SMART GRID CONSULTANCY

SMART THINKING FOR A BRIGHTER FUTURE

REACH PROJECT

Rural Overload REPORT WPA2-D1

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Version 0-1

1 Contents

2 Project Background

REACH is working closely with several rural community energy groups previously identified and engaged during the Discovery Phase of this Strategic Innovation Funded (SIF) project. Their role is informing the project's understanding of their decarbonisation priorities and contribute to defining the design requirements for modular rural energy centres aimed at supporting and accelerating their decarbonisation efforts. If developed to the expected conclusion, the final solution will offer communities the ability to own coordinated low carbon heating, public EV charging, and energy storage in areas where commercial markets may not serve customers and where the electricity network has limited capacity.

Working closely with community energy groups, National Grid Electricity Distribution and innovative suppliers, the project is evaluating the feasibility of a novel solution to help customers make cost effective decarbonisation plans. This is being coordinated with wider development plans while continuing to horizon scan for other potential interventions, that could offer a preferable outcome to the conventional reinforcement upgrades. In this 'Alpha phase' we also want to ensure that we identify any other competitive and complimentary solutions that could similarly address such challenges to ensure a wholistic approach to addressing community needs with optimal solutions.

The primary deliverable from the project is the design of an options assessment tool that will enable National Grid and Communities to collaborate and guide them through a process that will help them scope out the potential benefits of a community energy centre. Through this process we intend to help them navigate what would otherwise be a highly complicated interaction requiring specialist knowledge on their part. With the benefit of a tool, it will be possible for communities to input their expected adoption of LCTs, land availability, population growth and other variables to establish viable solutions. Similarly, National Grid will provide the empirical data and probabilistic load forecasting that will ensure that the options reflect the true physics of their energy needs and the network impacts. If introduced into BaU the tool will significantly simplify and enhance the customer journey through the complex variables that help model the financial, carbon and physical parameters on which any deployment decision would be made.

3 Document Purpose

The tool that is being developed is primarily to assist communities with sizing modules for a commercial opportunity that will be owned by either them or a third-party funder, the origins of the project stem from potential capacity constraints that could be particularly acute in rural networks. The REACH project is therefore of potential use to the DNO as well, through the temporary deployment of a hybrid generation module that could be rapidly mobilised in the event that increasing demand could result in restrictions to customers. While communities interested in developing a smart hub for environmental and commercial benefit will have access to the options tool, to assist in their initial 'customer journey' to calculate their optimised specification, the proposition to DNOs is much simpler. The hybrid unit would be deployed temporarily

3.1 Rural Networks

The main development of rural electricity networks started during the late 1940's and the 1950's these continued to be extended to the early 2000's. The network sizing was based on the available power at the point of supply and the load data based on a factor of diversity for domestic dwellings. The main requirements for power in rural areas is for agriculture and domestic where in an urban area it will be primarily for Inustrial and Commercial as well as and domestic. The power demand density in urban area far exceeds that for a rural area and this is reflected in the way networks are designed, managed and maintained, reflecting that larger numbers of users are concentrated within metropolitan areas.

Rural primary substations are fed from a bulk supply point substation, which will be close to an urban area and the cables between this, and the rural primary substation can be as much as 30km in length. These cables will have both overhead lines mounted on poles or towers as well as potentially including some sections of buried cable.

Downstream of the rural primary substation is a network which feeds ground and pole mounted distribution transformers with capacities up to 500Kva for ground mount and 200Kva down to 20Kva pole mounted. These distribution transformers can be 10 to 15KM away from the rural primary substation and these in the main will be overhead lines mounted on poles.

The distribution transformer feeds the low voltage network to customers, and this can be either overhead line or buried.

Domestic dwellings typically have had a very low overall power demand and the network capacity has been based on this low demand which on a normal day has 2 peaks morning during breakfast and evening ten morning peak seen by the network can be 2 hours long and the evening peak 3 hours long. This allows the use of intermittently rated cables which heat up during the peak period and cool down during lower demand periods.

The basic capacity of rural networks has not changed from the original design and installation where we now find that rural primary substations will require reinforcement or upgrading to meet the rising demand that is largely driven gy the growth in domestic LCTs. This reinforcement will require the cables between the bulk supply point to be upgraded with poles and towers possibly need to be changed as well new larger capacity transformers and switchgear. The same applies to the rural areas of the distribution network which will require extensive repolling and new overhead cable spans over long distances, upgraded or additional transformers.

Most of the rural primary substations are connected by what are referred to as radial circuits, which means there is no other interconnection to another point of supply radial circuits. To help visualise what this means, you can compare the cabling hierarchy to a road network where there are motorways and dual carriageways representing the high capacity high voltage lines that transport large volumes of power along main routes. Similar to roads, it is possible for the electricity to be routed in different ways to minimise congestion and help the power flow more efficiently. In this context, radial circuits are best compared with cul-de-sacs as they are only there to provide access at the very end of the journey and have only a single route in or out. It is the simplest and most cost effective method to install and supply low demand areas but does mean ythat there can be a compromises from not having and alternative options for routing, leading to some limited redundancy issues and outages during periods of bad weather,. high winds etc

There is another option which is an interconnected or messed system where rural primaries are interconnected at the lower and high voltages this requires more cables switchgear and then the radial circuits but increases the resilience and can provide increased capacity for peak due to the interconnected nature of a messed network.

4 PROBLEM STATEMENTS

The requirement for households to shift to low carbon technologies for heating and transportation in rural areas is going to create dramatic change in the demand profile of all network but due to the limited capacity of rural networks the impact of this change will be greater and require more reinforcement of the network than in urban areas.

In order to provide some context of the scenarios that support the hypothesis above, the REACH project considered three particular problem scenarios that could lead to customer dissatisfaction resulting from rural capacity restrictions.

4.1 DOMESTIC EV CHARGING

Potential first time EV owners may be unaware of dependencies outside of their control that could impact the availability of an EV charger to their household. This may be related to looped supplies or location of the consumer supply / fuse board being located inconveniently to the preferred exterior location of their charger. These can cause delays and some added expense but are generally addressed on a case-by-case basis. Within the REACH project we have identified a potential issue, particularly in remote or rural environments, that could result in significant delays to provision of a new home charger(s). For example, if someone within a constrained community has decided to get their first EV, they may even have purchased the car or signed their lease agreement before attempting to order a charger. Often this is left to the installer to complete the process of contacting the DNO to inform them that the householder wants to install a charger. Although the DNO is obliged to fulfil any demand connection requests, it may come with certain conditions attached, including delays if the capacity is not readily available. In the case of some rural communities, the delay could be quite significant particularly if being considered from the perspective of someone who has just agreed a 2yr lease deal on a new car.

4.2 Electrification of Heating

The heating scenario has similarities to EV charging, at least in respect of the underlying issues and that the major impact is not that a household can't electrify their heating source, but that it would be potentially significant to a household if they were faced with any protracted delay in the commissioning of a heat pump or similar. The reason this is likely to be so problematic is that the replacement of a heating system commonly has timing dependencies. For example, it will often be associated with the end of life of the existing heating system or part of planned improvements such as refurbishment or extension of an existing property. This is compounded by the number of households that are not served by the gas grid and therefore they already have a more limited options, with oil fired boilers being the most common method of heating. This equates to over 1.5 million households in the UK on oil but it is recognised to be more carbon intensive that either gas or electricity so the government had previously tabled a motion to ban oil-boilers from 2026 although this has been delayed but will require the fuel itself to be phased out in favour of lower carbon alternatives such as HVO. While this will extend the life of some boilers, it is expected to be substantially more expensive and encourage many households to seek an alternative technology that use electricity instead.

4.3 Small scale housing development

The final scenario will be less common but is most likely to be the most disruptive to any linear growth models and potentially result in the greatest level of dissatisfaction. It relates to the expansion of communities themselves. The labour government has set an ambitious target of 1.5 million new homes over the next 5 years coupled with compulsory targets for local councils. We therefore expect to see an increase in the number of small developments, expanding existing rural communities in line with some softening of planning conditions. Combining scenarios, A & B with the desire to add these technologies in any additional housing could result in the perfect storm from a network capacity perspective. If a developer is investing in acquiring land and all the costly bureaucracy of obtaining planning permission, it will not reflect well on DNOs if they are one of the key barriers to proceeding with building.

5 Network Analysis Method

The process to identify any overloading within the volunteer communities was carried out through a combination of work by NGED, using their normal approach as well as some additional analysis by SGC. The approach of the work by SGC accessed different data resources and required changes depending on the measurements as KW needs to be calculated differently to kWh. For distribution transformer data we were looking at the max demand (KW) to see if there is headroom or overloads which are existing or potential further overloads due to increased demand by LCT. This differs slightly from rural 11KV networks from primary to distribution transformers where the data is KWH half hourly (HH) based on amps. This provides a more rounded peak figure as it is based on the average load over an interval (typically half hour) than the max demand data. The review of headroom on rural and urban primary substations was based on the data which shows which primaries have headroom and which do not under constraint conditions based on existing connections and the agreed but not connected demand.

The analysis carried out by the NGED network planning engineers considers the loading on the network under abnormal conditions as there is a responsibility DNO Regulation Rule **P6**, part of the RIIO-ED2[1] price control framework, focuses on ensuring the reliability and security of the electricity distribution network. It includes provisions for operation '**n-1**', which is how the industry commonly expresses the scenario where there has been the loss of a vital asset. The ability to operate under 'n-1' conditions is a crucial safety standard in electricity grid operation, ensuring that the network can continue functioning even if a major component fails. This means the network must be designed and operated in a way that can withstand the loss of one major piece of equipment, like a transformer or high-voltage line, without causing a widespread blackout or instability. DNOs are required to implement processes and technologies to maintain operation n-1 resilience, such as switching and redundancy strategies. However, as this should only apply under abnormal conditions and not represent the typical operating state this is not the standard to which the SGC analysis was presumed to represent as taking this perspective and applying it in a widespread manner gives a false impression of the real network capacity and resilience. In fact, taking this approach would demonstrate that a large proportion of rural communities are already constrained, when in reality they have sufficient headroom for continued operation as standard. In the event that a 'n-1' condition occurs there are already a wide range of procedures to manage the restoration of the network with the minimum of disruption. The procedures vary as 'n-1' can occur for a variety of reasons including planned maintenance and the requirement to withdraw assets to be serviced or replaced safely. Alternatively, it can also be the result of a failure or even through external influence such as damage caused by a third party, requiring an emergency repair response. In the majority of cases, however, the operational state is temporary and a DNO will seek to resolve 'n-1' conditions as quickly as possible, and

[1] The RIIO-ED2 price control is a regulatory mechanism implemented by Ofgem to set the outputs and revenues for 14 electricity distribution network operators (DNOs).

https://www.ofgem.gov.uk/sites/default/files/2023-10/RIIO-ED2%20-%20Annex%20F%20Interruptions%20v1.1.pdf it is not the intended function of the REACH Hybrid to address this. Instead, it is intended to address constraints that are likely to occur during normal operation where the network is fully intact and serving customers in a standard configuration. There may be some rare use cases where there is a situation that requires an extended duration of 'n-1' running required where the temporary deployment of a Hybrid EC is more practical and efficient than conventional interventions such as emergency diesel generators, but this is currently out of scope for this project which is focused on rural communities and ensuring capacity to allow for unfettered ability to adopt LCTs.

For the purposes of assessing the network capacity for requirements relating to the project outcomes, we have assumed that the network will remain fully intact without the need to consider 'n-1' and if such conditions are to occur in the future, the Hybrid Module will positively impact the operational challenges and may in some cases provide an embedded solution that meets the P6 license condition but this is not its primary role. In the event of an unplanned outage of an asset, a DNO is likely to still trigger conventional interventions to address 'n-1' running and in particular, priorotise network restoration where any customers end up 'off supply' as a result.

The analysis was focused on the volunteer communities that were not originally identified on the basis that they had any increased expectations of being subject to the hypothesis that 'high adoption levels of LCTs has eroded all of their headroom capacity.' The communities became involved with the project during the discovery phase on a self-elective basis, relating to stakeholder engagement rather than being selected on the basis of experiencing the engineering challenges that the REACH solution is intended to address. In fact, the original purpose of the REACH project was to test to see if there is evidence of the underlying hypothesis, but even within this context it is expected that such capacity constraints will be the exception rather than the rule. Further work is required to establish a procedure that helps flag which communities are most likely to be impacted and establish reliable forecasts of how often this is likely to occur per DNO region and nationally. While the evidence gathered during the trial and engagement with all of the DNOs recognise the potential is very real, expanding this to a forecast of when, where and how often is plagued with difficulties. Much of this is down to a lack of the necessary type of data and much of the influence that would trigger such constraints being behavioral at a household level.

The two key factors that are most likely to lead to the rural constraints we are concerned with are the adoption of LCTs which can rapidly erode headroom and the amount of time that is necessary to complete an upgrade to the infrastructure to resolve.

- LCT Installation data is not consistent and of a particularly high standard for a number of reasons but it can have a greater impact in rural communities. To a large extent DNOs are required to identify and model future load growth based on annualized data which incorporates notifications of newly connected LCTs by their installers. This is very reliant on LCT installers following the correct procedures under 'connect and notify'[2] principles which unfortunately isn't the case for many. A recent investigation of the issue by parliamentary committee attracted responses from industry groups and one particular manufacturer of LCTs cited research that suggested that as

[2] https://www.energynetworks.org/industry/connecting-to-the-networks/connecting-electric-vehicles-and-heat-pumps

much as 60% of new installations failed to notify the DNO after installation.[3] This absence of proactive flagging increases the difficulty with which a DNO can be expected to identify potentially impactful clusters of LCTs that could trigger a headroom shortage that will impact the ability for other households to connect without risk to the network resilience. Instead, the DNO will be required to identify the risk to the network from the actual rise in demand rather than the increased potential that it could occur. In metropolitan areas the networks are more likely to more options to manage and greater diversity of users to mitigate sharp increases. This is less common in rural communities where there is also limited research to suggest that increased 'community' interactions may also result in higher-than-average uptake levels based on sharing of personal experiences and trusted recommendations.

- The other aspect of the scenario is a protracted period to carry out necessary engineering based remediation to the network which is not a metric that is immediately accessible. It is subject to a number of variables that only when combined in a process that is mostly manual, can provide a reasonable estimate of how long it will take to complete engineering work. The conditions for truly rural communities can be more complex, particularly where there cables are mostly overhead and include long spans over areas of countryside which include some that are hard to access. When upgrades that incorporate the restringing of overhead lines it will often incorporate inspection and replacement of old poles which may be located on agricultural land. This process will typically include pole inspections and if any need replacing or additional poles to carry heavier lines then access requires to be agreed to landowners such as farmers who will request that this takes place outside of periods when they are actively growing crops or tending livestock.

What data was accessed for the analysis process?

NGED EV capacity maps; these capacity maps show approximately what power is available and primary and distribution substations. On the distribution's substations, only ground mounted assets have been assessed.

REACH community's transformer capacity and number of meters connected to each transformer; this allowed for a basic transformer capacity at low voltage per meters to be assessed.

NGED heat maps; To obtain the capacity of the rural primary substations and the published head room.

REACH extract data from 7 communities; This gives the transformer daytime and nighttime max demand information which allows the transfer day and nighttime headroom to be calculated.

Rural distribution transformer capacities and head room for the 7 communities.

AAT time series results; which provide 5 years increase in demand both coordinated and none coordinated

[3] https://committees.parliament.uk/writtenevidence/121665/html

MCM_20241104-Demand_Gen_corrected DT; this provided the primary substation details for headroom for Rural and Urban across the 4 license areas in NGED

Was the data adequate or is there additional data that would improve the analysis if you had access to it?
The data is adequate for the purposes of what the project is trying to ascertain an SLD of the rural 11KV network would have been advantageous and would help to show the results graphically

If there is additional data that would be helpful? What is preventing access to it?

The data provided is averaged over a half hour period and therefore any short duration peaks won't record the actual maximum values. It would therefore be helpful if there were instantaneous maximum values with the time and date of occurrence then we would have a more complete picture of the constraint conditions.

6 RESULTS SUMMARY

The analysis on the 7 communities that have been engaged as stakeholders as expected, did not identify that they are at immediate risk of exceeding the available headroom using the half hourly average value calculated for the peak periods. As intimated earlier in the document, this was what we expected to find, on the basis that such circumstances are likely to be the exception rather than the rule while the network is operating in a standard configuration where all assets are fully intact. This also supports the original innovation application where the concerns regarding this potential new risk is expected to start becoming a reality towards the end of ED2 and into ED3 as the full impact of LCT adoption is realized, rather than at this stage where many are still regarded as 'early adopters' However, even within the very small sample set of communities that we have been analysing there are some indications that they could be at some likelihood of constraint in a few years or if there was an unexpectedly high uptake of LCTs over a short period of time. The NGED network planners analysis also eludes to this, with their results already demonstrating that under some 'n-1' scenarios there would already be insufficient headroom to meet peak demand.

In order to extrapolate these findings and garner a more wholistic view of the frequency that LCT driven constraints are likely to occur in rural networks will require the introduction of a new probabilistic model with a better understanding of the growth patterns of demand. To do this reliably will require improved visibility and timely completion of the administration associated with 'connect and notify' installs. Given what has been learned already within the REACH project it may be worth consideration by the regulator as to the impact of not requiring installers in certain circumstances, to actually apply in advance so as to avoid negative unintended consequences.

This is also supported by the DNO/DSO engagement carried out within the WPA4 work package, which was primarily for the purposes of establishing whether the hypothesis being tested is not unique to NGED and whether any other networks have identified similar risks for the near future and if they have been developing any alternative interventions to address them. Although the results of the interviews are mostly anecdotal, UKPN has specifically carried out an innovation project called "Neighborhood Green"[4] that explored new technologies connecting to electricity networks in the delivery of Net Zero will lead to increased domestic demand and a change in diversity factors and load profiles. The trial is exploring what normal domestic loads and After Diversity Maximum Demand (ADMD) will be in the future for heating technologies, so that networks can be planned and managed appropriately. Although this wasn't exclusively considering rural environments, it was focused on domestic customers and there is some overlap between the identification of risk factors. The other DNO/DSOs interviewed acknowledged the potential of the identified risk factors but confirmed that they had not done any specific investigations or a likely solution in the event that a scenario under BaU occurs in the very short term. We will therefore be seeking letters of support from the other networks to include with a Beta application, should NGED wish to continue the innovation development of the REACH concept.

6.1 Data Sources Used

NGED EV capacity maps; these capacity maps show approximately what power is available and primary and distribution substations. On the distribution substations, only ground mounted assets have been assessed.

REACH community's transformer capacity and number of meters connected to each transformer, this allowed for a basic transformer capacity at low voltage per meters to be assessed.

NGED heat maps. To obtain the capacity of the rural primary substations and the published head room.

REACH extract data 7 communities. this gives the transformer daytime and nighttime max demand information which allows the transfer day and nighttime head room to be calculated.

Rural distribution transformer capacities and head room for the 7 communities.

[4] https://innovation.ukpowernetworks.co.uk/projects/neighbourhood-green

6.2 Bigbury Net Zero

Communi	What is th	Licence A	Substatio	Substatio	Substatio	Asset ID	Asset Type	PV count	EV Charge	Day Max D	Night Max	Substation R	day head r	night head
Bigbury N	Bigbury C	South Wes	340722	Bigbury C	Pole Mtd D	5599711	Transformer, PM, HV/LV	4	0	45	77	200	155	123
Bigbury N	Bigbury or	South Wes	342639	The Warre	Grd Mtd D	609493	Transformer, GM, HV/LV	14	4	226	227	500	274	273
Bigbury N	Bigbury or	South Wes	343442	Parker Rd	Grd Mtd Di	9359	Transformer, GM, HV/LV	7	2	60	66	300	240	234
Bigbury N	Easton (T(	South Wes	341955	Easton	Pole Mtd D	988184	Transformer, PM, HV/LV	3	0	49	40	200	151	160
Bigbury N	Easton (T(	South Wes	342950	Bowls Cro	Pole Mtd D	9169	Transformer, PM, HV/LV	1	0	2	1	15	13	14
Bigbury N	Mount Fol	South Wes	343419	Folly Hill	Grd Mtd D	5013471	Transformer, GM, HV/LV	7	2	50	79	500	450	421
Bigbury N	St Anns Ch	South Wes	341959	St Annes C	Pole Mtd D	14407536	Transformer, PM, HV/LV	10	2	129	91	315	186	224
Bigbury N	St Anns Ch	South Wes	346112	Pickwick I	Pole Mtd D	14443036	Transformer, PM, HV/LV			10	4	315	305	311
												2345	1774	1760
									primary		demand head room		demand headroom	
									Modbury		1		0	
									limiting factor		circuit		transformer	
									Kingsbridge		4.3		2.1	
									limiting factor		circuit		transformer	

The distribution transformer all have headroom during the day and night periods the daytime head room will have a contribution from the solar generation. 1 transformer has an almost equal demand day and night based on max demand this has a high level of solar and 4 EV chargers. 2 of the distribution transformers see a higher nighttime max demand than daytime this will be due to the EV chargers.

6.3 Transition Bro Gwaun

Community Energy Gr	What is th	Licence A	Substatio	Substation Nam	Substa	Asset ID	Asset Type	PV count	EV Charge	Day Max D	Night Max	Substatio	day head	night head
Transition Bro Gwaun	Mathry (S/	South Wal	603106	Nebo Chapel Ma	Pole M	721394	Transformer, PM, HV/LV	1		14	6	50	36	44
Transition Bro Gwaun	Mathry (S/	South Wal	603107	Mathry Village X	Pole M	733670	Transformer, PM, HV/LV	7	0	76	53	200	124	147
Transition Bro Gwaun	Mathry (S/	South Wal	603105	Vicarage Mathry	Pole M	14532898	Transformer, PM, HV/LV	4	0	72	79	100	28	21
Transition Bro Gwaun	Panteg (S/	South Wal	605729	Panteg Stw Gooc	Pole M	726684	Transformer, PM, HV/LV			5	1	50	45	49
Transition Bro Gwaun	Panteg (S/	South Wal	605730	Waun-Fawr X M	Pole M	732453	Transformer, PM, HV/LV			2	1	25	23	24
Transition Bro Gwaun	Panteg (S/	South Wal	605725	Hendre Uchaf X	Pole M	711516	Transformer, PM, HV/LV	3	0	30	46	50	20	4
Transition Bro Gwaun	Scleddau '	South Wal	602251	Scleddau Ganol	Pole M	14646956	Transformer, PM, HV/LV			5	2	25	20	23
Transition Bro Gwaun	Scleddau '	South Wal	602250	Scleddau House	Pole M	14572145	Transformer, PM, HV/LV		0	5	2	16	11	14
Transition Bro Gwaun	Scleddau '	South Wal	602248	Scleddau Gate Ir	Grd Mt	1129345	Transformer, GM, HV/LV	23	2	222	173	500	278	327
												1016	585	653
									primary substations		deamnd head room now		demand headroom after accepted not conencted	
									Fishguard		2.2		0	
									limiting factor		circuit		circuit	
									Brawdry		2.1		0	
									limiting factor		circuit		circuit	

There is an interesting observation on some for the distribution transformers max demand where the max demand is higher at night there is no date or time for the max demands but where the max demand is higher at night there is no EV changing noted but there is solar so the daytime max demand could be higher than quoted and it's the solar generation which is creating a negative demand during the day at some locations.

The primary substations for the area both have existing headroom capacity which has a limiting factor of the circuit the current headroom is 2.2 and 2.1MW when all the accepted connections are connected neither primary substation will have headroom.

6.4 LITTLE WENLOCK VILLAGE HALL

Communi	What is th	Licence A	Substatio	Substatio	Substatio	Asset ID	Asset Type	PV count	EV Charge	Day Max D	Night Max	Substation F	day head room	night head room
Little Wenl	Little Wenl	West Midl	843845	LITTLE WEI	Pole Mtd D	3246306	Transformer, PM, HV/LV	10	4	105	85	200	95	115
Little Wenl	Little Wenl	West Midl	844058	SPOUT LAI	Pole Mtd D	3248043	Transformer, PM, HV/LV	4		20	23	50	30	27
Little Wenl	Little Wenl	West Midl	843843	Coalbrook	Pole Mtd D	14484711	Transformer, PM, HV/LV	7	2	49	58	200	151	142
												450	276	284
									primary		demand head room		demand headroom after accepted	
									Madley		2.4		1.1	
									limiting factor		Transformer		Transformer	

There is quite a high solar count connected to all the distribution transformers all the transformers have day and nighttime headroom.

6.5 BRASSINGTON

Communi	What is th	Licence A	Substatio	Substatio	Substatio	Asset ID	Asset Type	PV count	EV Charge	Day Max D	Night Max	Substatio	day head r	night head
Brassingt	Brassingt	East Midla	894611	Green Viev	Grd Mtd D	3042736	Transformer, GM, HV/LV	6	1	59	121	200	141	79
Brassingt	Brassingt	East Midla	894531	Church Str	Grd Mtd D	5109099	Transformer, GM, HV/LV	15	5	283	322	500	217	178
Brassingt	Brassingt	East Midla	894530	Many Ston	Pole Mtd D	3204389	Transformer, PM, HV/LV	1	1	40	58	50	10	-8
Brassingt	Brassingt	East Midla	894532	Hillside La	Grd Mtd D	5569594	Transformer, GM, Hv/Lv Pa	7	2				273	366
												750	641	615
									primary		demand head room		demand headroom	
									Longcliffe		0		0	
									limiting factor		Transformer		transformer	

There is a distribution transfer which is showing negative headroom based on nighttime max demand this has both PV and a single EV charger both capacities are unknown. There is headroom on all the other distribution transformers all the transformers shower a higher nighttime max demand than daytime. The primary substation is showing no headroom

6.6 COMMUNITY SPONSORS CHARITY

Communi	What is th	Licence A	Substatio	Substatio	Substatio	Asset ID	Asset Type	PV count	EV Charge	Day Max D	Night Max	Substatio	day head	night head
Communi	Bradpole (	South Wes	253662	Curtiss Wr	Grd Mtd Di	1159746	Transformer, GM, HV/LV			334	252	500	166	248
Communi	Bradpole (	South Wes	251788	Fishweir F	Grd Mtd D	1242292	Transformer, GM, HV/LV	11	1	90	40	500	410	460
Communi	Bradpole (	South Wes	250384	Gore Hous	Pole Mtd D	542466	Transformer, PM, HV/LV			4	2	5	1	3
Communi	Bradpole (	South Wes	253626	Corbin Wa	Grd Mtd D	1014244	Transformer, GM, HV/LV			189	133	500	311	367
Communi	Bradpole (	South Wes	252904	St Katherir	Grd Mtd Di	544956	Transformer, GM, HV/LV	4	1	26	32	300	274	268
Communi	Bradpole (	South Wes	252657	Hillingdor	Grd Mtd D	14205324	Transformer, GM, HV/LV	2		45	28	500	455	472
Communi	Bradpole (	South Wes	251757	Forester F	Pole Mtd D	662687	Transformer, PM, HV/LV	3	0	46	44	200	154	156
Communi	Bradpole (	South Wes	251335	Grammar	Grd Mtd D	622200	Transformer, GM, HV/LV	5		214	151	500	286	349
Communi	Bradpole (	South Wes	252737	St Andrew	Grd Mtd Di	545366	Transformer, GM, HV/LV	4		85	56	315	230	259
Communi	Bradpole (	South Wes	251336	Bradpole	Grd Mtd D	5630060	Transformer, GM, HV/LV	12	1	115	86	500	385	414
Communi	Bradpole (	South Wes	251337	Court Clos	Grd Mtd Di	3514549	Transformer, GM, HV/LV	7	2	161	210	315	154	105
Communi	Bradpole (	South Wes	250476	Gore Lane	Pole Mtd D	602819	Transformer, PM, HV/LV	7		63	39	200	137	161
Communi	Bradpole (	South Wes	252673	Askers Pu	Pole Mtd D	668258	Transformer, PM, HV/LV			0	0	100	100	100
Communi	Bradpole (	South Wes	252889	Fox Close	Grd Mtd D	544941	Transformer, GM, HV/LV	9	1	83	61	315	232	254
Communi	Bradpole (	South Wes	252104	Sea Road	Grd Mtd Di	4292388	Transformer, GM, HV/LV	1		67	42	315	248	273
Communi	Bradpole (	South Wes	251342	Watton Ga	Grd Mtd D	543422	Transformer, GM, HV/LV	14	2	42	38	300	258	262
Communi	Bradpole (	South Wes	253496	Gore Cros	Grd Mtd Di	4801265	Transformer, GM, HV/LV	6		433	284	800	367	516
Communi	Bradpole (	South Wes	258809	Gore Lane	Pole Mtd D	2221084	Transformer, PM, HV/LV			8	3	50	42	47
Communi	Bradpole (	South Wes	252674	White Hor	Pole Mtd D	4817272	Transformer, PM, HV/LV	8	0	49	24	200	151	176
Communi	Loders (D1	South Wes	251400	Vicarage	Pole Mtd D	5335891	Transformer, PM, HV/LV	3		63	99	100	37	1
Communi	Loders (D1	South Wes	252145	Waddon F	Grd Mtd Di	5088389	Transformer, GM, HV/LV	10	0	114	172	500	386	328
Communi	Loders (D1	South Wes	251947	Gore Cros	Grd Mtd D	5005170	Transformer, GM, HV/LV	7	2	148	72	500	352	428
Communi	Uploders (	South Wes	251951	Uploders I	Pole Mtd D	544022	Transformer, PM, HV/LV	4	0	47	42	100	53	58
Communi	Uploders (	South Wes	251950	Knowle Fa	Pole Mtd D	14521111	Transformer, PM, HV/LV	4	0	44	54	100	56	46
Communi	Uploders (	South Wes	252540	Matravers	Pole Mtd D	1286167	Transformer, PM, HV/LV	5	1	29	23	50	21	27
Communi	Uploders (	South Wes	252478	Crown Inn	Pole Mtd D	4759029	Transformer, PM, HV/LV	7	0	71	80	100	29	20
Communi	Uploders (	South Wes	251404	Matravers	Pole Mtd D	543484	Transformer, PM, HV/LV			30	27	50	20	23
Communi	Yondover	South Wes	253624	Well Plot	Pole Mtd Dist. Substation								0	0
Communi	Yondover	South Wes	252479	Old Mill	Pole Mtd D	4863924	Transformer, PM, HV/LV			3	1	25	22	24
Communi	Yondover	South Wes	252146	Higher Yo	Pole Mtd D	544213	Transformer, PM, HV/LV	3	0	26	44	50	24	6
Communi	Yondover	South Wes	251402	New Stree	Pole Mtd D	2284928	Transformer, PM, HV/LV	1		30	43	50	20	7
Communi	Bradpole (DT6 3HS)		252121	New Brit Works									0	0
												8040	5381	5858
									primary		demand head room		demand headroom	
									Bridport		7.1		0	
									limiting factor		circuit		transformer	

This is a large community with 32 distribution transformers total power 8040KW with a total daytime headroom of 5381KW and a nighttime total headroom of 5858KW. For most of the distribution substations the max demand is daytime there are 2 notable exceptions where the nighttime load is 50% greater than the daytime load 1 of these transformers is showing 2 EV chargers the other has no EV charger.]

The primary substation has an existing headroom of 7.1MW but zero headroom after all the accepted connections are connected.

6.7 Sustainable Brailes

Communi	What is th	Licence A	Substatio	Substatio	Substatio	Asset ID	Asset Type	PV count	EV Charge	Day Max D	Night Max	Substatio	day head r	night head
Sustainab	Brailes OX	East Midla	931548	BREACH LA	Pole Mtd D	3220027	Transformer, PM, HV/LV	5	2	70	139	200	130	61
Sustainab	Brailes OX	West Midl	773287	GREENSLA	Pole Mtd D	3234601	Transformer, PM, HV/LV			4	18	100	96	82
Sustainab	Brailes OX	West Midl	771621	LOWER BR	Pole Mtd D	3267341	Transformer, PM, HV/LV	5	1	88	116	200	112	84
Sustainab	Brailes OX	West Midl	771626	Upper Bra	Pole Mtd D	3267260	Transformer, PM, HV/LV	1	1	46	36	100	54	64
Sustainab	Brailes OX	West Midl	771633	Jeffs Close	Grd Mtd D	3076199	Transformer, GM, HV/LV	4	1	90	113	300	210	187
Sustainab	Brailes OX	West Midl	773297	UPPER GR	Pole Mtd D	3235169	Transformer, PM, HV/LV	1	0	9	20	50	41	30
Sustainab	Brailes OX	West Midl	771625	SUTTON L	Pole Mtd D	3235837	Transformer, PM, HV/LV	1	4	192	237	315	123	78
Sustainab	Brailes OX	West Midl	771623	Grove End	Pole Mtd D	3267253	Transformer, PM, HV/LV	2	1	18	18	100	82	82
Sustainab	Brailes OX	West Midl	771627	LOWER BR	Pole Mtd D	3267420	Transformer, PM, HV/LV	4	1	104	135	100	-4	-35
Sustainab	Brailes OX	West Midl	770103	UPPER BR	Pole Mtd D	3252857	Transformer, PM, HV/LV	4	3	105	111	100	-5	-11
Sustainab	Brailes OX	West Midl	771630	GILLETTS H	Pole Mtd D	3268084	Transformer, PM, HV/LV	1	1	11	5	100	89	95
Sustainab	Brailes OX	West Midl	771631	CASTLE HIl	Pole Mtd D	3267248	Transformer, PM, HV/LV	3	4	39	51	200	161	149
Sustainab	Brailes OX	West Midl	771629	BRAILES SC	Pole Mtd D	14409341	Transformer, PM, HV/LV	1	0	129	54	100	-29	46
Sustainab	Brailes OX	West Midl	770776	BRAILES IN	Pole Mtd D	14251731	Transformer, PM, HV/LV	1		36	18	200	164	182
Sustainab	Brailes OX	West Midl	771632	GILLETTS L	Pole Mtd D	3268169	Transformer, PM, HV/LV	2	2	47	38	100	53	62
Sustainab	Brailes OX	West Midl	771622	THE GREEN	Pole Mtd D	3267169	Transformer, PM, HV/LV	3	1	68	45	100	32	55
												2365	1309	1211
									primary		demand head room		demand headroom	
									Epwell		10.4		9.7	
									limiting factor		Transformer		Transformer	

There are two distribution transformer which based on max demand are overloaded during both the day and night periods. And a third which is overload based on max demand during the daytime. These overloads are 35% overloaded being the worst case. The day and nighttime loads there is a 50/50 mix between daytime max demand and nighttime max demands in this area.

Primary substation has existing headroom of 10.4MW and this reduces to 9.7MW when all the accepted demands are connected.

6.8 Awel Amen Tawe

Community Energy Grou	What is th	Licence A	Substatio	Substatio	Substatio	Asset ID	Asset Type	PV count	EV Charge	Day Max D	Night Max	Substatio	day head r	night head
Awel Amen Tawe	Cwmgors	South Wal	523068	Parc Howa	Pole Mtd D	14485283	Transformer, PM, HV/LV			14	4	50	36	46
Awel Amen Tawe	Cwmgors	South Wal	523261	Waunleisi	Grd Mtd D	710726	Transformer, GM, HV/LV	15	2	161	72	300	139	228
Awel Amen Tawe	Cwmgors	South Wal	523056	Llwyn Rd	Pole Mtd D	711624	Transformer, PM, HV/LV	1	3	146	72	200	54	128
Awel Amen Tawe	Cwmgors	South Wal	523258	Gurwen St	Grd Mtd D	1811767	Transformer, GM, HV/LV	8	1	227	134	500	273	366
Awel Amen Tawe	Cwmgors	South Wal	523014	Cwmgorse	Grd Mtd D	730218	Transformer, GM, HV/LV	8	0	105	52	315	210	263
Awel Amen Tawe	Cwmgors	South Wal	522961	Cae-Newy	Grd Mtd D	4536304	Transformer, GM, HV/LV	6	0	66	35	315	249	280
Awel Amen Tawe	Cwmgors	South Wal	523057	High St Cw	Pole Mtd D	704058	Transformer, PM, HV/LV	4	2	105	48	200	95	152
Awel Amen Tawe	Cwmgors	South Wal	522970	G C G Seni	Pole Mtd D	724208	Transformer, PM, HV/LV	1		52	13	200	148	187
Awel Amen Tawe	Cwmgors	South Wal	523050	Craftdene	Grd Mtd D	14448587	Transformer, GM, HV/LV			88	32	800	712	768
Awel Amen Tawe	Cwmgors	South Wal	523065	Old Star S	Pole Mtd D	5708807	Transformer, PM, HV/LV	5		44	39	200	156	161
Awel Amen Tawe	Cwmgors	South Wal	523260	Cwmgors	Pole Mtd D	729524	Transformer, PM, HV/LV	4		112	49	200	88	151
Awel Amen Tawe	Cwmgors	South Wal	523053	Cwmgorse	Pole Mtd D	14434997	Transformer, PM, HV/LV	6	1	139	75	315	176	240
Awel Amen Tawe	Cwmgors	South Wal	523015	Upper Col	Grd Mtd D	711592	Transformer, GM, HV/LV	12	3	299	123	500	201	377
Awel Amen Tawe	Cwmgors	South Wal	523067	Galebourr	Grd Mtd D	711150	Transformer, GM, HV/LV			39	42	200	161	158
Awel Amen Tawe	SA92GN	South Wal	521977	Bryn Brain	Pole Mtd D	727211	Transformer, PM, HV/LV			15	4	16	1	12
Awel Amen Tawe	SA92GN	South Wal	523011	Beili-Glas	Grd Mtd D	703744	Transformer, GM, HV/LV	12	3	172	68	300	128	232
Awel Amen Tawe	SA92GN	South Wal	521984	Cefn Bryn	Pole Mtd D	733039	Transformer, PM, HV/LV	3	0	32	12	50	18	38
Awel Amen Tawe	SA92GN	South Wal	521988	Greenhill	Pole Mtd D	702045	Transformer, PM, HV/LV	2	0	36	27	100	64	73
Awel Amen Tawe	SA92GN	South Wal	521979	Cefn Hous	Pole Mtd D	730400	Transformer, PM, HV/LV	7	0	95	41	100	5	59
Awel Amen Tawe	Cwmgors	South Wes	343132	Vicarage F	Grd Mtd D	977720	Transformer, GM, HV/LV	13	2	135	114	315	180	201
												5176	3094	4120
									primary		demand head room		demand headroom	
									Gwan Cae Curwan		2		1.9	
									limiting factor		Transformer		Transformer	
									Ystradgynlais		14.1		6.9	
									Limiting factor		Transformer		Transformer	

There is 1 nighttime max demand greater than the daytime max demand in this community in general there is headroom on most of the distribution substations currently through some transformers are close to max demand during the daytime period with a good head room level during the night period these would be ideal to be supported by battery storage using and arbitrage model rather than traditional system upgrades.

The area is fed via two primary substation one has a significant capacity 14.1MW while the other has 2MW.

The DSO staff have looked at the reinforcement costs and timings for each of the areas based on two different demand increase scenarios.

Community group	BV HV network costs	LV network cost	Total Cost (BV)
Bigbury Net Zero	£ 125,000.00	£ 1,040,440.80	£ 1,165,440.80
Transition Bro Gwaun	£ 234,000.00	£ 73,525.00	£ 307,525.00
Little Wenlock Village Hall	£ 425,000.00	£ 107,260.00	£ 532,260.00
Brassington	£ 187,000.00	£ 558,790.00	£ 745,790.00
Community Sponsors Char	£ 156,000.00	£ 625,578.70	£ 781,578.70
Awel Amen Tawe	£ 136,000.00	£ 591,487.00	£ 727,487.00
Sustainable Brailes	£ 833,000.00	£ 338,042.00	£ 1,171,042.00

Area	First Year of Constraint	Reinforcements Rec	Cost of Reinforcements (£k	Reinforcement Timeframes	Headroom Range
Devon - Modbury-Kingsbridge-Blackawton	2025	0.74km New Interlink 0.08km Overlay	£125k	1-2 Years	0.5-0.63 MVA
West Wales - Fishguard-Brawdy	2028	1.54km Reconductor	£234k	1 Year	0 MVA
Telford - Madeley-Leaton	2028	2.5km New Circuit 0.2km Overlay	£425k	2-3 Years	0.13 - 0.47 MVA
Derby - Longcliffe	2028	1.2 New Cable	£187k	0.5 Years	0.66 MVA
Somerset - Bridport	2025	0.6km Reconductor 0.83km Overlay	£156k	1-2 Years	0.75 MVA (250340/0301) NA - 250340/0310
Swansea - Travellers Rest-Gwaun Cae Gurwen	2032	2.8km Reconductor	£136K	1-2 Years	2.5 - 2.4 MVA
Worcester - Epwell	2032	4km New Circuit	£833k	2-3 Years	0 MVA

Reinforcement work required for the BV scenario

Community group	CT HV network cost	LV network cost	Total Cost (CT)
Bigbury Net Zero	£ 228,000.00	£ 1,040,440.80	£ 1,268,440.80
Transition Bro Gwaun	£ 234,000.00	£ 73,525.00	£ 307,525.00
Little Wenlock Village Hall	£ 499,000.00	£ 107,260.00	£ 606,260.00
Brassington	£ 187,000.00	£ 558,790.00	£ 745,790.00
Community Sponsors Char	£ 107,200.00	£ 625,578.70	£ 732,778.70
Awel Amen Tawe	£ 734,000.00	£ 591,487.00	£ 1,325,487.00
Sustainable Brailes	£ 1,316,000.00	£ 338,042.00	£ 1,654,042.00

Area	First Year of Constraint	Reinforcements Rec	Cost of Reinforcements	Reinforcement Timeframes	Headroom Range
Devon - Modbury-Kingsbridge-Blackawton	2025	1.3km New Interlink	£228k	1-2 Years	0.5-0.63 MVA
West Wales - Fishguard-Brawdy	2028	1.54km Reconductor	£234k	1 Year	0 MVA
Telford - Madeley-Leaton	2028	3.2km New Circuit	£499k	2-3 Years	0.13 - 0.47 MVA
Derby - Longcliffe	2028	1.2km New Cable	£187k	0.5 Years	0.66 MVA
Somerset - Bridport	2025	5.54km Overlay 3.68km Reconductor	£1,072k	3-4 Years	0.5 to -0.2 MVA (250340/0301) NA - 250340/0310
Swansea - Travellers Rest-Gwaun Cae Gurwen	2025	4.47km Overlay 0.76km Reconductor	£734k	1-2 Years	1.5 to -1.5 MVA
Worcester - Epwell	2027	6.2km new Circuit 2.0km Reconductor	£1,316k	2-3Years	0 MVA

Reinforcement works required CT scenario

Across the 403 rural primary substations across the NGED license area the headroom varies from 0 to 19.1MW with total headroom of 1127.1MW when the accepted but not connected demands are connected the total headroom drops to 284.1MW across the license areas this represents a significant drop in headroom in rural areas.

See excel Rural primaries M for details.

7 Appendices - Results Tables

dfes_version	underlying_demand_version	ESA	licence_area	technology	subtechnology	P_MW	Q_MVAr	demand head room connected MW	demand head room including accepted MW	zero headroom substation count	zero headroom substation count
2022	3	Abergavenny Primary	South Wales	Demand	Rural	20.44366	0	9.1	6.1		
2022	3	Aberpergwm	South Wales	Demand	Rural	4.861298	0.211273	11.2	8.3		
2022	3	ALBRIGHTON 33 11kV S STN	West Midlands	Demand	Rural	14.57	0.6	12.5	0		1
2022	3	ALDERTON 66 11kV S STN	West Midlands	Demand	Rural	12.28192	0.31056	10	9.7		
2022	3	ALFORD 33 11kV S STN	East Midlands	Demand	Rural	5.3424	1.5582	0	0	1	
2022	3	Almondsbury	South West	Demand	Rural	12.09776	3.976341	8.2	0		2
2022	3	ALVESTON 33 11kV S STN	West Midlands	Demand	Rural	13.82992	0.24456	0	0	2	3
2022	3	ANSTY 33 11kV S STN	East Midlands	Demand	Rural	6.76704	1.97372	10.8	0		4
2022	3	ARLEY 33 11kV S STN	East Midlands	Demand	Rural	3.9936	1.1648	0	0	3	5

2022	3	ASHBOURNE 33 11kV S STN	East Midlands	Demand	Rural	15.07296	4.39628	0	0		4	6
2022	3	Ashwater	South West	Demand	Rural	1.513475	0.497455	3.1	0			7
2022	3	ATHERSTONE 33 11kV S STN	East Midlands	Demand	Rural	15.16	0.73	0	0		5	8
2022	3	Axbridge	South West	Demand	Rural	5.574427	1.832226	3.9	0			9
2022	3	Axminster	South West	Demand	Rural	6.144386	0.427522	8.7	0			10
2022	3	BANBURY ROAD 33 11kV S STN	East Midlands	Demand	Rural	10.78736	-0.27952	0	0			11
2022	3	Beaminster	South West	Demand	Rural	4.847979	1.593454	5.7	0			12
2022	3	BEVERCOTES 33 11kV S STN	East Midlands	Demand	Rural	3.19104	0.93072	1.7	0			13
2022	3	BEVINGTON 66 11kV S STN	West Midlands	Demand	Rural	12.00688	1.90284	11.9	11.6			
2022	3	BINGHAM 33 11kV S STN	East Midlands	Demand	Rural	7.4976	2.1868	3.2	0			14
2022	3	Bishopston	South Wales	Demand	Rural	4.0434	0	5.1	5.1			
2022	3	BIXHEAD 33 11kV S STN	West Midlands	Demand	Rural	11.71832	2.38576	16	16			
2022	3	Blackawton	South West	Demand	Rural	1.395741	0.458758	0	0		6	15
2022	3	Blaenporth	South Wales	Demand	Rural	4.411633	0.422495	0	0		7	16

2022	3	BLIDWORTH 33 11kV S STN	East Midlands	Demand	Rural	5.63328	1.64304	0	0		8	17
2022	3	BODENHAM 66 11kV S STN	West Midlands	Demand	Rural	7.2856	2.5858	0	0		9	18
2022	3	Bodmin	South West	Demand	Rural	11.39163	3.712038	0	0		10	19
2022	3	BOTTESFORD 33 11kV S STN	East Midlands	Demand	Rural	4.70208	0.28144	6.5	0			20
2022	3	Boverton	South Wales	Demand	Rural	7.815404	-0.15702	8.4	0			21
2022	3	Bovey Tracey	South West	Demand	Rural	5.590813	1.837611	0	0		11	22
2022	3	Bowhays Cross	South West	Demand	Rural	7.78528	2.556268	7.8	0			23
2022	3	Braunton	South West	Demand	Rural	8.986915	2.953856	0	0		12	24
2022	3	Brawdy	South Wales	Demand	Rural	4.141591	0.177254	2.1	0			25
2022	3	Brecon	South Wales	Demand	Rural	13.34355	-0.35381	1.7	0			26
2022	3	Bridell	South Wales	Demand	Rural	3.981837	0.692449	0	0		13	27
2022	3	Bridge Mills	South West	Demand	Rural	6.229701	2.047604	0	0		14	28
2022	3	Bridport	South West	Demand	Rural	12.74022	4.165814	7.1	0			29
2022	3	Bristol International Airport	South West	Demand	Rural	3.964087	1.302933	0	0		15	30
2022	3	Broadfield	South Wales	Demand	Rural	7.758235	0.166403	1.5	0			31
2022	3	BROADWAY 66 11kV S STN	West Midlands	Demand	Rural	12.1144	0.4642	17	16.1			

2022	3	BROMYARD 66/11kV	West Midlands	Demand	Rural	9.2272	0.8896	0	0		16	32
2022	3	BROSELEY 33 11kV S STN	West Midlands	Demand	Rural	7.52	0.14	0	0		17	33
2022	3	BROTHERIDGE GRN 66 11kV S STN	West Midlands	Demand	Rural	7.81	0.28	6.5	6.1			
2022	3	BRUNTINGTHORPE 33 11kV S STN	East Midlands	Demand	Rural	5.68128	1.65704	0	0		18	34
2022	3	Buckfastleigh	South West	Demand	Rural	5.106778	-0.31011	0	0		19	35
2022	3	BUCKINGHAM 33 11kV S STN	East Midlands	Demand	Rural	12.71232	3.70776	0	0		20	36
2022	3	BUDBY 33 11kV S STN	East Midlands	Demand	Rural	1.4688	0.4284	0	0		21	37
2022	3	BUGBROOKE 33 11kV S STN	East Midlands	Demand	Rural	6.6336	1.9348	0	0		22	38
2022	3	Builth Wells	South Wales	Demand	Rural	7.767093	-0.0502	1.8	0			39
2022	3	BURTON LATIMER 33 11kV S STN	East Midlands	Demand	Rural	14.30112	4.17116	4.5	0			40
2022	3	Caerau Primary	South Wales	Demand	Rural	8.823804	0.663702	0	0		23	41
2022	3	Callington	South West	Demand	Rural	9.316496	3.061198	0	0		24	42
2022	3	CALVERTON 33 11kV S STN	East Midlands	Demand	Rural	4.78368	1.39524	0	0		25	43

2022	3	CAMP 33 11kV S STN	West Midlands	Demand	Rural	7.99	1.24	0	0		26	44
2022	3	Cardigan	South Wales	Demand	Rural	7.393724	1.208178	0	0		27	45
2022	3	CASTLE DONINGTON 33 11kV S STN	East Midlands	Demand	Rural	10.09824	2.94532	0	0		28	46
2022	3	CAYTHORPE 33 11kV S STN	East Midlands	Demand	Rural	8.72	-0.23	6.5	0			47
2022	3	CHAPEL ST LEONARDS 33 11kV S STN	East Midlands	Demand	Rural	6.6816	1.9488	0	0		29	48
2022	3	Cheddar	South West	Demand	Rural	4.524227	1.487041	1.6	0			49
2022	3	Chepstow	South Wales	Demand	Rural	10.40372	-0.90907	1.8	1.1			
2022	3	Chew Stoke	South West	Demand	Rural	3.482585	1.14467	1.1	0			50
2022	3	Chewton Mendip	South West	Demand	Rural	4.352311	-0.52148	0.6	0			51
2022	3	Chudleigh Knighton	South West	Demand	Rural	7.852701	1.397795	0	0		30	52
2022	3	Churchill Gate 33/11	South West	Demand	Rural	3.010138	0.989385	4.1	0			53
2022	3	CLAVERDON 33 11kV S STN	East Midlands	Demand	Rural	12.288	3.584	0	0		31	54
2022	3	Clovelly	South West	Demand	Rural	4.187642	1.358334	1.9	0			55
2022	3	Clyst Honiton	South West	Demand	Rural	5.520279	1.812784	8.5	0			56
2022	3	Coker	South West	Demand	Rural	2.586687	0.850203	3.3	1.2			
2022	3	Colley Lane	South West	Demand	Rural	22.70439	7.462573	0	0		32	57

2022	3	Colyford	South West	Demand	Rural	9.504786	3.124072	9.7	0			58
2022	3	Compton Martin 33/11kv S/S	South West	Demand	Rural	2.67964	0	1.7	0			59
2022	3	Congresbury	South West	Demand	Rural	13.22201	1.816562	0	0		33	60
2022	3	Constantine 33kv	South West	Demand	Rural	3.827279	1.231014	3.7	0			61
2022	3	CORBY No2 11kV S STN	East Midlands	Demand	Rural	15.0528	4.3904	6	0			62
2022	3	Core Hill	South West	Demand	Rural	4.725957	1.553347	0	0		34	63
2022	3	COTES HEATH 33 11kV S STN	West Midlands	Demand	Rural	6.26	-0.45	10.7	0			64
2022	3	COTGRAVE 33 11kV S STN	East Midlands	Demand	Rural	8.2424	1.6632	0	0		35	65
2022	3	Cowbridge	South Wales	Demand	Rural	5.739932	-0.19029	5.2	0			66
2022	3	Crediton	South West	Demand	Rural	8.681546	2.853486	0	0		36	67
2022	3	Creech St Michael	South West	Demand	Rural	8.643444	0.590837	0	0		37	68
2022	3	Crickhowell	South Wales	Demand	Rural	4.374142	-0.12992	1.7	0			69
2022	3	CROMFORD 33 11kV S STN	East Midlands	Demand	Rural	6.124809	1.786403	0	0		38	70
2022	3	Cross Hands	South Wales	Demand	Rural	6.601321	1.409513	6	0			71
2022	3	CROWLAND 33 11kV S STN	East Midlands	Demand	Rural	4.09824	1.19532	0	0		39	72
2022	3	Cullompton	South West	Demand	Rural	8.035692	0	0	0		40	73

2022	3	Culmhead	South West	Demand	Rural	2.265901	0.744766	0	0		41	74
2022	3	Curry Mallet	South West	Demand	Rural	2.645349	0.267623	0	0		42	75
2022	3	Dartmouth	South West	Demand	Rural	6.992218	2.298231	0	0		43	76
2022	3	Davidstow	South West	Demand	Rural	2.511549	0.420896	0	0		44	77
2022	3	Dawlish	South West	Demand	Rural	10.96931	3.605438	0	0		45	78
2022	3	Delabole	South West	Demand	Rural	7.492021	2.293565	0	0		46	79
2022	3	DENTON 33 11kV S STN	East Midlands	Demand	Rural	3.28224	0.95732	0	0		47	80
2022	3	Devoran	South West	Demand	Rural	4.087077	1.343357	0	0		48	81
2022	3	Dinder	South West	Demand	Rural	3.131355	0.892165	0.6	0			82
2022	3	DONINGTON 33 11kV S STN	East Midlands	Demand	Rural	7.104	2.072	0	0		49	83
2022	3	DONNINGTON 33 11kV S STN	West Midlands	Demand	Rural	10.37096	0.43028	9.6	0			84
2022	3	DOTHILL 33 11kV S STN	West Midlands	Demand	Rural	9.28608	0.12344	8.4	0			85
2022	3	Dowlish Ford	South West	Demand	Rural	8.125673	2.670779	5.3	0			86
2022	3	DOWSBY FEN 33 11kV S STN	East Midlands	Demand	Rural	4.15776	1.21268	0	0		50	87
2022	3	Drinnick.	South West	Demand	Rural	18.0688	4.556573	0	0		51	88

2022	3	DYMOCK 66 11kV S STN	West Midlands	Demand	Rural	4.76632	0.45476	0	0		52	89
2022	3	East Aberthaw Primary	South Wales	Demand	Rural	9.383329	-0.75162	4.2	0			90
2022	3	East Brent	South West	Demand	Rural	4.420823	1.453054	0.5	0			91
2022	3	East Chinnock Primary	South West	Demand	Rural	2.359899	0.231896	3.7	1.8			
2022	3	East Curry	South West	Demand	Rural	3.454615	1.169321	5.8	0			92
2022	3	EAST LEAKE 33 11kV S STN	East Midlands	Demand	Rural	11.7984	3.4412	3.7	0			93
2022	3	Easton-In-Gordano	South West	Demand	Rural	3.859826	1.268664	2.4	2.3			
2022	3	ECCLESHALL PRIMARY 33 11kV S STN	West Midlands	Demand	Rural	3.73528	1.11904	2.8	0			94
2022	3	Edgarley	South West	Demand	Rural	3.757973	1.235186	0	0		53	95
2022	3	ELTON 33 11kV S STN	West Midlands	Demand	Rural	5.14216	0.12688	4.9	4.4			
2022	3	EPWELL 66 11kV S STN	West Midlands	Demand	Rural	9.88	-0.16	10.4	9.7			
2022	3	Evercreech	South West	Demand	Rural	6.926595	2.276662	0.6	0			96
2022	3	Exebridge	South West	Demand	Rural	3.990915	1.297946	0	0		54	97
2022	3	Exminster	South West	Demand	Rural	3.812866	1.253228	0	0		55	98
2022	3	EXTON 33 11kV S STN	East Midlands	Demand	Rural	2.60352	0.75936	4.7	0			99

2022	3	FARNDON ROAD 33 11kV S STN	East Midlands	Demand	Rural	10.3872	3.0296	6.7	0			100
2022	3	FARNSFIELD 33 11kV S STN	East Midlands	Demand	Rural	4.98912	1.45516	0	0		56	101
2022	3	Feckenham 66/11kVDUMMY	West Midlands	Demand	Rural	2.26	0.13	11.6	10.1			
2022	3	FERNWOOD 33 11kV S STN	East Midlands	Demand	Rural	1.54	-0.18	6.7	0			102
2022	3	Fishguard	South Wales	Demand	Rural	6.62747	0.434026	2.2	0			103
2022	3	FISKERTON 33 11kV S STN	East Midlands	Demand	Rural	11.462	0.341	0	0		57	104
2022	3	Folly Bridge	South West	Demand	Rural	4.853642	1.593343	0	0		58	105
2022	3	FOUR ASHES 33 11kV S STN	West Midlands	Demand	Rural	13.8148	0.9714	12.1	0			106
2022	3	Fowey	South West	Demand	Rural	3.043459	1.000336	1.6	0			107
2022	3	Fraddon	South West	Demand	Rural	8.008122	1.408545	13.1	0			108
2022	3	Fremington	South West	Demand	Rural	3.184855	1.040566	0	0		59	109
2022	3	FROGHALL 33 11kV S STN	West Midlands	Demand	Rural	1.1	0.62	6.7	0			110
2022	3	GAYDON 33 11kV S STN	East Midlands	Demand	Rural	9.2736	2.7048	7.2	0			111
2022	3	Georgeham	South West	Demand	Rural	5.838672	0.666792	0	0		60	112

2022	3	Glasbury	South Wales	Demand	Rural	6.655601	0.036392	1.9	0			113
2022	3	GNOSALL 33 11kV S STN	West Midlands	Demand	Rural	4.95744	0.33092	2.9	0			114
2022	3	Golden Hill Primary	South Wales	Demand	Rural	11.80285	-1.18938	9.4	0			115
2022	3	GRANTHAM NORTH 11kV S STN	East Midlands	Demand	Rural	11.67576	0.58168	15.8	0			116
2022	3	GRANTHAM SOUTH 11kV S STN	East Midlands	Demand	Rural	14.42	-1.24	6.8	0			117
2022	3	GREAT ALNE 66 11kV S STN	West Midlands	Demand	Rural	10.13	1.4	16.7	14.8			
2022	3	GREAT HALE 33 11kV S STN	East Midlands	Demand	Rural	3.5712	1.0416	5.8	0			118
2022	3	Great Torrington	South West	Demand	Rural	5.834848	1.825303	5.2	0			119
2022	3	Gunnislake	South West	Demand	Rural	5.330538	1.752063	0	0		61	120
2022	3	HALLCROFT RD 33 11kV S STN	East Midlands	Demand	Rural	7.21536	2.10448	0	0		62	121
2022	3	HAMMERLEY DOWN 33 11kV S STN	West Midlands	Demand	Rural	14.67	0.2	0	0		63	122
2022	3	HARBURY 11kV S STN	East Midlands	Demand	Rural	6.95808	2.02944	10.9	0			123
2022	3	HARROLD 33 11kV S STN	East Midlands	Demand	Rural	2.09	-0.2	11.1	0			124
2022	3	Hatherleigh	South West	Demand	Rural	5.956494	-0.39976	0	0		64	125

2022	3	HATTON 33 11kV S STN	East Midlands	Demand	Rural	26.30576	2.53168	4.3	0			126
2022	3	Haverfordwest Power Stn	South Wales	Demand	Rural	9.861325	0.465462	11.8	0			127
2022	3	Hayle	South West	Demand	Rural	14.404	0.411728	0	0		65	128
2022	3	Heddon Cross	South West	Demand	Rural	2.230294	0.233167	3.7	0			129
2022	3	Helston	South West	Demand	Rural	14.31226	4.63256	3.4	0			130
2022	3	Hemyock	South West	Demand	Rural	4.806256	0.670811	0	0		66	131
2022	3	High Littleton	South West	Demand	Rural	4.855432	1.588015	0.7	0			132
2022	3	HINSTOCK 33 11kV S STN	West Midlands	Demand	Rural	3.05	0.41	1.3	0			133
2022	3	Holford	South West	Demand	Rural	1.29409	0	4.5	0			134
2022	3	Holsworthy	South West	Demand	Rural	7.776912	2.15581	1.3	0			135
2022	3	Honiton Heathfield	South West	Demand	Rural	9.982707	-0.55741	1.7	0			136
2022	3	HOPTON 33 11kV S STN	East Midlands	Demand	Rural	2.744743	0.80055	0	0		67	137
2022	3	HORNCASTLE 33 11kV S STN	East Midlands	Demand	Rural	12.06424	2.01832	0	0		68	138
2022	3	Ilfracombe	South West	Demand	Rural	9.872867	3.051459	0	0		69	139
2022	3	Isles Of Scilly	South West	Demand	Rural	3.548	1.166171	0	0		70	140
2022	3	Ivybridge	South West	Demand	Rural	9.203228	2.926021	1	0			141

2022	3	JAGUAR CARS BROWNS LANE 33 11kV S STN	East Midlands	Demand	Rural	6.88896	2.00928	8.3	0			142
2022	3	KENSWICK 66 11kV S STN	West Midlands	Demand	Rural	5.03536	-0.31552	0	0		71	143
2022	3	KETTERING NORTH 33 11kV S STN	East Midlands	Demand	Rural	6.0576	1.7668	15	0			144
2022	3	KEYWORTH 33 11kV S STN	East Midlands	Demand	Rural	6.7584	1.9712	0.7	0			145
2022	3	KIBWORTH 11kV S STN	East Midlands	Demand	Rural	10.61184	3.09512	8.3	0			146
2022	3	Kidwelly	South Wales	Demand	Rural	3.46152	0.059891	2.9	0			147
2022	3	Kingsbridge	South West	Demand	Rural	13.75705	0	4.3	2.1			
2022	3	KINGSLEY HOLT 33 11kV S STN	West Midlands	Demand	Rural	5.07688	-0.53216	2.2	0			148
2022	3	KINGTON 66 11kV S STN	West Midlands	Demand	Rural	7.53064	1.46852	0	0		72	149
2022	3	KIRTON 33 11kV S STN	East Midlands	Demand	Rural	6.24552	1.34536	0	0		73	150
2022	3	KNIGHTON 66 11kV S STN	West Midlands	Demand	Rural	5.78048	0.87264	0	0		74	151
2022	3	Lampeter Primary	South Wales	Demand	Rural	6.506139	0.715239	2.4	0			152
2022	3	Laneast	South West	Demand	Rural	3.348929	0.190147	0	0		75	153

2022	3	LANGRICK 33 11kV S STN	East Midlands	Demand	Rural	4.08096	1.19028	0	0		76	154
2022	3	Lanner	South West	Demand	Rural	8.020802	2.63631	5.1	0			155
2022	3	Lanreath	South West	Demand	Rural	2.67741	0.879948	0	0		77	156
2022	3	Lapford	South West	Demand	Rural	2.580994	3.719706	0	0		78	157
2022	3	Launceston	South West	Demand	Rural	11.61207	3.06073	2.4	0			158
2022	3	LEADENHAM 33 11kV S STN	East Midlands	Demand	Rural	6.07584	1.77212	0.6	0			159
2022	3	LEDBURY 66/11kV	West Midlands	Demand	Rural	13.99492	1.25296	0	0		79	160
2022	3	LEEBOTWOOD 33 11kV S STN	West Midlands	Demand	Rural	7.50608	0.33844	0	0		80	161
2022	3	LEEK 33 11kV S STN	West Midlands	Demand	Rural	15.86	1.12	2.3	1.6			
2022	3	LEOMINSTER 66 11kV S STN	West Midlands	Demand	Rural	16.84432	2.52876	0	0		81	162
2022	3	Lichfield 132/11kVDUMMY	West Midlands	Demand	Rural	43.74	-0.36	21.4	14.9			
2022	3	Lifton	South West	Demand	Rural	5.769691	1.671914	0	0		82	163
2022	3	Liskeard	South West	Demand	Rural	12.016	3.533681	0	0		83	164
2022	3	Llanarth Primary	South Wales	Demand	Rural	3.794847	0.172212	1.7	0			165
2022	3	Llandeilo	South Wales	Demand	Rural	4.55936	0.334415	3.9	0			166

2022	3	Llandovery	South Wales	Demand	Rural	2.719859	0.168137	1	0			167
2022	3	Llandrindod Wells	South Wales	Demand	Rural	6.848629	0.772715	1.5	0			168
2022	3	Llanfihangel Ystrad	South Wales	Demand	Rural	7.42789	-0.01196	1.9	0			169
2022	3	Llanfyrnach	South Wales	Demand	Rural	1.846481	0.441429	1.9	0			170
2022	3	Llanrhidian	South Wales	Demand	Rural	4.510177	0.304057	1.5	1.3			
2022	3	LONG SUTTON 33 11kV S STN	East Midlands	Demand	Rural	13.92576	4.06168	0	0		84	171
2022	3	Looe	South West	Demand	Rural	7.579765	2.491348	0	0		85	172
2022	3	Lostwithiel	South West	Demand	Rural	6.422183	2.110869	2	0			173
2022	3	LOWER CHADNOR 66 11kV S STN	West Midlands	Demand	Rural	4.48	0.31	0	0		86	174
2022	3	Luckwell Bridge	South West	Demand	Rural	2.645826	0	0	0		87	175
2022	3	Lydeard St Lawrence Primary	South West	Demand	Rural	3.518557	1.156494	0	0		88	176
2022	3	Lynton	South West	Demand	Rural	2.578001	0.847348	3	0			177
2022	3	MAGNA PARK 33 11kV S STN	East Midlands	Demand	Rural	8.62368	2.51524	1.9	0			178
2022	3	MANTON 33 11kV S STN	East Midlands	Demand	Rural	9.6096	2.8028	0	0		89	179
2022	3	Manweb Source (Llanilar)	South Wales	Demand	Rural	27.46278	1.13743	3.2	5.9			
2022	3	Marazion	South West	Demand	Rural	6.146883	0.363044	0	0		90	180

2022	3	MARKET DEEPING 33 11kV S STN	East Midlands	Demand	Rural	8.6688	2.5284	0	0		91	181
2022	3	MARKET DRAYTON 33 11kV S STN	West Midlands	Demand	Rural	17.3861	4.774696	4.2	0			182
2022	3	MARKET HARBOROUGH 33 11kV S STN	East Midlands	Demand	Rural	13.27872	3.87296	1.6	0			183
2022	3	Marsh Green	South West	Demand	Rural	3.62667	1.192029	1.7	0			184
2022	3	Martock	South West	Demand	Rural	10.21032	3.232386	0	0		92	185
2022	3	MEAD LA 33 11kV S STN	West Midlands	Demand	Rural	14.2604	7.8622	13	12.9			
2022	3	Meinciau	South Wales	Demand	Rural	0.990311	0.147409	2.9	0			186
2022	3	MELTON MOWBRAY 11KV S STN	East Midlands	Demand	Rural	16.36608	4.77344	1.5	0			187
2022	3	Merlins Bridge	South Wales	Demand	Rural	8.49863	-0.22304	4.1	0			188
2022	3	Merthyr East Primary	South Wales	Demand	Rural	20.97434	0.708306	8.9	2.9			
2022	3	METHERINGHAM 33 11kV S STN	East Midlands	Demand	Rural	9.284	1.112	2	0			189
2022	3	Mevagissey	South West	Demand	Rural	4.666186	-0.48712	5.8	0			190
2022	3	Middle Barlington	South West	Demand	Rural	2.065257	0.284863	4	0			191
2022	3	Millfield	South West	Demand	Rural	16.75284	1.882748	0	0		93	192
2022	3	MISTERTON 33 11kV S STN	East Midlands	Demand	Rural	1.8432	0.5376	0	0		94	193

2022	3	Modbury	South West	Demand	Rural	3.581634	1.177226	1	0			194
2022	3	Monmouth	South Wales	Demand	Rural	12.53748	0.950898	7.2	0			195
2022	3	MORETON 66 11kV S STN	West Midlands	Demand	Rural	11.14	0	10.4	10			
2022	3	Morlanga	South Wales	Demand	Rural	2.408467	0	4.8	0			196
2022	3	Mortonhampstead	South West	Demand	Rural	2.650155	0.849699	2	0			197
2022	3	Morwenstow	South West	Demand	Rural	6.476085	2.047401	8	0			198
2022	3	MOUNT BRIDGE BOSTON 33 11kV S STN	East Midlands	Demand	Rural	10.85096	0.97028	0	0		95	199
2022	3	Mousehole	South West	Demand	Rural	2.161073	0.710311	0	0		96	200
2022	3	Mullion	South West	Demand	Rural	4.325013	1.421563	3.7	0			201
2022	3	NAILSTONE 33 11kV S STN	East Midlands	Demand	Rural	5.30208	1.54644	0	0		97	202
2022	3	Nantgaredig	South Wales	Demand	Rural	2.678078	0.106959	1.1	0			203
2022	3	Nether Stowey	South West	Demand	Rural	7.074181	2.325171	0	0		98	204
2022	3	NETHERHILLS 33 11kV S STN	West Midlands	Demand	Rural	6.31	-0.44	8.7	0			205
2022	3	Nevern	South Wales	Demand	Rural	2.139048	-0.02181	2.1	0			206
2022	3	NEW BEACON ROAD GRANTHAM 33 11kV S STN	East Midlands	Demand	Rural	11.84592	0.40756	0	0		99	207

2022	3	New Lodge	South Wales	Demand	Rural	6.333773	-0.03826	2.9	0			208
2022	3	Newcastle Emlyn South	South Wales	Demand	Rural	6.96616	0.813926	0	0		100	209
2022	3	NEWENT 66 11kV S STN	West Midlands	Demand	Rural	10.44841	0.62	0	0		101	210
2022	3	Newquay Trevemper	South West	Demand	Rural	15.89089	5.223083	0	0		102	211
2022	3	Newton Ferrers	South West	Demand	Rural	2.386456	0.78439	1.1	0			212
2022	3	Newton Poppleford	South West	Demand	Rural	2.565137	0.837532	3.4	3.4			
2022	3	Newton St Cyres	South West	Demand	Rural	2.5901	0.851325	0	0		103	213
2022	3	Neyland	South Wales	Demand	Rural	4.25334	-0.02629	3.1	0			214
2022	3	North Street Langport	South West	Demand	Rural	5.650212	1.857135	0	0		104	215
2022	3	North Tawton	South West	Demand	Rural	4.046116	0.460024	2.1	0			216
2022	3	NORTH WHEATLEY 33 11kV S STN	East Midlands	Demand	Rural	3.31008	0.96544	0	0		105	217
2022	3	OAKHAM 11kV S STN	East Midlands	Demand	Rural	16.79	0.68	3	0			218
2022	3	Offwell	South West	Demand	Rural	4.783715	0.112679	0	0		106	219
2022	3	Ogmore Vale	South Wales	Demand	Rural	4.821874	-0.14152	0	0		107	220
2022	3	Okehampton	South West	Demand	Rural	9.79226	1.092241	4.2	0			221
2022	3	OLD DALBY 33 11kV S STN	East Midlands	Demand	Rural	4.5984	1.3412	3.5	0			222

2022	3	OLNEY 33 11kV S STN	East Midlands	Demand	Rural	10.32	3.01	0	0		108	223
2022	3	Ottery St Mary	South West	Demand	Rural	5.788186	-0.30575	1.7	0			224
2022	3	OUNDLE 33 11kV S STN	East Midlands	Demand	Rural	6.84536	0.00448	1.1	0			225
2022	3	Padstow	South West	Demand	Rural	8.496574	0.118578	5.4	0			226
2022	3	Pantyffynon	South Wales	Demand	Rural	14.71047	1.222326	2.7	0			227
2022	3	Park Lane SWAE	South Wales	Demand	Rural	14.94659	0	0	0		109	228
2022	3	Park Lane SWEB	South West	Demand	Rural	10.47854	3.074688	0.8	0			229
2022	3	PATTINGHAM 33 11kV S STN	West Midlands	Demand	Rural	2.26	-0.17	16.5	0			230
2022	3	Peasedown	South West	Demand	Rural	3.748304	1.232008	0.7	0			231
2022	3	Penblewin	South Wales	Demand	Rural	9.455474	1.154836	2.8	0			232
2022	3	Penn Cross	South West	Demand	Rural	5.478846	1.80081	8	0			233
2022	3	Penryn	South West	Demand	Rural	6.811012	0.347582	8	0			234
2022	3	Pensilva	South West	Demand	Rural	2.479981	0.136416	0	0		110	235
2022	3	Penzance Heamoor	South West	Demand	Rural	7.197781	2.365796	0	0		111	236
2022	3	Periton	South West	Demand	Rural	4.038797	1.327489	0	0		112	237
2022	3	Perranporth	South West	Demand	Rural	8.243972	2.686983	2.6	0			238

2022	3	PETERCHURCH 66 11kV S STN	West Midlands	Demand	Rural	3.59016	0.50588	0	0		113	239
2022	3	POLESWORTH 33 11kV S STN	East Midlands	Demand	Rural	9.14592	2.66756	0	0		114	240
2022	3	Polzeath	South West	Demand	Rural	6.807308	0.306932	0	0		115	241
2022	3	Pont Ar Annell	South Wales	Demand	Rural	1.45566	0.08087	1.4	0			242
2022	3	Pontardawe	South Wales	Demand	Rural	9.634978	0.71333	7.1	5.9			
2022	3	PRESTEIGNE 66 11kV S STN	West Midlands	Demand	Rural	6.27088	0.80484	0	0		116	243
2022	3	PRINCESS ROYAL 33 11kV S STN	West Midlands	Demand	Rural	8.1092	0.3806	5	5			
2022	3	Probus 33	South West	Demand	Rural	3.473377	1.141644	0	0		117	244
2022	3	QUATT 33 11kV S STN	West Midlands	Demand	Rural	11.81224	0.56232	0	0		118	245
2022	3	RATCLIFFE ON SOAR 33 11kV S STN	East Midlands	Demand	Rural	3.36	0.98	0	0		119	246
2022	3	Rhayader	South Wales	Demand	Rural	3.412991	-0.38736	1.2	0			247
2022	3	Rhos Primary	South Wales	Demand	Rural	6.908156	0.432358	0	0		120	248
2022	3	ROADE 33 11kV S STN	East Midlands	Demand	Rural	5.35296	1.56128	0	0		121	249
2022	3	ROBIN HOOD 33 11kV S STN	East Midlands	Demand	Rural	3.0528	0.8904	2.8	0			250

2022	3	ROSS ON WYE 66 11kV S STN	West Midlands	Demand	Rural	13.21667	0.42	0	0		122	251
2022	3	Roundswell	South West	Demand	Rural	12.79412	-0.65895	5.6	0			252
2022	3	ROWTON 33 11kV S STN	West Midlands	Demand	Rural	3.37536	0.40448	1.6	1.6			
2022	3	RUFFORD 33 11kV S STN	East Midlands	Demand	Rural	6.02632	0.38976	0	0		123	253
2022	3	RUGELEY TOWN 132 11kV S STN	West Midlands	Demand	Rural	26.30728	0.20504	15	11.6			
2022	3	Salcombe 340038	South West	Demand	Rural	4.748673	1.560813	3.3	2.1			
2022	3	SAPCOTE 33 11kV S STN	East Midlands	Demand	Rural	11.70816	3.41488	0	0		124	254
2022	3	Schwyll	South Wales	Demand	Rural	4.475242	0	3.1	0			255
2022	3	SCOT HAY 33 11kV S STN	West Midlands	Demand	Rural	6.14272	-0.15004	1.3	1			
2022	3	Shapwick	South West	Demand	Rural	3.676357	1.20836	0	0		125	256
2022	3	SHARNBROOK 33 11kV S STN	East Midlands	Demand	Rural	6.58536	0.98948	10.8	6.6			
2022	3	Shebbear	South West	Demand	Rural	3.321935	1.09167	2.5	0			257
2022	3	Shepton Mallet	South West	Demand	Rural	12.71825	1.74371	0.6	0			258
2022	3	SHIFNAL 33 11kV S STN	West Midlands	Demand	Rural	2.81	5.23	9.4	0			259

2022	3	SHIPSTON 66 11kV S STN	West Midlands	Demand	Rural	12.6	-0.32	15.4	14.8			
2022	3	SIBTHORPE 33 11kV S STN	East Midlands	Demand	Rural	1.84704	0.53872	3.5	0			260
2022	3	SKILLINGTON 33 11kV S STN	East Midlands	Demand	Rural	3.08704	0.40872	0	0		126	260
2022	3	SLEAFORD 11kV S STN	East Midlands	Demand	Rural	11.35	-0.38	8	0			262
2022	3	Somerton	South West	Demand	Rural	5.344434	1.75663	0	0		127	263
2022	3	South Brent	South West	Demand	Rural	4.110333	1.341469	1.7	1.7			
2022	3	SOUTH CARLTON 33 11kV S STN	East Midlands	Demand	Rural	9.11968	0.05324	0	0		128	264
2022	3	SOUTH CROXTON 33 11kV S STN	East Midlands	Demand	Rural	2.68224	0.78232	0	0		129	265
2022	3	South Molton	South West	Demand	Rural	5.625966	1.762722	4.6	0			266
2022	3	SOUTHAM 33 11kV S STN	East Midlands	Demand	Rural	8.04248	-0.53636	7.6	0			267
2022	3	SOUTHWELL 33 11kV S STN	East Midlands	Demand	Rural	7.1088	2.0734	1.6	0			268
2022	3	SPALDING CLAY LAKE 11kV S STN	East Midlands	Demand	Rural	10.46304	3.05172	0	0		130	269
2022	3	SPILSBY 33 11kV S STN	East Midlands	Demand	Rural	5.84712	0.49416	0	0		131	270

2022	3	St Arvans	South Wales	Demand	Rural	2.008113	0.178961	2.9	2.6			
2022	3	St Buryan	South West	Demand	Rural	3.68521	1.165583	0	0		132	271
2022	3	St Clears	South Wales	Demand	Rural	6.321312	-0.07231	1.9	0			272
2022	3	St Columb Major	South West	Demand	Rural	7.232313	2.262107	4.8	0			273
2022	3	St Davids	South Wales	Demand	Rural	1.778323	0.150705	2	0			274
2022	3	St Florence	South Wales	Demand	Rural	2.492828	-0.03551	1.5	0			275
2022	3	St Keverne	South West	Demand	Rural	5.117782	-0.51431	3.8	0			276
2022	3	St Mawgan	South West	Demand	Rural	4.956622	0.6109	5.9	0			277
2022	3	St Neot	South West	Demand	Rural	4.076038	1.132329	0	0		133	278
2022	3	St Tudy	South West	Demand	Rural	4.059223	1.323027	0	0		134	279
2022	3	St Twynells	South Wales	Demand	Rural	2.202959	0	5.4	0			280
2022	3	STEEPLE CLAYDON 33 11kV S STN	East Midlands	Demand	Rural	5.04	0	0	0		135	281
2022	3	Steynton	South Wales	Demand	Rural	8.015109	-0.29326	6	0			282
2022	3	STOCKTON 33 11kV S STN	West Midlands	Demand	Rural	5.08	0.62	0	0		136	283
2022	3	STOW 66 11kV S STN	West Midlands	Demand	Rural	5.91	0.32	7.8	7.7			
2022	3	STOWFIELD 33 11kV S STN	West Midlands	Demand	Rural	2.52	0.38	7.8	6.3			

2022	3	Stratton	South West	Demand	Rural	11.91593	3.583292	8.1	0			284
2022	3	STRENSHAM 66 11kV S STN	West Midlands	Demand	Rural	11.28	1.13	10.5	0			285
2022	3	Sudbrook Primary	South Wales	Demand	Rural	6.596731	0	10.8	10.8			
2022	3	Swansea Road Merthyr	South Wales	Demand	Rural	7.95749	0.266239	0	0		137	286
2022	3	Tavistock	South West	Demand	Rural	12.70025	3.272791	0	0		138	287
2022	3	TEAN 33 11kV S STN	West Midlands	Demand	Rural	5.03	-1.26	13.7	0			288
2022	3	TENBURY 33 11kV S STN	West Midlands	Demand	Rural	8.85	0.86	0	0		139	289
2022	3	Tenby	South Wales	Demand	Rural	4.271689	0.172491	1.5	0			290
2022	3	Tewkesbury Grid 132/11kVDUMMY	West Midlands	Demand	Rural	27.84	4.49	19.1	11.7			
2022	3	THENFORD 33 11kV S STN	East Midlands	Demand	Rural	6.768	1.974	4.9	3.7			
2022	3	THRAPSTON 33 11kV S STN	East Midlands	Demand	Rural	10.43152	-0.10664	5.1	0			291
2022	3	TINWELL ROAD KETTON 33 11kV S STN	East Midlands	Demand	Rural	2.8128	0.8204	0	0		140	292
2022	3	Tiverton Junction	South West	Demand	Rural	11.03781	3.627954	0	0		141	293
2022	3	Tiverton Moorhayes	South West	Demand	Rural	6.252944	2.055243	0	0		142	294
2022	3	Tiverton South	South West	Demand	Rural	12.33739	4.055104	0	0		143	295

2022	3	Torpoint Antony	South West	Demand	Rural	7.180981	2.359946	0	0		144	296
2022	3	Torycombe	South West	Demand	Rural	6.297353	2.051434	4.5	0			297
2022	3	Totnes	South West	Demand	Rural	11.05734	3.557459	0	0		145	298
2022	3	TOWCESTER 33 11kV S STN	East Midlands	Demand	Rural	12.71	-0.26	0	0		146	299
2022	3	Trebal	South West	Demand	Rural	2.657495	0.873477	5.6	0			300
2022	3	Tregaron	South Wales	Demand	Rural	3.754546	0.336199	2.3	0			301
2022	3	TRENT ALLOYS 33 11kV S STN	East Midlands	Demand	Rural	3.1584	0.9212	6	0			302
2022	3	TRENT LANE 33 11kV S STN	East Midlands	Demand	Rural	9.1296	2.6628	0	0		147	303
2022	3	Trevaughan	South Wales	Demand	Rural	15.53494	-0.0569	2.2	0			304
2022	3	Truro Shortlanesend	South West	Demand	Rural	13.10317	4.26046	0	0		148	305
2022	3	TRUSTHORPE 33 11kV S STN	East Midlands	Demand	Rural	8.43744	0.39592	0	0		149	306
2022	3	Tumble	South Wales	Demand	Rural	9.192178	0	3.2	0			307
2022	3	TUXFORD 33 11kV S STN	East Midlands	Demand	Rural	8.47776	2.47268	1.6	0			308
2022	3	Twelveheads.	South West	Demand	Rural	6.695659	0.761692	0	0		150	309
2022	3	UPPINGHAM 33 11kV S STN	East Midlands	Demand	Rural	6.64704	1.93872	2.4	0			310

2022	3	WADDINGTON 33 11kV S STN	East Midlands	Demand	Rural	9.39864	-0.10748	7.1	5.3			
2022	3	Wadebridge	South West	Demand	Rural	6.853297	0	0	0		151	311
2022	3	WARDENTREE PARK 33 11kV S STN	East Midlands	Demand	Rural	11.14848	3.25164	0	0		152	312
2022	3	WARTH LANE SKEGNESS 33 11kV S STN	East Midlands	Demand	Rural	16.8864	4.9252	0	0		153	313
2022	3	Waterlake Primary	South West	Demand	Rural	3.947643	1.790517	4.8	0			314
2022	3	Wedmore	South West	Demand	Rural	2.672206	0.877983	0	0		154	315
2022	3	WEEDON 33 11kV S STN	East Midlands	Demand	Rural	5.23296	1.52628	6.7	0			316
2022	3	Wellington Primary	South West	Demand	Rural	3.474059	1.141868	0	0		155	317
2022	3	Wellington Town	South West	Demand	Rural	11.10969	3.615751	0	0		156	318
2022	3	Wells	South West	Demand	Rural	10.84966	3.566111	0	0		157	319
2022	3	WELTON 33 11kV S STN	East Midlands	Demand	Rural	5.428	0.709	6.2	0			320
2022	3	WESSINGTON 33 11kV S STN	East Midlands	Demand	Rural	5.78992	-0.09044	2.3	1.2			
2022	3	WEST DEEPING 33 11kV S STN	East Midlands	Demand	Rural	4.64	0.64	0	0		158	321
2022	3	WEST HADDON 33 11kV S STN	East Midlands	Demand	Rural	5.6832	1.6576	0	0		159	322

2022	3	WESTBOROUGH 33 11kV S STN	East Midlands	Demand	Rural	5.06592	1.47756	0.9	0			323
2022	3	Western Approach	South West	Demand	Rural	9.053733	2.123966	10.1	0			324
2022	3	WHAPLODE DROVE 33 11kV S STN	East Midlands	Demand	Rural	3.2064	0.9352	0	0		160	325
2022	3	Wheal Reeth	South West	Demand	Rural	3.877264	0.989755	0	0		161	326
2022	3	Whiddon Down	South West	Demand	Rural	3.953683	0.226019	2	0			327
2022	3	Whitland	South Wales	Demand	Rural	3.109445	0.67452	1.9	0			328
2022	3	WICKEN 33 11kV S STN	East Midlands	Demand	Rural	4.56	1.33	0	0		162	329
2022	3	WILLESLEY 33 11kV S STN	East Midlands	Demand	Rural	12.2784	3.5812	9.3	5.1			
2022	3	WILLOUGHBY 11kV S STN	East Midlands	Demand	Rural	7.12824	0.31032	3.8	0			330
2022	3	Winscombe	South West	Demand	Rural	5.834186	0.216267	3.9	0			331
2022	3	WINSLOW 33 11kV S STN	East Midlands	Demand	Rural	6.1344	1.7892	0	0		163	332
2022	3	Witheridge	South West	Demand	Rural	3.287209	0.798771	0	0		164	333
2022	3	WITTERING 33 11kV S STN	East Midlands	Demand	Rural	4.86	0.13	0	0		165	334
2022	3	Wiveliscombe	South West	Demand	Rural	4.81659	1.518714	8.2	0			335

2022	3	WOOD END 33 11kV S STN	East Midlands	Demand	Rural	8.72928	2.54604	0	0		166	336
2022	3	WOOD LANE 33 11kV S STN	East Midlands	Demand	Rural	2.89	0.4	0	0		167	337
2022	3	WOODBECK 33 11kV S STN	East Midlands	Demand	Rural	3.48672	1.01696	1.2	0			338
2022	3	Woodbury	South West	Demand	Rural	5.289213	1.73848	1	0			339
2022	3	WOODFORD HALSE 33 11kV S STN	East Midlands	Demand	Rural	6.63552	1.93536	2.1	0			340
2022	3	WOODHALL SPA 33 11kV S STN	East Midlands	Demand	Rural	3.696	1.078	0	0		168	341
2022	3	WOOFFERTON 66 11kV S STN	West Midlands	Demand	Rural	5.722485	1.669058	0	0		169	342
2022	3	WRAGBY 33 11kV S STN	East Midlands	Demand	Rural	3.81	0.26	0	0		170	343
2022	3	WRANGLE 33 11kV S STN	East Midlands	Demand	Rural	5.89056	1.71808	0	0		171	344
2022	3	WRIBBENHALL 33 11kV S STN	West Midlands	Demand	Rural	14.08	1.24	0	0		172	345
2022	3	Yelverton	South West	Demand	Rural	6.07794	-0.02038	3	0			346
								1127.2	284.1			