH MANCHSTER 330225 410566 18.3 37.3 10.7 1.9 BURNEY 33 ROCHDALE 38559 434469 58.1 76.1 10.7 1.9 BURNEY 33 KEARSLEY 37255 40056 18.3 77.4 1.9 BURTON 33 STATURIDGE 40779 37547 0.0 48.3 10.7 1.9 CARINER MAREA / HUTON 333855 555683 7.6 28.6 6.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENCHAM BISDHAM	6.6 11 6.6 11 6.6 11 11 11	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW	Voltage (kV) 33 33 33 33 33 33 33	B B CA CA HARK	SSP Group REDBURY KEARSLEY RRINGTON KEARSLEY KER / HUTTON		BSP Coord Easting 389188 380345 376380 366150 319709	Northing 388310 401831 389012 402088 470489	Demand He Firm 55.6 14.5 47.5 19.2 39.4	Non Firm 73.6 26.5 65.5 37.2 79.4	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2	adroom - N-0 - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5	Battery Sto N-0
BISPHAM 33 PERWORTHAM WEST / STANAH 33232 439711 33.9 51.9 40.6 7.4 BLACKBURN 33 PERWORTHAM EST / SCHDALE 370584 429294 60.0 77.6 84.4 36.6 BLACKBOOL 33 PERWORTHAM WEST / STANAH 330835 435308 28.6 46.6 36.9 6.7 BLOOM ST 33 SOUTH MANCHESTER 38421 397717 0.0 10.4 160.0 45.8 BURNEY 33 SOUTH MANCHESTER 38421 397717 0.0 10.4 100.0 45.8 BURNEY 33 RCCHDALE 38509 434469 58.1 76.1 10.7 1.9 BURY 33 RCARINGTON 373107 399020 23.9 10.7 1.9 CARLISE 33 HARREY / HUTON 388655 55658 7.6 28.6 6.7 1.9 CARNINGTON 37310 399020 21.6 51.6 0.0 0.0 <	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BISPHAM	6.6 11 6.6 11 6.6 11 6.5 11 5.5	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW BARTON	Voltage (kV) 33 33 33 33 33 33 33	B B CA k HARK CA	REDBURY (EARSLEY RRINGTON (EARSLEY (EARSLEY ER / HUTTON RRINGTON		BSP Coord Easting 389188 380345 376380 366150 319709 376758	Northing 388310 401831 389012 402088 470489 397174	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7	Non Firm 73.6 26.5 65.5 37.2 79.4 76.7	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7	adroom - N-0 -(MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9	Battery Sto N-0
BLACKBURN 33 PENWORTHAM WEST / STANAH 37054 42224 60.0 77.6 84.4 36.6 BLACKPOL 33 PENWORTHAM WEST / STANAH 330835 435308 28.6 46.6 36.9 6.7 BLOCM ST 33 SOUTH MANCHESTER 384221 397717 0.0 10.4 160.0 45.8 BURNEY 33 RCCHDALE 38559 43469 55.1 76.1 10.7 1.9 BURNY 33 STALYBRIDGE 407769 375476 0.0 48.3 10.7 1.9 BURN 33 STALYBRIDGE 407769 375476 0.0 48.3 10.7 1.9 CARLISLE 33 HARKER / HUTON 335655 556583 7.6 28.6 6.7 1.9 CARLISLE 33 CARNINGTON 373110 393020 21.6 51.6 0.0 0.0 CARTINGTON BSP 33 CARNINGTON 373110 393020 21.6 51.0 51.5	BARROW BARTON DOCK RD BEDORD BELGRAVE BENCHILL BENTHAM RISDHAM	6.6 11 6.6 11 6.6 11 11 5.5	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW BARTON BELFIELD	Voltage (kV) 33 33 33 33 33 33 33 33 33 33 33	B B CA HARK CA CA R	REDBURY (EARSLEY RRINGTON (EARSLEY (ER / HUTTON RRINGTON OCHDALE		BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033	Northing 388310 401831 389012 402088 470489 397174 413945	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3	Adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7	adroom - N-0 -(MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 12.9	Battery Sto N-0
BLACKPOOL 33 PENWORTHAW WEST / STANAH 33085 435308 28.6 46.6 36.9 6.7 BLOMD T 33 SOUTH MANCHESTER 334221 397717 0.0 10.4 160.0 45.8 BURNLEY 33 KEARSLEY 372255 410566 18.3 37.3 10.7 1.9 BURNLEY 33 RCOLPALE 38559 434469 58.1 76.1 10.7 1.9 BURNLEY 33 KEARSLEY 380272 411184 22.9 23.9 10.7 1.9 BURTON 33 HARER / HUTON 33855 55583 7.6 28.6 6.7 1.9 CARINGTON BSP 33 CARRINGTON 373110 393020 21.6 51.6 0.0 0.0 CARINGTON BSP 33 CARRINGTON 373110 393020 21.6 51.6 0.0 0.0 CARINGTON BSP 33 MARER / HUTON 30104 51.0 10.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM RISDHAM	6.6 11 6.6 11 6.6 11 11 11 5.5	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARTON BELFIELD BISPHAM	Voltage (kV) 33 33 33 33 33 33 33	B B CA HARR CA R PENWORTH	SSP Group REDBURY (EARSLEY RRINGTON (EARSLEY (ER / HUTTON RRINGTON OCHDALE AM WEST / STA	INAH	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328	Northing 388310 401831 389012 402088 470489 397174 413945 439711	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9	Adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9 51.9	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6	adroom - N-0 -(MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 12.9 7.4	Battery Sto N-O
BLOOM ST 33 SOUTH MANCHESTER 38421 97717 0.0 10.4 160.0 45.8 BUIRNEY 33 KEARSLEY 37255 410566 18.3 37.3 10.7 1.9 BURNLEY 33 RCOHOALE 38559 434469 58.1 76.1 10.7 1.9 BURY 33 KEARSLEY 380272 411184 23.9 23.9 10.7 1.9 BURY 33 STALYBRIDGE 407769 375476 0.0 48.3 10.7 1.9 CARLISCING BSP 33 CARRINGTON 3738020 21.6 51.6 0.0 0.0 CARRINGTON 33 ROCHOALE 38461 411290 19.9 58.9 12.2.6 23.0 CARDINGTON 33 WHITEGATE 38417 40321 10.1 10.7 1.9 CARINGTON 33 WHITEGATE 38417 40321 10.1 10.7 1.9 CARINGTON 33	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM RISCHAM	6.6 11 6.6 11 6.6 11 11 11 11	BSP ADSWOOD AGECROFT ALTENINCHAM ATHERTON BARROW BARTON BELFIELD BISPHAM BLACKBURN	Voltage (kV) 33 33 33 33 33 33 33	G B CA K HARK CA CA R PENWORTHA PENWORTHA	SSP Group REDBURY (EARSLEY RRINGTON (EARSLEY ER / HUTTON RRINGTON OCHDALE AM WEST / STA MM EAST / ROCH	INAH IDALE	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584	Northing 388310 401831 389012 402088 470489 397174 413945 439711 429294	Demand He Firm 55.6 14.5 19.2 39.4 46.7 55.3 33.9 60.0	adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9 51.9 77.6	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4	adroom - N-0 -(MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 12.9 7.4 36.6	Battery Sto N-0
BOLTON 33 KRASLEY 37225 410566 18.3 37.3 10.7 1.9 BURNLEY 33 ROCHDALE 385599 434699 58.1 76.1 10.7 1.9 BURY 33 KEARSLEY 380579 43469 53.1 76.1 10.7 1.9 BURY 33 STALYBRIDGE 407769 375476 0.0 48.3 10.7 1.9 CARLISLE 33 HARKER / HUTTON 338655 556583 7.6 28.6 6.7 1.9 CARTINGTON BSP 33 CARRINGTON 373110 393020 21.6 51.6 0.0 0.0 CASTETTON 33 ROCHDALE 38461 411290 19.9 58.9 122.6 23.0 CHADDERTON 33 MHITEGATE 389137 403821 10.5 10.5 98.3 17.8 DROVISDEN 33 STALYBRIDGE 390140 398146 42.1 60.1 10.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BISSHAM	6.5 11 6.5 11 6.5 11 11 11 5.5	BSP ADSWOOD AGECROFT ALTRINCHAM TATHERTON BARTON BARTON BLACH BISPHAM BLACKBURN BLACKPOOL	Voltage (kV) 33 33 33 33 33 33 33	B B CA CA HARK CA CA R PENWORTH PENWORTH PENWORTH	SSP Group REDBURY (EARSLEY RRINGTON (EARSLEY (ER / HUTTON RRINGTON OCHDALE AM WEST / ST/ AM WEST / ST/	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584 330835	Northing 388310 401831 389012 402088 470489 397174 413945 439711 422294 435308	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6	adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9	adroom - N-O -(MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 12.9 7.4 36.6 6.7	Battery Sto N-0
BURNLEY 33 ROCHDALE 38559 434469 58.1 76.1 10.7 1.9 BURY 33 KEARSLEY 380272 411184 23.9 23.9 10.7 1.9 BURTON 33 STALYBRIDGE 407769 375476 0.0 48.3 10.7 1.9 CARLISLE 33 HARER / HUTON 338655 55683 7.6 28.6 6.7 1.9 CARSINGTON BSP 33 CARRINGTON 373110 393020 21.6 51.6 0.0 0.0 CARSINGTON BSP 33 CARRINGTON 373110 393020 21.6 51.6 0.0 0.0 CARDERTON 33 ROCHDALE 388641 411290 19.9 58.9 12.2.6 23.0 CHADDERTON 33 WHTEGATE 389137 403821 10.5 10.5 19.8 17.8 DROVISDEN 33 STALYBRIDGE 390140 398147 40321 60.1 10.7 1.9 <td>BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM RISPHAM</td> <td>6.5 11 6.5 11 6.5 11 11 11 5.5</td> <td>BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW BARTON BELFIELD BISPHAM BLACKBURN BLACKBURN BLACKBURN BLACKBURN BLACKBURN</td> <td>Voltage (kV) 33 33 33 33 33 33 33</td> <td>B B CA HARK CA R PENWORTH PENWORTH PENWORTH SOUTH</td> <td>SSP Group REDBURY (EARSLEY RRINGTON (EARSLEY (ER / HUTTON RRINGTON OCHDALE AM WEST / STA M EAST / ROCH AM WEST / STA M MACHESTER</td> <td>INAH IDALE INAH</td> <td>BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584 330835 384221</td> <td>Northing 388310 401831 389012 402088 470489 397174 413945 439711 422294 435308 397177</td> <td>Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0</td> <td>adroom (MW) Non Firm 73.6 26.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4</td> <td>Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 35.9 160.0</td> <td>adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 12.9 7.4 36.6 6.7 45.8</td> <td>Battery Sto N-0</td>	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM RISPHAM	6.5 11 6.5 11 6.5 11 11 11 5.5	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW BARTON BELFIELD BISPHAM BLACKBURN BLACKBURN BLACKBURN BLACKBURN BLACKBURN	Voltage (kV) 33 33 33 33 33 33 33	B B CA HARK CA R PENWORTH PENWORTH PENWORTH SOUTH	SSP Group REDBURY (EARSLEY RRINGTON (EARSLEY (ER / HUTTON RRINGTON OCHDALE AM WEST / STA M EAST / ROCH AM WEST / STA M MACHESTER	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584 330835 384221	Northing 388310 401831 389012 402088 470489 397174 413945 439711 422294 435308 397177	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0	adroom (MW) Non Firm 73.6 26.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 35.9 160.0	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 12.9 7.4 36.6 6.7 45.8	Battery Sto N-0
DURY 33 KEANLEY 380/2/2 41144 25.9 25.9 10.7 1.9 BUKTON 33 STALYBRIDGE 407769 375476 0.0 48.3 10.7 1.9 CARUSLE 33 HARKE / HUTTON 338655 556583 7.6 28.6 6.7 1.9 CARRINGTON BSP 33 CARRINGTON 373110 393020 21.6 51.6 0.0 0.0 CATEITON 33 ROCHDALE 388461 411290 19.9 58.9 122.6 23.0 CHADDERTON 33 WHITEGATE 389137 403821 10.5 10.5 98.3 17.8 DROYTSDEN 33 STALYBRIDGE 399140 42.1 60.1 10.7 1.9 EGREMONT 33 HARKER / HUTTON 301070 513074 68.1 76.1 97.5 58.7 FRDDRICK RD 33 BOLD 360607 397590 0.0 10.2 6.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM RISCHAM	6.6 11 6.6 11 6.6 11 11 11	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW BARTON BLACKPOL BLOCM ST BOLTON	Voltage (kV) 33 33 33 33 33 33 33 33 33 3	B B CA HARK CA PENWORTH PENWORTH PENWORTH SOUTH	SP Group REDBURY (EARSLEY RRINGTON (EARSLEY (EARSLEY (EARSLEY (EARSLEY) (EARST)/ROCH AM WEST / STA MWEST / STA MWEST / STA MWEST / STA MANCHESTER (EARSLEY)	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584 330835 384221 372255	Northing 388310 401831 389012 402088 470489 397174 413945 439711 422294 43508 397717 410566	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 18.3	adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 37.3	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 19 12.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.2 9 1.2 9 1.2 1.9 1.9 1.2 1.9 1.2 1.9 1.9 1.2 1.9 1.2 1.9 1.2 1.9 1.2 1.9 1.2 1.9 1.5 1.9 1.5 1.9 1.2 1.9 1.2 1.9 1.2 1.9 1.2 1.9 1.5 1.9 1.9 1.2 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Sto N-0
BUXION 35 STATURIUSE 407/89 572+79 0.0 48.5 10.7 1.9 CARLISLE 33 HARKER / HUTTON 338655 555683 7.6 28.6 6.7 1.9 CARLISLE 33 CARNINGTON 37310 393020 21.6 51.6 0.0 0.0 CASTLETON 33 ROCHOALE 38461 411290 19.9 58.9 122.6 23.0 CHADDERTON 33 ROCHOALE 389137 403821 10.5 10.5 98.3 17.8 DROVISDEN 33 STALTRINGE 390140 398146 42.1 60.1 10.7 1.9 EGREMONT 33 HARKER / HUTTON 301070 513074 68.1 76.1 97.5 58.7 FREDERICK RD 33 KEARSLEY 38175 599250 0.0 10.2 6.7 1.9 GOLBORNE 33 BOLD 36607 397.690 3.7 18.7 0.0 0.0 <	BARROW BARTON DOCK RD BELOFORD BELGRAVE BENCHILL BENTHAM BICDHAM	6.6 11 6.6 11 6.6 11 11 11 5.5	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARTON BARTON BLACKBURN BLACKBURN BLACKBURN BLACKPOL BLOOM ST BOLTON BURNLEY	Voltage (kV) 33 33 33 33 33 33 33	B B CA CA CA PENWORTH PENWORTH PENWORTH SOUTH B R SOUTH B R SOUTH B R SOUTH B R CA CA CA CA CA CA CA CA CA CA CA CA CA	SSP Group REDBURY (EARSLEY RRINGTON (EARSLEY (ER / HUTTON RRINGTON OCHDALE AM WEST / STA M MAST / ROCH AM WEST / STA M ANCHESTER (EARSLEY OCHDALE (EARDLE)	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 391033 392328 370584 330335 383228 370584 330335 384221 384221 372255 385569	Inates Northing 388310 401831 389012 402088 470489 397174 413945 439711 422294 435308 3977177 440566 434469	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 18.3 58.1 58.1	adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 76.1 23.0	Generation He Inverter Based 100.1 90.4 151.5 90.4 154.7 40.6 84.4 36.9 160.0 10.7 10.7	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 12.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Sto N-O
CARLIGLE 33 CARRINGTON 37310 398020 216 51.6 0.0 0.0 CARINGTON BSP 33 RCCHDALE 38841 411290 19.9 58.9 12.2.6 23.0 CHADDETTON 33 ROCHDALE 388451 411290 19.9 58.9 12.2.6 23.0 CHADDETTON 33 WHTEGATE 389137 403211 10.5 10.5 98.3 17.8 DROYLSDEN 33 STALYBRIDGE 390140 398146 42.1 60.1 10.7 1.9 EGREMONT 33 HARKEY / HUTTON 301070 513074 68.1 76.1 97.5 58.7 FREDERICK RD 33 KEARSLEY 38175 39250 0.0 10.2 6.7 1.9 GOLBORNE 33 BOLD 36607 3776 31.3 31.3 38.5 7.0 HAZEL GROVE 33 BREDURY 391313 386577 37.7 55.7 10.0.3 18.2 </td <td>BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BISCHAM</td> <td>6.6 11 6.6 11 6.6 11 11 11</td> <td>BSP ADSWOOD AGECROFT ALTRINCHAM TATHERTON BARROW BARROW BARROW BARROW BARROW BARROW BLACKBURN BLACKBURN BLACKBURN BLACKPOOL BLOOM ST BOLTON BURY BURY BURY</td> <td>Voltage (kV) 33 33 33 33 33 33 33 33 33 3</td> <td>B B CA CA CA CA CA PENWORTH PENWORTH PENWORTH SOUTI- SOUTI- SOUTI- SOUTI- CA CA CA CA CA CA CA CA CA CA CA CA CA</td> <td>SP Group REDBURY (EARSLEY RRINGTON (EARSLEY ER / HUTTON RRINGTON OCHDALE AM WEST / ST/ M MACHESTER (EARSLEY OCHDALE (EARSLEY AV SRADOCE</td> <td>INAH IDALE INAH</td> <td>BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584 330835 384221 370584 330835 384221 372255 385569 380272 403720</td> <td>inates Northing 388310 401831 389012 389012 399174 402088 470489 397174 439451 435308 397717 410546 434469 434469 411184 255.75</td> <td>Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 18.3 58.1 23.9 0.0</td> <td>adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 76.1 23.9 23.9</td> <td>Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7 10.7 10.7</td> <td>adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 7.4 36.6 1.9 1.9 1.9 1.9 7.4 3.6 6.7 1.9 1.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0</td> <td>Battery Sto N-0</td>	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BISCHAM	6.6 11 6.6 11 6.6 11 11 11	BSP ADSWOOD AGECROFT ALTRINCHAM TATHERTON BARROW BARROW BARROW BARROW BARROW BARROW BLACKBURN BLACKBURN BLACKBURN BLACKPOOL BLOOM ST BOLTON BURY BURY BURY	Voltage (kV) 33 33 33 33 33 33 33 33 33 3	B B CA CA CA CA CA PENWORTH PENWORTH PENWORTH SOUTI- SOUTI- SOUTI- SOUTI- CA CA CA CA CA CA CA CA CA CA CA CA CA	SP Group REDBURY (EARSLEY RRINGTON (EARSLEY ER / HUTTON RRINGTON OCHDALE AM WEST / ST/ M MACHESTER (EARSLEY OCHDALE (EARSLEY AV SRADOCE	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584 330835 384221 370584 330835 384221 372255 385569 380272 403720	inates Northing 388310 401831 389012 389012 399174 402088 470489 397174 439451 435308 397717 410546 434469 434469 411184 255.75	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 18.3 58.1 23.9 0.0	adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 76.1 23.9 23.9	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7 10.7 10.7	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 7.4 36.6 1.9 1.9 1.9 1.9 7.4 3.6 6.7 1.9 1.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0	Battery Sto N-0
CASTELETON 33 ROCHDALE 388461 411290 19.9 58.9 122.6 23.0 CHADDERTON 33 WHITEGATE 38917 403821 10.5 10.5 98.3 17.8 DROYTSDEN 33 STALYBRIOGE 399140 498146 42.1 60.1 10.7 1.9 EGREMONT 33 HARKER / HUITON 301070 513074 68.1 76.1 97.5 58.7 FREDERICK RD 33 KARASLEY 381755 399250 0.0 10.2 6.7 1.9 GOLBORNE 33 BOLD 366607 397590 3.7 18.7 0.0 0.0 GREENHILL 33 WHITEGATE 393262 404755 31.3 31.3 38.5 7.0 HAZEL GROVE 33 BROBURY 391313 366977 37.7 55.7 10.0.3 18.2 HAZEL GROVE 33 STALYBRIDGE 397322 399442 27.4 84.4 6.7 1.	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM RISCHAM	6.6 11 6.6 11 6.6 11 11 11 5.6	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW BARTON BLACKPOOL BLACKPOOL BLACKPOOL BLACKPOOL BLOM ST BOLTON BURNLEY BUXTON CARUE IE	Voltage (kV) 33 33 33 33 33 33 33	B B CA CA CA CA CA CA PENVORTHA PENWORTHA PENWORTHA PENWORTHA SOUTI SOUTI SOUTI	SP Group REDBURY (EARSLEY RENINGTON (EARSLEY ER / HUTTON RENINGTON OCHDALE AM WEST / STZ M KEST / ROC MANCHEST / STZ MANCHEST	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584 330835 332328 370584 330835 383569 385569 385569	Inates Northing 388310 401831 389012 402088 4770489 397174 413945 439711 429294 435710 429294 435710 429294 435708 597717 410566 434469 431184	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 18.3 58.1 23.9 0.0 7.6	adroom (MW) Non Firm 73.6 26.5 65.5 65.5 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.9	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7 10.7 10.7 6.7	adroom - N-O - (MW) Synchronous 25.4 25.4 25.4 25.4 25.4 25.4 17.1 14.5 19 12.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Sto N-0
CHADDERTON 25 HUREATE 289137 403821 10.5 10.5 98.3 17.8 DROVISDEN 33 STALTBRIDGE 390140 998146 42.1 60.1 10.7 1.9 EGREMONT 33 STALTBRIDGE 390140 998146 42.1 60.1 10.7 1.9 EGREMONT 33 HARKER / HUTTON 301070 513074 66.1 76.1 97.5 58.7 FREDERICK RD 33 KEARSLEY 38175 599250 0.0 10.2 6.7 1.9 GOLBORNE 33 BOLD 360607 397690 3.7 18.7 0.0 0.0 GOLBORNE 33 BOLD 390607 397590 3.1.3 38.5 7.0 HAZEL GROVE 33 BEDDURY 59131 386677 37.7 55.7 100.3 18.2 HATSHEAD-HEYROD 35 STALYBRIDGE 399742 27.4 84.4 6.7 1.9 HUNCOAT	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BICDHAM	5.6 11 6.6 11 6.6 11 11 11 11 11 5.6	BSP ADSWOOD AGECROFT ALTRINCHAM ALTRINCHAM BARROW BARTON BBARROW BARROW BLACKBURN BLACKBURN BLACKBURN BLACKBURN BLACKBURN BLOM ST BOLTON BURY BURY BURY BURY CARLISLE CABDINGTON SED	Voltage (kV) 33 33 33 33 33 33 33 33 33 33 33 33 33	B B CA CA B HARR CA B CA B PENWORTH PENWORTH PENWORTH PENWORTH B PENWORTH SOUTH SOUTH S SOUTH S S S S T S T CA B CA B CA B CA B CA B CA B CA B CA	SP Group REDBURY KEARSLEY REINGTON KEARSLEY REINGTON CEARSLEY REINGTON OCHDALE AM WEST / STA MEAST / ROCA AM WEST / STA MEAST / ROCA CEARSLEY OCHDALE KEARSLEY OCHDALE KEARSLEY CHUTTON BEINGTON	INAH IDALE INAH	BSP Coord Easting 389188 30345 376380 366150 319709 376758 391033 332328 370584 330385 384221 330385 384221 372255 385569 380272 386555 332510	Instes Northing 388310 401831 389012 402088 470489 397174 413945 439711 425208 435308 397717 410566 431045 555583 393020	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 28.6 0.0 18.3 58.1 23.9 0.0 0.0 7.6	adroom (MW) Non Firm 73.6 26.5 37.2 79.4 76.7 74.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.6 51.6	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7 10.7 0.0	adroom - N-O - (MW) Synchronous 54.1 25.4 25.4 14.5 1.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 0.0	Battery Sto N-0
DROVLSDEN 33 STALYBRIDGE 390140 398146 42.1 60.1 10.7 1.9 EGREMONT 33 HARKER / HUTTON 301070 513074 68.1 76.1 97.5 58.7 FRDEDRICK RD 33 KEARSLEY 381795 399250 0.0 10.2 6.7 1.9 GOLBORNE 33 BOLD 360607 397690 3.7 18.7 0.0 0.0 GREENHILL 33 WHTEGATE 399252 404755 31.3 31.3 38.5 7.0 HAZEL GROVE 33 BREDDURY 391313 386877 37.7 55.7 100.3 18.2 HARTSHEAD-HEYROD 33 STALYBRIDGE 397322 39942 27.4 84.4 6.7 1.9 HUNCOAT 33 PADIHAM 37797 431083 37.1 55.1 31.5 5.7 HVDE 33 STALYBRIDGE 395522 95547 53.8 71.8 10.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BISCHAM	6.6 11 6.6 11 6.6 11 11 11 11 5.5	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW BARROW BARROW BLACKPOOL BLOM ST BOLTON BURY BURY BURY BURY CARINETFON	Voltage (kV) 33 33 33 33 33 33 33	B B CA CA CA CA CA PENWORTH PENWORTH PENWORTH SOUTH SOUTH SOUTH SOUTH ARR HARR CA CA CA CA CA CA CA CA CA CA CA CA CA	SP Group REDBURY (EARSLEY RRINGTON CEARSLEY ER / HUTTON RRINGTON OCHDALE AM WEST / STA MANCHESTER (EARSLEY OCHDALE EARSLEY ALYBRIDGE (EARSLEY ALYBRIDGE (EARSLEY ALYBRIDGE (EARSLEY ALYBRIDGE (CHDALE RC) / HUTTON RRINGTON OCHDALE	INAH IDALE INAH	BSP Coord Easting 380188 380185 380345 376380 366150 319709 376758 391033 332328 370584 330835 330835 330835 330835 3385569 380272 4007669 380555 3385559 330272 4007659 373110 388555	Instes Northing 388310 401831 389012 402088 470489 397174 413945 439711 425204 435308 937717 405566 434469 556583 393020 41129A	Demand Hee Firm 55.6 14.5 19.2 39.4 46.7 55.3 33.9 46.0 0 28.6 0.0 28.6 23.9 0.0 7.6 21.6 19.6	adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.6 51.6 58.9	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 12.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Sto N-0
EGREMONT 33 HARKER / HUTTON 301070 513074 68.1 76.1 97.5 58.7 FREDERICK RD 33 KEARSLEY 381795 399250 0.0 10.2 6.7 1.9 GOLBORNE 33 BOLD 360607 397590 3.7 18.7 0.0 0.0 GREENHILL 33 WHTEGATE 393252 404755 31.3 33.5 7.0 HAZEL GROVE 33 BREDBURY 391313 366877 37.7 55.7 100.3 18.2 HARTSHEAD-HEYROD 33 STALYBRIDGE 397322 39942 27.4 84.4 6.7 1.9 HUNCOAT 33 PADIHAM 37797 431083 37.1 55.1 31.5 5.7 HYDE 33 STALYBRIDGE 399522 395647 53.8 71.8 10.7 1.9 KEARSLEY LOCAL 33 KEARSLEY 37535 404783 9.4 52.4 6.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BISDHAM	6.6 11 6.6 11 6.6 11 11 11 11 6.6	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW BARTON BEIFEID BISPHAM BLACKPOOL BLOCM ST BOLTON BURY BURY BURY BURY CARUSLE CARRINGTON BSP CASTLETON	Voltage (kV) 33 33 33 33 33 33 33 33 33 33 33 33 33	B B CA CA CA CA CA CA CA CA CA CA CA CA CA	ISP Group REDBURY (EARSLEY EARSLEY EAR / HUTTON RRINGTON OCHDALE AM WEST / STC M EAST / ROCC M EAST / ROCC M EAST / ROCC M EAST / ROCC AM WEST / STC EARSLEY OCHDALE (EARSLEY ALYBRIDGE EA / HUTTON RRINGTON OCHDALE (HITEGATE	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584 330835 384221 330835 384221 383559 383555 383555 383555 383555	Instes Northing 388310 401831 389012 402088 470489 397174 439713 422294 435308 397717 410566 434469 411184 375476 5556583 3993020 403821	Demand He Firm 55.6 14.5 19.2 19.2 19.4 47.5 19.2 19.2 19.4 46.7 55.3 33.9 60.0 28.6 0.0 0.2 8.6 0.0 18.3 58.1 23.9 0.0 7.6 21.6 19.9	adroom (MW) Non Firm 73.6 26.5 65.5 65.5 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.6 51.6 58.9 10.5	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 67 54.7 40.6 84.4 35.9 160.0 10.7 10.7 10.7 10.7 10.7 9.7 0.0 122.6 98.3	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 12.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Sto N-0
FREDERICK RD 33 KEARSLEY 381795 399250 0.0 10.2 6.7 1.9 GOLBORNE 33 BOLD 360607 397690 3.7 18.7 0.0 0.0 GREENHIL 33 WHITEGATE 399262 404755 31.3 31.3 38.5 7.0 HAZEL GROVE 33 BREDDURY 391313 386877 37.7 55.7 100.3 18.2 HATSHEAD-HEYROD 33 STALVBRIDGE 397322 399442 27.4 84.4 6.7 1.9 HUNCOAT 33 PADIHAM 37797 431083 37.1 55.1 31.5 5.7 HYDE 33 STALVBRIDGE 399522 395647 53.8 71.8 10.7 1.9 KEARSLEY LOCAL 33 KEARSLEY 376355 404783 9.4 52.4 6.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BISDHAM	6.6 11 6.6 11 5.6 11 11 11 5.5	BSP ADSWOOD AGECROFT ALTRINCHAM ALTRINCHAM BARTON BARTON BARTON BLACKBURN BLACKBURN BLACKBURN BLACKBURN BLACKBURN BLACKBURN BLOM ST BOTON BURNLEY BURY BURY BURY CARLISLE CARRINGTON BSP CASTLETON CARDERTON DROYLOSEN	Voltage (kV) 33 33 33 33 33 33 33	B B CA CA CA CA CA PENWORTH PENWORTH PENWORTH PENWORTH SOUTF	SP Group REDBURY (EARSLEY REINIGTON REINIGTON REINIGTON RRINGTON OCHOALE EARSLEY AM WEST / STA M MEST / STA M MEST / STA (EARSLEY ALYBRIDGE ER / HUTTON RRINGTON OCHOALE (HITEGATE ALYBRIDGE	INAH IDALE IDALE	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584 330835 332328 370584 330835 332528 384521 338559 380272 407769 338655 373110 3388461 389137	Instes Northing 388310 401831 389012 402088 470489 397174 413945 439711 429294 435056 434469 555658 393020 411290 403821 398146	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 28.6 0.0 28.6 0.0 28.8 1 23.9 0.0 0 18.3 58.1 23.9 0.0 0 0 0 18.5 19.9 19.9 19.9 19.9	adroom (MW) Non Firm 73.6 26.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.6 51.6 51.6 51.6 58.9 10.5 60.1	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7 10.7 0.0 122.6 98.3 10.7	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Ste N-G
GOLBORNE 33 BOLD 360607 397690 3.7 18.7 0.0 0.0 GREENHILL 33 WHITEGATE 393262 404755 31.3 31.3 38.5 7.0 HAZEL GROVE 33 BREDBURY 391313 386877 37.7 55.7 100.3 18.2 HARTSHEAD-HEYROD 33 STALYBRIDGE 397322 399942 27.4 84.4 6.7 1.9 HUNCOAT 33 PADIHAM 37797 431083 37.1 55.1 31.5 5.7 HYDE 33 STALYBRIDGE 395524 95547 53.8 71.8 10.7 1.9 KEARSLEY LOCAL 33 KEARSLEY 376355 404783 9.4 52.4 6.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BERCHILL BENTHAM BISCHAM	6.6 11 6.6 11 6.6 11 11 11 6.6	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW BARTON BELFIELD BISPHAM BLACKPOOL BLOOM ST BOLTON BURY BURY BURY BURY CARLISLE CARRINGTON BSP CARLISLE CARRINGTON BSP CARLISLE CARRINGTON ST BURY BURY BURY BURY BURY BURY BURY BURY	Voltage (kV) 33 33 33 33 33 33 33	B B CAA HARR CA PENWORTHA PENWORTHA PENWORTHA PENWORTHA SOUTH B N R R SUTH HARR CAA R R W W STT HARR HARR	SP Group REDBURY (EARSLEY RENNIGTON (EARSLEY) RENNIGTON OCHDALE AM WEST / STA MM EST / STA MM STA / STA MAY STA (EARSLEY OCHDALE (EARSLEY OCHDALE EAR / HUTTON RRINGTON OCHDALE RE/ HUTTON RRINGTON OCHDALE (EARSLEY ALYBRIDGE EAR / HUTTON	INAH IDALE IDALE	BSP Coord Easting 389188 380345 376380 376380 3976758 391033 332328 370584 330355 384221 372255 385569 3884221 372255 388559 388552 333110 388655 373110 388559 3338555 373110 388451 338655 373110 388451 388451 388451 388451 388451 388451 389137	Instes Northing 388310 401831 389012 402088 402088 470489 997174 413945 439711 413945 439714 413945 433701 556583 939202 411290 403821 998146 513074	Demand He Firm 55.6 14.5 14.5 19.2 39.4 49.7 49.7 55.3 33.9 60.0 28.6 0.0 18.3 58.1 23.9 0.0 7.6 21.6 19.9 23.9 10.5 10.5 42.1 68.1	adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.6 51.6 58.9 10.5 60.1 76.1	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 98.3 10.7 98.3 10.7	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 19 12.9 7.4 36.6 6.7 45.8 19 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Stor N-O
GREENHILL 33 WHITEGATE 392362 404755 31.3 31.3 38.5 7.0 HAZEL GROVE 33 BREDBURY 391313 386877 37.7 55.7 100.3 18.2 HARTSHEAD-HEYROD 33 STALYBRIDGE 397322 399442 27.4 84.4 6.7 1.9 HUNCOAT 33 PADIHAM 37797 431083 37.1 55.1 31.5 5.7 HYDE 33 STALVBRIDGE 395522 395647 53.8 71.8 10.7 1.9 KEARSLEY LOCAL 33 KEARSLEY 376355 404783 9.4 52.4 6.7 1.9	BARROW BARTON DOCK RD BELGRAVE BENCHILL BENTHAM BLCDHAM	6.6 11 6.6 11 6.6 11 11 11 11 5.6	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARTON BARTON BLACKBURN BLACKBURN BLACKBURN BLACKBURN BLACKBURN BLACKPOL BLOM ST BURY BURY BURY BURY CARLISLE CARRINGTON BSP CASTLETON CHADDERTON DROYLSDEN EGREMONT FREDERICK RD	Voltage (kV) 33 33 33 33 33 33 33	B B CA CA B CA CA CA CA CA CA PENWORTH PENWORTH SOUTH	ISP Group REDBURY (EARSLEY (EARSLEY) REA/HUTTON RRINGTON OCHDALE REA/HUTTON AM WEST / STA AM WEST / STA AM WEST / STA AM WEST / STA CHDALE CARSLEY OCHDALE (EARSLEY ALYBRIDGE RRINGTON OCHDALE HITEGATE RRINGTON ALYBRIDGE ER / HUTTON REA/BRIDGE	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 366150 319709 319709 319709 319709 3310758 330335 332328 330385 330385 330385 330385 330355 330559 330555 3385569 330722 407769 3386555 3373110 388565 3373110 388461 389137 390140	Instes Northing 388310 401831 389012 402083 470489 997174 439711 413945 435308 397717 410469 434469 43144 556583 393020 411290 400821 513074 399250	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 46.7 55.3 33.9 60.0 28.6 0.0 28.6 0.0 0.0 88.1 23.9 0.0 7.6 21.6 21.9 9.9 10.5 24.2 1 9.9 10.0 24.2 10.0 24.5 24.5 24.5 24.5 24.5 24.5 24.5 24.5	adroom (MW) Non Firm 73.6 26.5 97.2 79.4 76.7 74.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.6 51.6 51.6 51.6 51.9 76.1 23.9 48.3 28.5 51.6 5	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 35.9 160.0 10.7 10.7 10.7 10.7 98.3 10.7 98.3 10.7 97.5 6.7	adroom - N-O - (MW) Synchronous 54.1 25.4 25.4 25.4 17.1 14.5 1.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Sto N-C
HAZEL GROVE 33 BREDBURY 391313 386877 37.7 55.7 100.3 18.2 HARTSHEAD-HEYROD 33 STALVBRIDGE 397322 399942 27.4 84.4 6.7 1.9 HUNCOAT 33 PADIHAM 377997 431083 37.1 55.1 31.5 5.7 HVDE 33 STALVBRIDGE 395524 395647 53.8 71.8 10.7 1.9 KEARSLEY LOCAL 33 KEARSLEY 376355 404783 9.4 52.4 6.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM RISCHAM	6.6 11 6.6 11 6.6 11 11 11 8.6	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARROW BARROW BARROW BLACKPOOL BLOM ST BURY BURY BURY BURY BURY BURY CARLINE CARRINGTON BSP CASTLETON CHADDERTON DROYLSDEN EGREMONT FREDERICK RD GOLBORNE	Voltage (kV) 33 33 33 33 33 33 33	B B CA CA CA CA CA PENWORTHA PENWORTHA PENWORTHA PENWORTHA SCA R CA CA CA CA CA CA CA CA CA CA CA CA CA	SP Group REDBURY (EARSLEY REINIGTON REARSLEY EA/ HUTTON RRINGTON OCHDALE EA/ HUTTON AM WEST / ST/ MACHESTER (EARSLEY ALYBRIDGE EA/ HUTTON RRINGTON OCHDALE EA/ HUTTON RRINGTON OCHDALE EA/ HUTTON RRINGTON OCHDALE EA/ HUTTON RRINGTON OCHDALE EA/ HUTTON CALBARE BUDD	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 332328 370584 330335 332328 370584 330335 384221 372255 383559 383559 383559 383559 383559 383559 333110 383559 333855 333110 383559 333855	Instes Northing 388310 401831 389012 402088 402088 470489 397174 413945 439711 429294 435308 997174 410566 434469 937502 411280 403821 398126 397690	Demand Hee Firm 55.6 14.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 28.6 0.0 28.6 0.0 28.6 23.9 0.0 7.6 21.6 23.9 0.0 7.6 21.6 58.1 20.5 10.5 10.5 10.5 10.5 10.5 10.5 10.5 1	adroom (MW) Non Firm 73.6 26.5 65.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.6 51.6 58.9 10.5 60.1 76.1 10.2 18.7	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 40.6 84.4 36.9 160.0 10.7 10.7 10.7 10.7 98.3 10.7 97.5 6.7 0.0	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 12.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Sto N-0
HARTSHEAD-HEYROD 33 STALYBRIDGE 39732 399942 27.4 84.4 6.7 1.9 HUNCOAT 33 PADIHAM 37797 431083 37.1 55.1 31.5 5.7 HVDE 33 STALYBRIDGE 395527 395647 53.8 71.8 10.7 1.9 KEARSLEY LOCAL 33 KEARSLEY 376355 404783 9.4 52.4 6.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BISDHAM	6.6 11 6.6 11 6.6 11 11 11 11 11 6.6	BSP ADSWOOD AGECROFT ALTRINCHAM BARTON BARTON BARTON BLOCKERTON BLOCKERTON BLOCKERTON BURY BURY BURY BURY BURY BURY BURY CARLISLE CARRINGTON BSP CASTLETON CARLISLE CARRINGTON BSP CASTLETON DROYLSDEN EGREMONT FREDERICK RD GOLBORNE GREENHILL	Voltage (kV) 33 33 33 33 33 33 33 33 33 33 33 33 33	B B CA CA CA CA CA CA CA CA PENWORTH PENWORTH PENWORTH PENWORTH PENWORTH CA CA CA CA CA CA CA CA CA CA CA CA CA	ISP Group REDBURY (EARSLEY EARSLEY EARSLEY EAR / HUTTON RRINGTON OCHDALE AM WEST / 517 M AAST / ROCH AM WEST / 517 M ANCHESTER EARSLEY OCHDALE EARSLEY OCHDALE EARSLEY OCHDALE EARSLEY ALYBRIDGE EAR / HUTTON EARSLEY BOLD HITEGATE BOLD	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 376380 376758 391033 332328 370584 330335 384221 372255 385569 383655 373110 388451 383655 373110 388451 383655 373110 388451 383655 373110 388451 383655 37310 383655 39310 39310 39307 30107 3010	Instes Northing 388310 401831 389012 402088 470489 397174 439711 429294 433701 429274 413845 439711 410566 434469 411184 555583 393020 411280 403821 398146 513074 399250 397690	Demand He Firm 55.6 14.5 14.5 19.2 39.4 47.5 55.3 33.9 40.0 28.6 0.0 18.3 58.1 23.9 0.0 18.3 58.1 23.9 0.0 7.6 21.6 21.6 19.9 21.6 19.9 21.6 21.6 3.7 6 3.7 7 5 5 3.3 3.3 9 0.0 7 6 3.3 7 5 5 3.3 3.4 5 5 5 3.3 3.3 9 4 4 4 5 5 5 5 3.3 3.4 5 5 5 3.3 5 5 5 5 3.3 5 5 5 5 5 5 5 5 5	adroom (MW) Non Firm 73.6 26.5 65.5 65.5 79.4 76.7 74.9 77.6 10.4 37.3 76.1 23.9 48.3 76.1 23.9 48.3 28.6 51.6 58.9 10.5 60.1 76.1 10.2 18.7 31.3	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 10.7 10.7 10.7 10.7 10.7 10.7 6.7 6.7 6.7 0.0 10.7 10.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 0.7 98.3 0.7 97.5 6.7 0.0 38.5	adroom - N-O - (MW) Synchronous 25.4 25.4 25.4 25.4 25.4 17.1 14.5 19 12.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Sto N-C
HUNCOAT 33 PADIHAM 37797 43108 37.1 55.1 31.5 5.7 HYDE 33 STALYBRIDGE 395522 395647 53.8 71.8 10.7 1.9 KARASLEY_LOCAL 33 KEARSLEY 376355 404783 9.4 52.4 6.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BICDHAM	6.6 11 6.6 11 6.6 11 11 5.5	BSP ADSWOOD AGECROFT ALTRINCHAM ATHERTON BARTON BARTON BLOW BLOW BLOW BLOW BLOW STON BLACKBURN BLACKPOOL BLOW ST BURY BURY BURY BURY BURY CARTINGTON CARJUETON CARJUETON CARJUETON CARJUETON CARJUETON CRADUCTION CRADUCTION CRADUCTION CRADUCTION CRADUCTION CRADUCTION CRADUCTION CRADUCTION CONSEN CO	Voltage (kV) 33 33 33 33 33 33 33 33 33 33 33 33 33	B B CA CA CA CA CA CA CA CA CA CA CA CA CA	SP Group REDBURY (EARSLEY EARSLEY EARSLEY EAR) HUTTON RRINGTON OCHDALE EAR) HUTTON M WEST / STA M WEST / STA	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 319709 319709 319709 3307578 391033 332328 370584 330835 384221 372255 382559 380272 407769 383655 373110 383559 383559 383559 383559 373110 383655 37310 383655 37310 383655 37310 383655 37310 383655 37310 383655 37310 383655 37310 383655 37310 38372 37310 383722 37310 383722 37372 377772 37772 37772 377772 377772 377772 377772 377772 377772 3777772 377777777	Instes Northing 388310 401831 389012 402088 470489 397174 413945 439711 429294 43505 439717 4039711 439711 439714 43506 437469 9377476 9393020 411289 938146 513074 399520 404755 3986877	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 28.6 0.0 28.8 1 23.9 60.0 7.6 21.6 0.0 7.6 21.6 8.1 0.0 3.7 31.3 3.7 31.3 3.7	adroom (MW) Non Firm 73.6 26.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.6 51.6 51.6 51.6 51.6 51.6 51.6 51.7 10.2 10.2 11.7 31.3 55.7	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7 10.7 10.7 10.7 98.3 10.7 97.5 6.7 0.0 38.5 100.3	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery St
HYDE 33 STALYBRIDGE 395522 395647 53.8 71.8 10.7 1.9 KEARSLEY LOCAL 33 KEARSLEY 376355 404783 9.4 52.4 6.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BISCHOM	6.6 11 6.6 11 6.6 11 11 6.6 11 5.6	BSP ADSWOOD AGECROFT ALTRINCHAM BARTON BARTON BELFIELD BISPHAM BLACKPOOL BLOOM ST BOLTON BURY BURY BURY BURY BURY CARLISLE CARRINGTON BSP CARLISLE CARRINGTON BSP CARLISLE CARRINGTON BSP CARLISLE CARRINGTON BSP CARLISLE CARRINGTON ST BURY BURY BURY BURY BURY BURY BURY BURY	Voltage (kV) 33 33 33 33 33 33 33	B B CA CA CA CA CA CA CA CA CA CA CA CA CA	SP Group REDBURY (EARSLEY RRINGTON REARSLEY ER / HUTTON RRINGTON OCHDALE AM WEST / STA M EAST / ROCK AM WEST / STA MAINCHESTER (EARSLEY OCHDALE EARSLEY ALYBRIDGE LE / HUTTON RRINGTON OCHDALE RAINET REAL HITEGATE ALYBRIDGE EX / HUTTON (EARSLEY BOLD HITEGATE REDBURY LAYBRIDGE REDBURY	INAH IDALE IDALE	BSP Coord Easting 389188 380345 376380 366150 319709 376758 370758 370758 370758 370758 370758 370758 370758 370758 370758 380272 370255 385569 380272 407769 383655 373110 383559 388451 383655 373110 383655 373110 380407 3901070 381795 3800607 393262 391313	Instes Northing 388310 401831 389012 402088 402088 997174 413945 4397111 413945 439711 410566 375476 555658 993020 411290 403821 398146 513074 9397590 404755 3866972 3999942	Demand Hee Firm 55.6 14.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 28.6 23.9 0.0 7.6 21.6 23.9 0.0 7.6 21.6 10.5 42.1 68.1 0.0 3.7 31.3 37.7 27.4	adroom (MW) Non Firm 73.6 26.5 65.5 79.4 76.7 74.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.6 51.6 58.9 10.5 60.1 76.1 10.2 18.7 31.3 35.7 84.4	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 100.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 10.7 0.0 38.5 100.3 6.7	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 19 12.9 7.4 36.6 6.7 45.8 19 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery St N-4
KEARSLEY LOCAL 33 KEARSLEY 376355 404783 9.4 52.4 6.7 1.9	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENCHILL BICDHAM	6.6 11 6.6 11 6.6 11 11 11 11 11 6.6	BSP ADSWOOD AGECROFT ALTRINCHAM BARTON BARTON BARTON BEIFEID BISPHAM BLACKPOOL BLOM ST BURY BURY BURY BURY BURY BURY BURY BURY	Voltage (kV) 33 33 33 33 33 33 33 33 33 33 33 33 33	B B CA CA CA CA CA CA CA CA CA CA CA CA CA	ISP Group REDBURY (EARSLEY (EARSLEY) REANINGTON RRINGTON OCHDALE AM WEST / ST/ MANCHST / ROCH AM WEST / ST/ MANCHSTER EARSLEY OCHDALE (EARSLEY OCHDALE (EARSLEY OCHDALE REANINGTON OCHDALE REANINGTON OCHDALE REANINGTON CHDALE HINTEGATE BOLD BOLD HINTEGATE BOLD HINTEGATE BOLD HINTEGATE ALYBRIDGE REANINGTON CHDALE HINTEGATE BOLD	INAH IDALE INAH	BSP Coord Easting 389188 380345 376380 376580 319709 319709 319709 319709 330355 330335 334221 370584 330355 334221 372255 380569 380272 407769 380555 3835569 380272 407769 3835555 3835555 3835555 38355555555	Instes Northing 388310 401831 389012 402083 470489 997174 439711 413945 435708 435714 439717 410465 397717 435469 431184 375476 555683 398146 513074 399250 399250 431083 431083	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.3 33.9 60.0 28.6 0.0 0.28.6 0.0 0.28.6 0.0 0.28.6 58.1 23.9 0.0 0.0 7.6 21.6 19.9 10.5 58.1 23.9 19.9 10.5 58.1 23.9 35.1 21.5 35.7 55.3 58.1 23.9 35.7 55.3 58.1 23.9 35.7 55.5 55.5 55.5 55.5 55.5 55.5 55.5	adroom (MW) Non Firm 73.6 26.5 97.2 79.4 76.7 74.9 77.6 46.6 10.4 37.3 76.1 23.9 48.3 28.6 51.6 55.7 84.4 55.7 84.4 55.1	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7 10.7 10.7 10.7 10.7 6.7 98.3 10.7 6.7 0.0 38.5 100.3 6.7 0.0 38.5 100.3 6.7 31.5	adroom - N-O - (MW) Synchronous 25.4 25.4 25.4 25.4 25.4 17.1 14.5 19 12.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Str N-1
	BARROW BARTON DOCK RD BEDFORD BELGRAVE BENCHILL BENTHAM BICDHAM	6.6 11 6.6 11 6.6 11 11 11 5.5	BSP ADSWOOD AGECROFT ALTRINCHAM BARROW BARROW BARROW BARROW BLACKPOOL BLOM BLACKPOOL BLOM ST BOLTON BURY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY BUARY CARLISE CARRINETON BUARY CARLISE CARRINETON CARLISE CARRINETON CARLISE CARRINETON CARLISE CARRINETON CARLISE CARRINETON CARLISE CARLISE CARRINETON CARLISE CARLIS	Voltage (kV) 33 33 33 33 33 33 33 33 33 33 33 33 33	B B CA B CA B CA CA CA CA CA CA CA CA CA CA CA CA CA	SP Group REDBURY (EARSLEY REARSLEY REARSLEY (EARSLEY) REARSLEY (EARSLEY) (EARSLEY) (EARSLEY) (CHOALE) (CHOALE)	INAH IDALE IDALE	BSP Coord Easting 389188 380345 376380 366150 319709 376758 391033 370584 330335 370584 330355 380421 332528 380421 338559 380422 338559 380427 338465 339110 388461 300100 381795 3890140 380179 381795 380607 393262 391313 397322 377997	Instes Northing 388310 401831 389012 402088 470489 397174 413945 439711 429294 435703 407547 439711 977174 977174 977174 977174 977173 977174 97565 938146 513074 97755 939547 431083 995647	Demand He Firm 55.6 14.5 47.5 19.2 39.4 46.7 55.8 38.9 60.0 28.6 0.0 18.8 23.9 0.0 18.8 23.9 0.0 18.8 23.9 0.0 18.8 21.6 19.9 10.5 42.1 42.1 42.1 42.1 42.1 3.7 3.7.7 37.7 37.4 353.8	adroom (MW) Non Firm 73.6 26.5 37.2 79.4 76.7 74.9 51.9 77.6 46.6 10.4 37.3 28.6 51.7 23.9 48.3 28.6 51.6 51.6 51.6 51.7 23.9 48.3 28.6 51.6 51.6 51.7 23.9 48.3 28.6 51.6 51.6 51.6 51.7 23.9 48.3 28.6 51.7 51.7 51.7 51.6 51.6 51.6 51.6 51.6 51.6 51.7 71.8 51.7 71.8 51.7 71.8 7	Generation He Inverter Based 150.1 90.4 151.5 94.5 80.2 6.7 54.7 40.6 84.4 36.9 160.0 10.7 10.7 10.7 6.7 98.3 10.7 97.5 6.7 0.0 38.5 100.3 6.7 31.5 10.7	adroom - N-O - (MW) Synchronous 54.1 25.4 46.4 17.1 14.5 1.9 7.4 36.6 6.7 45.8 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	Battery Str N-4

Background Primary & BSP Headroom Data

- Basis of the previous tools
- Considers:
 - Network thermal capacity
 - Fault levels
 - Existing demand and generation
 - Accepted demand and generation

Heat Map Tool – Transmission Capacity

Appendix G Summ	ary							
GSP / Site		Capacity o	f Connected & Co	ctions (MW)	Materiality Headroom	Materiality	С	
		Part 1	Part 2	Part 3	Part 4	(Part 5) (MW)	Status	
BOLD*	BOLD	25.1	50.0	0.0	0.0	0	В	
BREDBURY	BREDBURY	10.1	78.5	0.0	0.0	57.75	A	
CARRINGTON	CARRINGTON	105.0	114.0	0.0	0.0	119	A	
HARKER	HARKER	671.0	123.7	0.0	143.9	0	С	
HUTTON	HUTTON	47.9	8.0	0.0	67.6	0	С	
HEYSHAM	HEYSHAM	284.6	0.0	0.0	105.1	0	С	
KEARSLEY	KEARSLEY	57.9	214.8	0.0	0.0	0	В	
KIRKBY	KIRKBY	6.0	115.9	0.0	0.0	0	В	
MACCLESFIELD	MACCLESFIELD	27.9	22.6	0.0	0.0	47.4	Α	
PADIHAM	PADIHAM	35.5	164.6	0.0	0.0	25.9	Α	
PENWORTHAM	PENWORTHAM	190.9	446.0	0.0	0.0	90	A	
ROCHDALE	ROCHDALE	204.7	161.7	0.0	0.0	0	В	
SOUTH MANCHESTER	SOUTH MANCHESTER	22.2	70.3	0.0	0.0	89.6	A	
STALYBRIDGE	STALYBRIDGE	58.3	221.5	0.0	0.0	33.5	В	
STANAH	STANAH	195.9	54.5	0.0	0.0	5	В	
WASHWAY FARM	WASHWAY FARM	14.2	112.7	0.0	0.0	18.5	A	
WHITEGATE	WHITEGATE	32.0	164.0	0.0	0.0	0	В	

Appendix G Summary

- Lists all ENWL GSPs
- Indicates:-
 - Existing generation connections
 - Constrained generation connections
 - Future generation connections
 - Thermal headroom
 - Fault level headroom

Heat Map Tool – Development



1.4



 In addition to the Excel workbook we will be introducing an interactive map to the web page

 Enable users to click on substation markers, which will display a pop up of information relating to the substation

Pelectricity

Bringing energy to your door

書冊書の書

Connection Offer Expenses: Update

Brian Hoy

BEIS introduced new regulations from April 2018

These allow DNOs to charge customers for their connection offer whether it is accepted or not

BEIS intention is to allow a fairer allocation of costs to customers



What do we charge for?



What we don't charge for

Budget Estimates

Minor connections (1-4)

Cancellations within cooling off period

Offers for diversions

What we do charge for

EHV offers (demand and gen) from May 18 HV generation offers over 1MVA from Jan 2019

Requotes including interactivity requotes

Cancellations (after cooling off period)

Gen+ initial assessments

What we might charge for in future

LV and other HV offers (demand and generation) but no immediate plans to

These charges will be due whether the connection offer is accepted or not





25

Four different options available to you for EHV offers and HV generation over 1MVA offers

Budget Estimate	Gen +	Full Works Offer	POC Only Offer
 No charge Can't accept No queue position 	 Initial charge of £500 payable in advance Further charge of £1,000 for full offer Queue position retained 	 Initial charge of £1,000 for Dual Offer Balance based on type of acceptance: £20,200 for EHV full works £15,800 for EHV POC only £5,870 for HV gen full works £4,500 for HV gen POC only 	 Initial charge of £1,000 for connection Offer Balance based on type of acceptance: £15,800 for EHV POC only £4,500 for HV gen POC only

EHV applicable from 4 May 2018 HV Generation greater 1MVA applicable from 1 January 2019

DEMAND	ENWL	NPg	SPEN	SSEN	UKPN	WPD
	No	Full	No	No	No	No
Demand LV work	charge	charge	charge	charge	charge	charge
	No	Full	No	Some	No	No
Demand HV work	charge	charge	charge	charge *	charge	charge
	Some	Full	Full	Some	No	Full
Demand EHV work	charge	charge	charge *	charge	charge	charge

* Denotes not all categories charged for

DG	ENWL	NPg	SPEN	SSEN	UKPN	WPD
	No	Full	No	No	No	No
DG LV work	charge	charge	charge	charge	charge	charge
	Some	Full	Full	Some	Some	No
DG HV work	charge *	charge	charge	charge	charge	charge
	Some	Full	Full	Some	Some	Full
DG EHV work	charge	charge	charge	charge	charge	charge

The tables above show where DNOs currently have implemented charges categorised as:

- 'Full charge'
- 'Some charge'
- 'No charge'

Stakeholder feedback has been for "consistency" but not always explicit on which approach.

One stakeholder group has indicated that they will initiate a modification to the Common Connections Charging Methodology

Should we change our approach?



- We are seeking to recover our costs and there are different ways we can do this
- Our initial approach was to have a relatively low charge for the quote which results in a large charge for the small number of acceptances
- We could increase the charge for the quote which would reduce the charge on acceptance
- Different approaches have different impacts on different stakeholders but we are interested in whether there is an overall preference in the light of experience
- Graphs show illustrative values

Pelectricity

Bringing energy to your door

Interactivity Process Brian Hoy

Stay connected... **F III III** www.enwl.co.uk

ENA consultation responses

- ENA Open Networks published a joint consultation on Application Interactivity and Queue Management
 - was open for eight weeks and closed on 25 September 2019.
- Consultation was on a 'minded to' consistent approach to interactivity based on the current UKPN approach
- Good reach:
 - ENA Webinar (40 attendees, over 20 Questions)
 - SSEN Webinar
 - LinkedIn Blog (over 100 readers)
- Good level of response:
 - 19 responses received from a broad range of stakeholders



- Consumer group
 Local authority
- Generation
- Generation/ Supply Generation/ Storage Networks business
- Supply/ Storage
 Trade Association

Application Interactivity

- Broad support for policy proposal
- Some detailed comments on related topics

Connection Queue Management

- Support for the principle of queue management
- Support for the proposal to promote flexibility in the connection queue where it frees capacity for others (action 1.6 of Smart Systems and Flexibility Plan)
- Concern raised on the detail of the policy particularly around the risk of customers being penalised on prescriptive time-lapsed application of milestones for issues out with their control

The 'Conditional' approach for interactivity



Offer preparation period

Application Interactivity

- Produce a guide to explain the 'conditional' process in more detail ~ Jan 2020
- Hold stakeholder briefings ~ Feb 2020
- Publish final guide ~ March 2020
- Develop an implementation timetable for network companies to roll out the new process ~ March 2020
- Prepare a process to apply the 'conditional' interactivity approach to connections across Transmission and Distribution where there is interactivity between customers connecting to different networks ~ 2020 work
- Extent across Distribution to Distribution and IDNOs to follow in 2020

Lunch & Networking





Pelectricity

Bringing energy to your door

書圖正書命書

Your post acceptance journey John Carlisle / Tracey Taylor

Project Delivery Lifecycle



Post acceptance, Project Delivery lifecycle for HV & EHV Projects.



Post acceptance – Project initiation

Stakeholder engagement meeting

Planning application status

Land Rights and Consents requirements

Project constraints and planning

Communication plan

Transmission approval

Milestone achievement

Statutory approvals will be confirmed, ensuring that the project is a "real project" and can proceed.

Design – definition of scope

Civil Design

Detailed Electrical Design

Route Proving

Land Rights and Consents

Milestone achievement

The scope of the project is defined, allowing the implementation of the Procurement and Quality Management Plan.

Procurement and mobilisation



Construction



Contestable works

Out of Outage Non-contestable works

Progress reporting

Quality Management Plan

G99 Commissioning Plan

Outage Planning

Milestone achievement

Project is built, Outage Plan is baselined and the Commissioning Plan is agreed.

Commissioning and Outage







1) How does our delivery lifecycle differ from other DNOs?

2) What do you perceive as the biggest challenge within the delivery lifecycle?

3) Would you propose any changes to our delivery lifecycle?

4) What improvements would you like to see with the delivery lifecycle literature?

Pelectricity north west

Bringing energy to your door

書圖重為

Engineering Recommendation G99

Victoria Brown

Brief Overview

G98:

Requirements for the connection of Fully Type Tested **Micro-generators** (up to and including 16 A per phase) in parallel with public Low Voltage Distribution Networks on or after 27 April 2019



G99:

Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019

PRODUCED BY THE OPERATIONS DIRECTORATE OF ENERGY NETWORKS ASSOCIATION
energy networks association
5 · · · B · · · · · · · · · ·
Engineering Recommendation G99
Issue 1 – Amendment 1
16 May 2018
Requirements for the connection of generation equipment in parallel with public distribution networks on or after 27 April 2019
www.energynetworks.org

Module



• Types affect technical requirements and which forms you use



EREC G99 - Power Generating Units & Power Generating Modules



PGF

PGM

GU

GU

GU

Types depend on PGM capacity

PGM definition depends on whether the technology is synchronous / asynchronous



Power Generating Facility, PGF

EREC G99 Compliance Options





S – Simulation study

P – Design data

MI – Manufacturers information

D – correspondence or other documents confirming requirements are met

 T – Site tests or monitoring to demonstrate compliance (may be witnessed)

TV – Type Test reports



- PGMD (Power Generating Module Document) must be completed by the Generator and sent to ENWL for approval before witness tests/commissioning tests can be undertaken.
 - Although EREC G99 states that the PGMD need only be submitted 28 days prior to synchronisation, we encourage you to submit this to us as early as practically possible. This provides ample time for any necessary changes to be made to the document, after we have assessed it.
- Some common stumbling blocks that have been encountered in recent PGMD submissions are:
 - Forms being submitted in PDF format rather than Word format. Word copies are available from the ENA website and doing this allows us to add comments into the document as feedback for each piece of evidence.
 - Old versions of forms being used on new submissions. This can mean that changes to criteria might not be captured on the PGMD. We recommend downloading a fresh Word copy for every submission –this also removes the possibility of accidently including information relating to another scheme.
 - Some submissions have included vague reference documents or no reference documents at all. Specifying document titles, sections, page references and tables for each evidence requirement enables us to assess your submission, and provide feedback, quicker.
 - Some simulations models have been submitted to ENWL using incompatible software. We require IPSA (full plug in, not UDM) for Type C & D models and the models must represent frequency and voltage dynamic.



- One PGMD must be submitted per generating unit. However, if there are multiple units of the same type, we will not duplicate until the end of the approvals process.
- > Please specify relevant serial numbers for generating units on the PGMD(s).
- Some submissions which relate to Electricity Storage have included evidence for criteria that Electricity Storage is currently exempt from. The exemptions for Electricity Storage can be found on Page 245 of EREC G99 Amendment 5.
- EREC G99 Amendment 5 came into effect on 14 November 2019.
 - This update covers clarification of the requirements for fast fault current injection that are applicable for Type B, C and D generators (excluding Electricity Storage). EREC G99 is constantly evolving and it is important to always refer to the latest amendment to ensure the criteria is up to date, in addition to using the most recent forms.
 - Both the PGMD documents and the latest version of EREC G99 are available on the ENA website: <u>http://www.energynetworks.org/electricity/engineering/distributed-generation/engineering-recommendation-g59.html</u>





1) Have you experienced any challenges with G99 compliance, outside of ENWL?

2) Have these challenges been resolved, and if so how?

3) What further support can we offer you to guide you through the G99 compliance process?

Pelectricity

Bringing energy to your door

書圖重為當

Accelerated Loss of Mains Change Programme

Steffan Jones





- EREC G59 requires GB generation owners to install loss of mains (LoM) protection at their generation sites.
- The two most commons forms of LoM protection are:
 - rate of change of frequency (RoCoF) relays, and
 - vector shift (VS) relays.
- Older relays work on a vector shift principle, which is susceptible to nuisance tripping and new sites connected using G99 or recent sites under G59-3, are prohibited from using VS protection.
- To lower the cost of the reserve generation, National Grid and the ENA have stated that all sites will have to be converted from Vector Shift protection to Rate of Change of Frequency (RoCoF) by September 2022.
- DC0079 is a national working group which has been established to modify historical loss of mains (LoM)
 protection settings to address network stability concerns.
- The first phase oversaw modified protection settings for all installations >5MW. This second phase is looking to modify the protection settings of all G59 generators fitted with LoM protection commissioned prior to February 2018.
- To comply with the latest requirements, it will be necessary to revise the LoM protection settings for all the existing non-type tested embedded generation fleet

- NGESO and DNO/IDNOs have devised a programme for facilitating the change to LoM protection.
- Older forms of LoM protection will need to be changed by September 2022.
- Generator owners will be offered support to help them to make the change.
- As part of the Accelerated Loss of Mains (LoM) Change Programme, generator owners are eligible to apply for a financial contribution to help them get the necessary work done by entering their details into the new online portal which went live on 2nd October 2019.



黄田、黄瓜、黄

- With the exception of the first cycle, the application process will run in cycles of three calendar months.
- At any time following the first call for applications up until closure of the payment scheme, DG owners can apply through a dedicated web portal <u>www.ena-eng.org/ALoMCP</u>. The application will require the provision of contact details and of the technical information necessary to assess the application.
 <u>Window</u> Opening day Closing day Duration
- Capacity
- Generation type
- Number of LoM devices
- Current LoM device type(s) and setting(s)
- Participating distributor
- Lead time for change
- MPAN

Window	Opening day	Closing day	Duration
Window 1	02/10/2019	12/11/2019	6 weeks
Window 2	13/11/2019	11/02/2020	3 calendar months
Window 3	12/02/2020	12/05/2020	3 calendar months
Window 4	13/05/2020	11/08/2020	3 calendar months



Depending on the work required to comply with the new settings, there is funding available on a first come basis:

Scope of works	Baseline approach	Revised approach where works are to be completed by a 'recognised contractor'	Potential Funding
Replacing an existing relay by a new relay	ENWL witness testing	Self certification with % of sites subject to a post event sample site visit	£4000 (plus VAT) per each relay to be replaced
Disabling an existing relay	ENWL witness testing	Self certification with % of sites subject to a post event sample site visit	£1500 (plus VAT)*
Change the settings of an existing relay	Self certification with % of sites subject to a post event sample site visit	Self certification with % of sites subject to a post event sample site visit	£1500 (plus VAT)*

*£500 (plus VAT) for each additional protection device on site that requires either settings change or protection function deactivation up to a maximum of 5 devices totalling £2500 (plus VAT) = £4000 (plus VAT) per site in total.

The amount of sites that will require witnessed testing is currently unknown, as this is dependent on the work needed to make the changes, and the contractor chosen by the DG to carry out the works.



- So far:
- A series of stakeholder events were held by ENA (Energy Networks Association) during April 2019 and a set of slides have been published on their website.
- Details published on ENWL website.
- Publicised in ICE newsletter.
- Email address: <u>ALoMCP@enwl.co.uk</u>
- Social media.
- Direct contact either via email or letter.

Celectricity

Bringing energy to your door

書圖重合書

Our Commitments Update

Hannah Sharratt



Action	Progress
Communicate with our Stakeholders on Engineering Recommendation G99 requirements for the connection of Generation Equipment.	
Engage with Stakeholders on our transition to Distribution System Operator (DSO) Strategy.	
Continuously improve how we provide information and publish requirements for flexible services, such as Demand Side Response.	
Clearly communicate where flexible connection options are available.	
Provide briefings for stakeholders on the proposed changes to charges through Ofgem's significant code review.	
> Review our interactivity processes in line with best practise identified through the Open Networks Project.	
Lead the national engagement with stakeholders on more consistent DNO connection charging approach to make charging fair for all of our customers.	



Action	Progress
Engage with our Stakeholders to improve outage communications, adopting the principles of the Solar Trade Association (STA) best practice guide and apply where appropriate.	
Improve access and presentation of information on available thermal capacity and fault level on our network.	
Engage with stakeholders to review and improve the post acceptance process.	
Engage with our stakeholders on the impact of our new Network Management System.	
Target improved Time to Quote timescales (57 working days).	
Improve 3 rd party access to our Network Information on GIS.	
Improve communications on Transmission Constraints.	
Engage with Stakeholders to improve the ENWL 'Get Connected' website.	

Pelectricity

Bringing energy to your door

書圖重合書

Engagement Methods & Activities Hannah Sharratt

Stay connected... F III O in www.enwl.co.uk

Stakeholder Engagement Methods – your preferences



61

- We have committed to : *Engage with Stakeholders to improve the ENWL 'Get Connected' website.*
 - Establish a working group for external users
 - Undertake a comparison of other similar websites to identify potential improvements & test these ideas with the working group.
 - Define improvements and implement where possible.

Provide feedback on current website Participate in group sessions (face to face or webinar) Provide feedback on improvements

 If you are interested in providing feedback on our website, please contact <u>ICE@enwl.co.uk</u> or register on our <u>events</u> page – dates to be released shortly.

Question & Answer Session





Pelectricity

Bringing energy to your door

Wrap up and Close Mark Williamson

Stay connected... F III O in www.enwl.co.uk

Wrap Up & Close

- Please give us your honest feedback on the forms provided
- Presentation slides will be available via our website shortly.
- Don't forget to get in touch with us at <u>ICE@enwl.co.uk</u>
- Thank you for your attendance and have a safe journey home.



