

Access to Flexibility: Scoping interventions

A report for National Grid Distribution System Operator

February 2026

Table of Contents

1. Executive Summary	4
2. Introduction.....	7
2.1. Background.....	8
2.2. Vulnerability and Flexibility.....	8
2.3. Project Approach.....	11
3. Priority Services Register data analysis	13
3.1. Context	13
3.2. Method	15
3.3. Analysis.....	16
3.4. Conclusion	18
4. Case Study 1: Electric Vehicles	19
4.1. Opportunity gap.....	20
4.1.1. Ability of those on the Motability Scheme to participate in flexibility.....	21
4.2. DSO Options to increase flexibility participation	22
4.2.1. Review of interventions.....	22
4.2.2. Next steps: Develop smart energy advice for Motability Scheme customers.....	23
5. Case Study 2 - Storage Heaters	24
5.1. Opportunity gap.....	25
5.1.1. Overall flexibility availability.....	25
5.1.2. Turn down potential.....	27
5.1.3. Turn up potential.....	28
5.2. DSO options to increase flexibility participation	29
5.2.1. Review of interventions.....	30
5.2.2. Next steps	31
6. Conclusions	33
6.1. PSR Analysis	33
6.2. Disabled EV drivers	33
6.3. Storage heaters.....	34
Appendix I.....	35

List of Tables

Table 1: Summary of participation issues and possible interventions.....	10
Table 2: PSR needs code high-level categories	15
Table 3: Overview of Motability customers.....	20
Table 4: Comparison of ev.energy’s general fleet and Motability users meeting technical requirements.....	21
Table 5: Capacity of storage heaters across the National Grid licence areas and CMZs.....	25
Table 6: Capacity of hot water heaters across the National Grid license areas and CMZs and totals with storage heaters.....	26
Table 7: Summary of interested parties’ roles and next steps (storage heaters)	32
Table 8: Chi-square contingency table results for differences in PSR and non-PSR registration and participation rates amongst different needs codes	35
Table 9: List of all CMZs with storage heater requesting turn down in the night delivery period - shaded cells relate to the CMZs in Map 2.....	35
Table 10: LSOAs containing more than 1MW of storage heater capacity in socially rented properties	39

List of Figures

Figure 1: Assessment of proportion of households on the PSR compared to how many are eligible	14
Figure 2: Proportions of PSR and non-PSR MPANs registered with Market Gateway and actively participating in flexibility	16
Figure 3: Proportion of PSR MPANs who are registered in the Market Gateway, and those participating in flexibility by needs code.....	17
Figure 4: Overlap of storage heater capacity with night delivery period CMZs	28

1. Executive Summary

This report explores how National Grid Electricity Distribution System Operator (NG DSO) can work with flexibility service providers (FSPs) and trusted intermediaries to widen participation in flexibility markets, ensuring equitable access and improved outcomes for households in vulnerable circumstances. Building on the initial [Access to Flexibility research](#), the study addresses the challenges of unequal access to flexibility markets amongst households in vulnerable circumstances. The report addresses two recommendations from the first report

1. DSOs need to assess uptake of flexibility services amongst households in vulnerable circumstances.
2. DSO need to identify ways to improve access to flexibility, particularly for those in vulnerable circumstances.

The current study responds to these two recommendations by assessing current and potential of levels participation within NG DSO licence areas, and then working with stakeholders to scope viable interventions that can increase access.

The analysis begins with Priority Services Register (PSR) data, which identifies households requiring additional support due to health, communication, or other needs. PSR eligibility is related to the impacts a household may face from interruptions to supply, and is not a perfect proxy for households that may face difficulties in participating in flexibility services. It does however provide a useful metric for identifying different participation rates across households with different types of needs. Analysis of this data found that there are PSR households are registered on NG DSO's Market Gateway, and some are actively participating in services. However, they are significantly less likely to participate compared to non-PSR households. Participation rates vary across needs codes, with lower rates for those requiring life-sustaining equipment (SNo1) and special communication needs (SNo3). The analysis demonstrates an emerging risk that households could be participating in services that are not appropriate for their needs or may put their health at risk. But it also demonstrates opportunities to increase participation if issues, such as special communication needs, can be addressed. As PSR needs codes are not designed to track the interaction between vulnerability and flexibility, DSOs should develop additional metrics to monitor this. Better metrics will mean that DSOs understand how well their markets are working for different types of households and how flexibility can exacerbate or mitigate existing vulnerabilities.

The study then presents two case studies of demographic groups who have a flexibility asset, but who are identified in research as facing difficulties in accessing flexibility services: disabled EV drivers and lower income households with storage heaters. The case-studies were developed with Flexibility Services Providers and intermediaries who are already working with these groups to understand if there are any opportunity gaps that could be reduced by DSO led interventions.

Case Study 1: Electric Vehicles (EVs), with the Motability Scheme and ev.energy

Motability Operations leases vehicles to disabled drivers through the Motability Scheme – providing them with freedom and independence.

They have a growing segment of EV drivers who have significant flexibility potential. EVs are the largest source of domestic flexibility currently and Motability Operations works with FSPs including ev.energy to support their customers in signing up to flexibility services. To understand if there was an opportunity gap we compared aggregated data from ev.energy on numbers of customers eligible for different flexibility markets. This data analysis showed that Motability Scheme EV drivers often meet all the technical requirements for different flexibility services, and at higher rates than ev.energy's wider customer base. This difference shows the effectiveness of Motability Operations' support which includes providing households with smart chargers, and working with installers and FSPs to enable EVs to be registered in different flexibility markets. The stakeholders then reviewed possible DSO-led interventions to widen participation. This did not identify further steps needed from the NG DSO specifically, but did confirm wider market-entry issues like MPAN registration accuracy and onboarding interoperability that require coordinated action across DSOs and regulators. Motability Operations also saw further opportunities to support their customers, including to develop better advice around EV tariffs and smart charging, in order to improve customers' experiences of EVs, and reduce running costs. This action is being taken forward by Motability Operations, its FSP partners, and CSE. The role for the DSO will then be to support their local advice partners in sharing this type of advice across the NGED's licence areas, allowing a wider set of customers to access it.

Case Study 2: Storage Heaters, with Connected Response

Storage heaters, common in low-income and socially rented homes, offer substantial untapped flexibility potential. To understand if there was an opportunity gap in NG DSO's area, we analysed data on household heating type and NG DSO's procurement of flexibility in their Constraint Management Zones (CMZs). This estimated 2.3 GW of capacity across the license areas, with significant clustering in certain localities. This included some CMZs in which NG DSO was procuring turn down services during over-night periods when storage heaters on Economy 7 tariffs were likely to be turned on. Connected Response is a FSP and technology company that works to improve control of storage heaters which reduces costs and increases comfort for households, but also enables storage heaters to become flexibility assets in DSO and other markets. We reviewed potential DSO-led interventions that could facilitate the use of storage heaters as flexibility assets in NG DSO's CMZs. The analysis found three specific CMZs that look viable for NG DSO to begin procuring turn down services from storage heaters. The analysis also found around 40 Low Layer Super Output Areas (LSOAs) with more than 1MW of storage heater capacity that could present opportunities for both turn up and turn down services. NG DSO will take forward a collaboration with Connected Response to explore this opportunity.

Next Steps

Following the analysis, the next actions are

Firstly, NG DSO takes forward a collaboration with Connected Response to develop flexibility services from storage heaters, covering both turn up and turn down services. Initial work should focus on CMZs with existing night-time turn-down requirements and be delivered in partnership with registered social landlords as trusted intermediaries. Subsequent work should focus on expanding into LSOAs with high storage-heater capacity to test larger-scale flexibility provision.

Secondly, Motability Operations, its FSP partners, and CSE develop tariff and smart charging advice for Motability Scheme EV drivers. NG DSO reviews the benefits and process of making this advice more widely available for EV drivers with additional needs in their region, through mechanisms like the smart energy advice forum.

Thirdly, NG DSO continues to analyse their PSR data to understand changes over time in participation rates across households with different needs.

Finally, NG DSO create an improved set of metrics to understand flexibility and vulnerability. Developing more robust metrics on registration and active engagement will enable better identification of emerging risks and exclusions. This is needed to build confidence that customers are well protected, as well as to design targeted interventions that overcome any risks or exclusions.

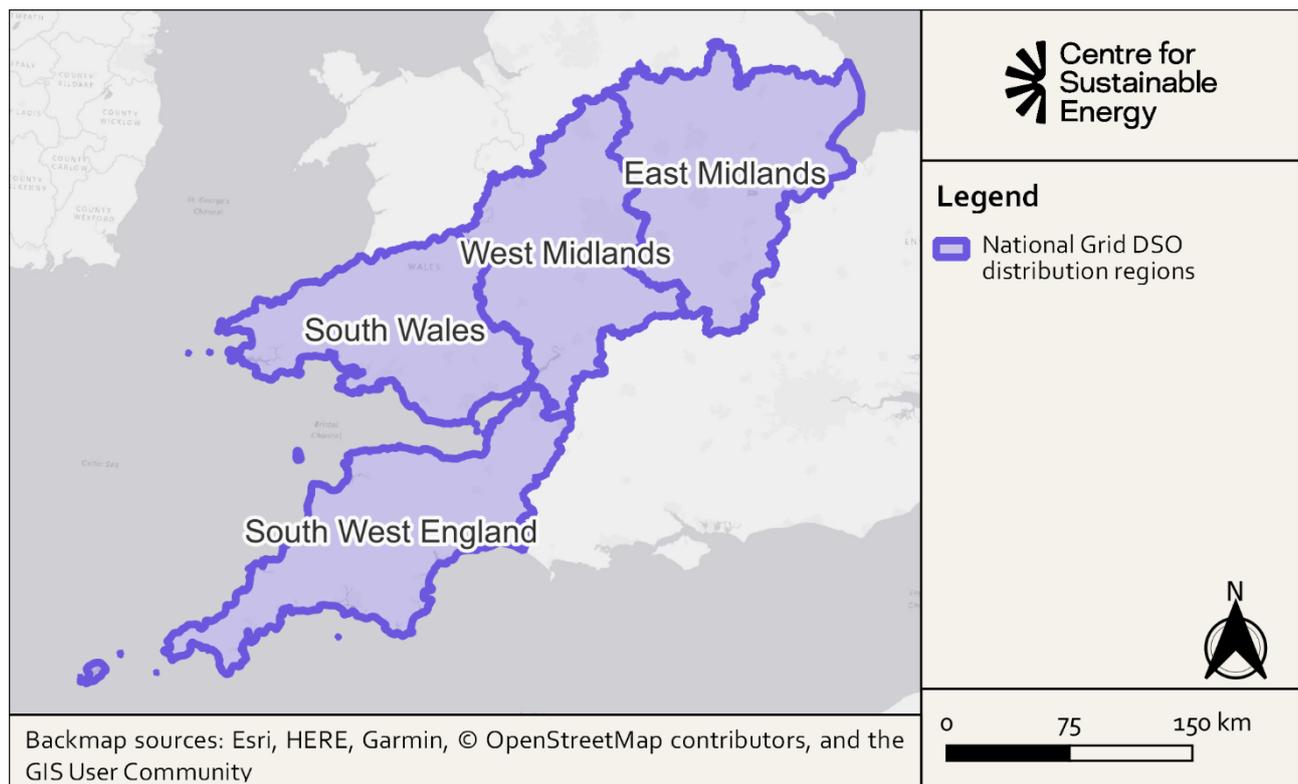
2. Introduction

This report examines how National Grid DSO can work with flexibility service providers (FSPs) to widen participation in DSO flexibility services. The overarching objective is to understand how DSOs can support equitable access to flexibility.

The report builds on previous research conducted by the Centre for Sustainable Energy (CSE) and National Grid Distribution System Operator (DSO) examining the distributional impacts of domestic flexibility services¹ and a workshop with stakeholders. The previous report examined the ability for low income and vulnerable consumers to interact with the DSO's flexibility services and outlined recommendations to mitigate unequal participation.

For reference, National Grid DSO's distribution regions are shown in Map 1.

Map 1: National Grid DSO's distribution regions.



¹ Access to Flexibility Report (2025). <https://centreforsustainableenergy.ams3.digitaloceanspaces.com/wp-content/uploads/2025/03/16095000/access-to-flexibility-a-report-for-national-grid-electricity-distribution-2025.pdf>.

2.1. Background

CSE's research in the Access to Flexibility report showed that higher income households have greater participation in low-voltage network flexibility markets. CSE analysed data on DSO procurement of flexibility in constraint managed zones (CMZs). This analysis showed that distributions for income and tenure types in and out of CMZs were similar, but flexibility procurement was more successful where CMZs had higher proportions of owner occupiers and high-income households. Conversely, CMZs with the least successful flexibility had over-representation of private and social rented tenures.

This creates two issues. The first issue is the distribution of financial rewards. Higher income households will be more able to reduce their running costs or generate rewards through flexibility services than lower income households. The second issue is the lack of flexibility in parts of the network. The DSO is unable to procure flexibility where it is needed.

The Access to Flexibility report made several recommendations to National Grid DSO about how their flexibility procurement could support more diverse participation. This research builds on some of these recommendations:

- 1) Work to assess uptake of flexibility services amongst households in vulnerable circumstances.
- 2) Consider the feasibility of how to improve access to flexibility, particularly for those in vulnerable circumstances

This report examines the participation of households registered on National Grid DSO's priority services register (PSR) in flexibility procurement. This is shown in Section 3. The PSR is a list of consumers who are particularly vulnerable to aspects of the electricity system. This could be those who rely on electricity for their health, or those who require extra support such as braille for the visually impaired. The PSR is not a definitive measure of those in vulnerable circumstances, nor is it a perfect proxy for households that may struggle to engage with flexibility. It does not flag low digital skills for example. However, it is a useful lens to view the participation of households with specific needs in NG DSO's flexibility markets.

The report then presents two case studies of opportunities that could widen participation in flexibility services. The first looks at electric vehicles, with ev.energy (an FSP) and Motability Operations, the organisation which runs the Motability Scheme, supporting people with disabilities to lease vehicles. The second looks at storage heaters, with Connected Response, a technology company and FSP who works with social landlords.

2.2. Vulnerability and Flexibility

Domestic flexibility is key to the UK's energy system transition and a rapid increase is required. The Government's Clean Power 2030 Action plan has a target to grow 'Consumer-led flexibility'

from 2.5 GW to 10-12 GW in the next 5 years². Flexibility enables more use of renewable energy generation and low carbon technologies, while also making more effective use of existing transmission and distribution networks. It is key to managing the costs of the UK's low carbon transition; flexibility will result in lower electricity bills for all customers than could otherwise be achieved as heat and transport are electrified. In addition to the system wide benefits, domestic flexibility services also provide a route for individual households to reduce their electricity bill. When households participate in flexibility services, they can access cheaper unit rates and receive incentives and rewards for changing when they use electricity.

The domestic flexibility sector has grown rapidly in the UK. There is emerging evidence that households in vulnerable circumstances are participating in these markets³, but that more needs to be done to address the differences in opportunities and outcomes that are seen between households that experience financial, health and other challenges, and households that do not.

Research with households taking part in recent large scale flexibility trials has investigated differing experiences and outcomes for households. For example, the Demand Flexibility Service ran from Winter 2022/23 with 16 million households and businesses taking part. The evaluation found the service had very low barriers to entry; the only technical requirement was a smart meter. This resulted in wide uptake across a wide range of different households, with coverage across socioeconomic groups and a large proportion of respondents reporting a physical or mental health condition (30%)⁴. However, outcomes differed substantially: households with assets and higher flexible loads (e.g. EVs, heat pumps) delivered more flexibility and therefore earned greater rewards. Households with long-term health conditions indicated willingness to participate in flex and evidence indicated that some individuals engaged in behaviours that could put them at risk e.g. turning off electrical medical equipment and heating. This also led to feelings of unfairness due to a perceived need to compromise health to participate. Crowdflex⁵ trials have also found differences in experiences between household types.

There is emerging evidence of three distinct issues relating to vulnerability and participation in flexibility:

- 1) Differences in outcome across households that have the same flexible load and are participating in the same flexibility service. For example, households with low energy literacy, limited digital skills, limited ability or confidence to optimise their household electricity demand are not shifting as easily or effectively.

² DESNZ (2025) Clean Power 2030 Action Plan' p.x: assets.publishing.service.gov.uk/media/677bc80399c93b7286a396d6/clean-power-2030-action-plan-main-report.pdf

³ Access to Flexibility Report (2025). <https://centreforsustainableenergy.ams3.digitaloceanspaces.com/wp-content/uploads/2025/03/16095000/access-to-flexibility-a-report-for-national-grid-electricity-distribution-2025.pdf>.

⁴ Household engagement with the Demand Flexibility Service 2022/23 (2023): www.neso.energy/document/282981/download

⁵ Crowdflex project description: www.neso.energy/about/our-projects/crowdflex

- 2) Households that have flexible load but struggle to bring this flexibility to market. Research has shown there is less innovation or services available to households who, for example, have a smart prepayment meter, or have storage heaters and immersion tanks, rather than heat pumps and EVs⁶.
- 3) Households that do not have flexible load. Often low-income households who use very low electricity. These households pay a larger proportion of their electricity bill on network charges and fixed costs. Here the priority is to ensure that flexibility delivers system wide benefits and reduces the costs of the net zero transition for all consumers.

These create a number of routes to support the uptake of flexibility services and make participation as easy and effective as possible so that both the household and the network benefit. Table 1 below summarises these.

Table 1: Summary of participation issues and possible interventions.

Participation issue	Potential interventions
Less effective participation	Targeted advice and practical support
No route to market	New services and tailored onboarding
No flexible load	Funding and engagement mechanisms that support households take up low carbon technologies and use them optimally

The energy sector is required to protect vulnerable customers. This requirement exists for suppliers and distribution network operators (DNOs) and is focused on ensuring reliability and affordability of supply⁷. However, Flexibility introduces some new issues to consider, not only the risk of power cuts or interruptions, but challenges associated with digital engagement, control and automation of and within households. Participating in flexibility can require a household to interact with complex tariffs, user interfaces (UI) and/or data sharing arrangements, and this can prevent households with complex needs from signing up or taking part effectively. As Table 1 shows, interventions to mitigate such barriers include supporting access to smart technologies, building trust in automation by service providers e.g. EV chargers, heat pumps, and supporting households to interpret and act on the appropriate events and signals. Such support has not typically been provided by the energy sector under existing services designed to protect vulnerable consumers. This is changing, as more evidence emerges about how flexibility intersects with vulnerability and what support is effective at widening positive participation.

Building on these insights into vulnerability and flexibility, the next section outlines the project’s approach and provides the framework, methods, and key questions used to identify practical interventions that DSOs can make to widen participation in flexibility markets.

⁶ Smart Energy Market Review (2025) www.cse.org.uk/resource/smart-and-fair-smart-energy-market-review-webinar-summary/

⁷ Ofgem (2025) Customer Vulnerability Strategy: www.ofgem.gov.uk/sites/default/files/2025-04/Final%20CVS%2015042025-20250414111309.pdf

2.3. Project Approach

This phase of the research was designed to identify DSO-led interventions that enable wider participation in flexibility markets, particularly among households in vulnerable circumstances. The work builds upon analysis run by CSE on NG DSO's procurement outcomes for low voltage constraint management zones, which identified a correlation between household income and successful procurement outcomes. NG DSO recognised a need to explore options for their flexibility markets to be accessible to a wider group of households. The approach combined stakeholder engagement, data analysis, and targeted case studies within a structured framework.

The project sought to answer two central questions:

- 1) Assessing uptake: Is there an opportunity gap? Are the assets currently used by households (e.g., EVs, storage heaters) underutilised for flexibility?
- 2) Reviewing interventions: Can DSO-led interventions close this gap? What actions can DSOs take, in collaboration with FSPs and trusted intermediaries, to overcome barriers and increase participation?

To address these questions, the research adopted a three-strand framework:

PSR Data Analysis – Examining participation among households on the Priority Services Register in NG DSOs flexibility services.

Case Study 1: Electric Vehicles – Assessing flexibility potential among disabled drivers using the Motability Scheme and identifying interventions to support EV adoption and smart charging.

Case Study 2: Storage Heaters – Evaluating the untapped flexibility in socially rented and low-income homes with storage heaters and identifying locations for a trial.

The framework provides a structured way to assess where targeted action is most effective, with a particular focus upon the proposed action of targeting support and innovation towards vulnerable customers with the most to gain and to enable the creation of more supportive flexibility procurement arrangements. The work informs NG DSO's Flex Service Accessibility roadmap.

Methods

Stakeholder Workshop: At project inception, a workshop with DSOs, FSPs, and advocacy organisations reviewed previous findings and co-developed intervention ideas. Discussions highlighted systemic challenges such as tariff availability, consumer trust, and regulatory constraints, while identifying opportunities for innovation. The workshop write up is available on CSE's website⁸. Following the workshop, CSE worked with FSPs to explore possible interventions.

⁸ Access to Flexibility – Workshop Summary (2025):
<https://centreforsustainableenergy.ams3.digitaloceanspaces.com/wp-content/uploads/2025/10/02092935/Driving-inclusive-flexibility-access-%E2%80%93-workshop-summary.pdf>

Data Integration and Analysis: NGED provided household-level data linking PSR flags with Market Gateway registration and participation. Chi-square tests and visualisations were used to quantify disparities between PSR and non-PSR households and across needs codes.

Mixed-Methods Case Studies:

- EVs: Combined quantitative data from Motability Operations and ev.energy with qualitative insights from stakeholders to understand technical eligibility, behavioural barriers, and potential support mechanisms.
- Storage Heaters: Mapped asset clusters using EPC and CMZ data, estimated flexibility capacity, and reviewed Connected Response's trials to assess technical feasibility and consumer benefits.

Intervention opportunities: Insights from all strands informed a set of next steps for the DSO, and for FSPs and trusted intermediaries.

3. Priority Services Register data analysis

3.1. Context

The Priority Services Register (PSR) was originally developed to help energy providers identify households most at risk from the impacts of power failures, ensuring they received additional support during outages. However, as the energy system becomes increasingly digitised and flexible, the nature of vulnerability is also changing⁹. Evidence indicates that while some households flagged on the PSR may possess strong digital skills, time flexibility, and high smart-energy capabilities, which would enable them to participate in and benefit from emerging flexibility services, others face compounded vulnerabilities as these services become more ubiquitous. Some households have specific needs driving their electricity use that are incompatible with demand shifting, or they may rely on assistive technologies which are incompatible with digital interfaces required for smart energy technologies. Therefore, eligibility for PSR does not necessarily indicate a household that is more likely to benefit or be disadvantaged by participating in flexibility services. Despite its limitations, PSR data remains the only available metric that DNOs can use to understand which domestic customers are engaging with flexibility services. Therefore, it provides a valuable metric to examine patterns of participation and opportunities for intervention.

National Grid Electricity Distribution (NGED) license area covers the East Midlands, West Midlands, South West England and South Wales. NGED maintains the register which assigns a different needs code to a household's MPAN, indicating the types of additional support or requirements that may apply. The makeup of NGED's PSR gives insight into vulnerable or higher-need households within these regions. Map 2¹⁰ shows the total numbers of PSR households registered across these regions. However not all households that are eligible to be on the PSR are actually registered. Figure 1 indicates the proportion of those on the PSR compared to those who are eligible using the same data from the latest PSR reach analysis¹¹. We have analysed the PSR data provided by National Grid to understand how PSR flags relate to participation in DSO flexibility markets. However, this data includes MPANs from households that are PSR-eligible, but who have not signed up to the PSR. Therefore, the analysis underrepresents PSR households by between 23.7% and 27.3% depending on the region.

⁹ Smart & Fair - Working with the smart energy capabilities lens (2024): <https://centreforsustainableenergy.ams3.digitaloceanspaces.com/wp-content/uploads/2024/02/25144104/smart-and-fair-working-with-the-smart-energy-capabilities-lens.pdf>. p7.

¹⁰ Created using NG social indicator mapping. Available: <https://customer.nationalgrid.co.uk/advice-and-guidance/priority-services/social-indicator-mapping>

¹¹ ED3 Sector Specific Methodology Consultation (2025): www.ofgem.gov.uk/sites/default/files/2025-10/ED3-sector-specific-methodology-consultation-core-document_clean.pdf. p72

Map 2: Total number of PSR households in NGED LSOAs.

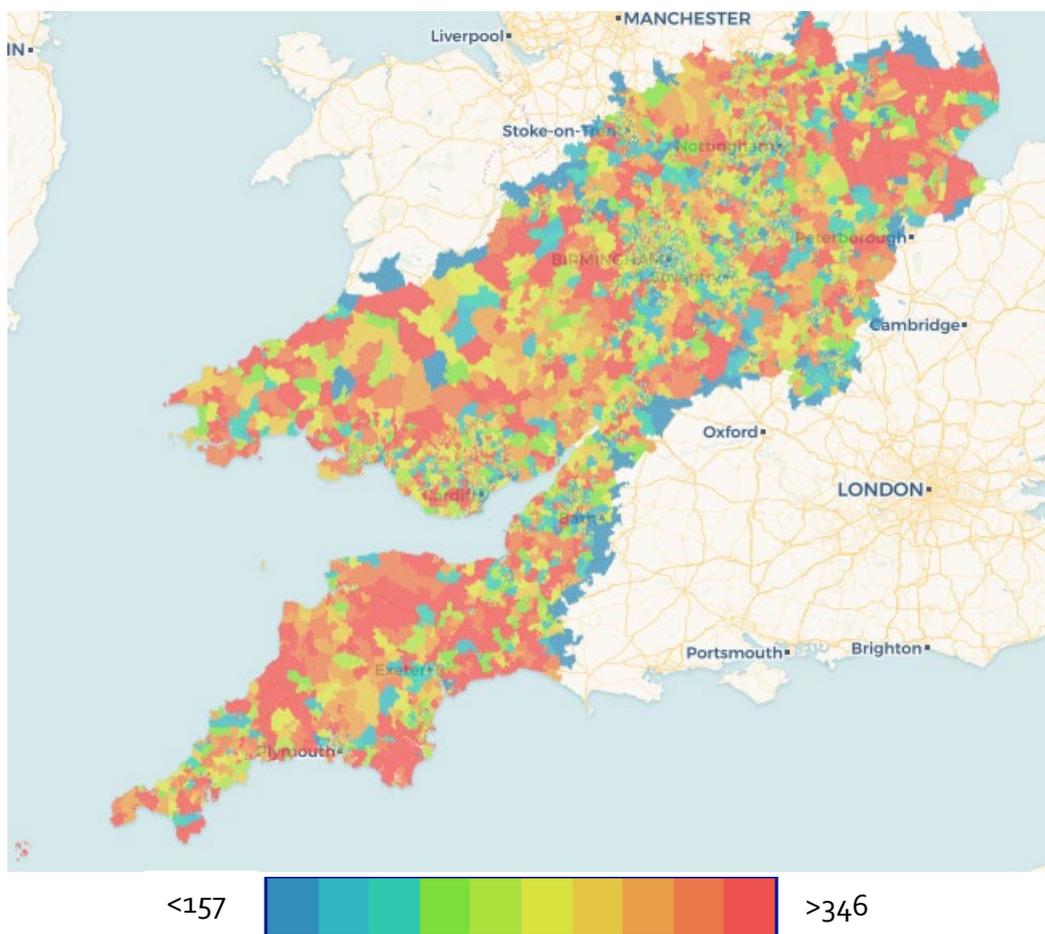
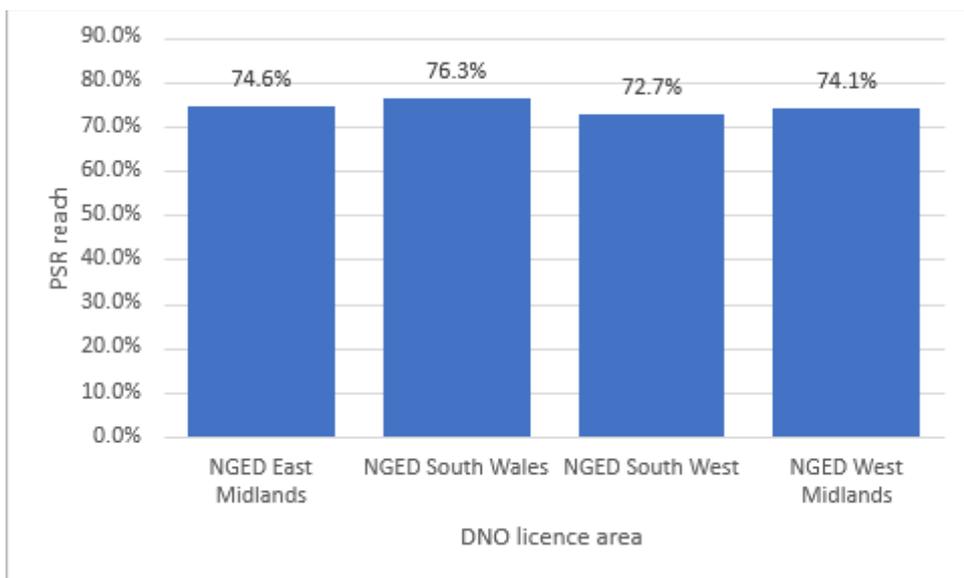


Figure 1: Assessment of proportion of households on the PSR compared to how many are eligible.



3.2. Method

Analysis of the PSR groups registered with Market Gateway was performed using data provided by National Grid DSO. FSPs participating in NG DSO's flexibility markets register the MPANs of households in their portfolios on NG DSO's Market Gateway. For this research NG DSO cross referenced the MPANs registered on their Market Gateway with their PSR data. This created a household level data set that CSE was able to analyse. In each case, chi-square tables and plots were created to test for the statistical significance of group differences and visualise these differences, respectively.

Initially, the differences between PSR and non-PSR households were assessed in terms of the proportion of those registered with Market Gateway compared to those actively engaging with energy flexibility – both of which were available in the dataset.

Following this, analysis included between and within PSR group analysis, analysing the differences between different PSR groups (i.e. SNo1 and SNo2) and the proportion of those registered and engaging, as above. Table 2 shows the different needs codes with examples of vulnerabilities that fit into each one, as well as the frequencies of MPANs within each category. The lack of mutual exclusivity between PSR categories was considered unproblematic, as the conclusions drawn from the analysis do not require the groups to be independent. However, this means we have not identified causal mechanisms determining which vulnerabilities lead to lower registration and participation rates. This would require individual level data and more extensive quantitative analysis.

Table 2: PSR needs code high-level categories.

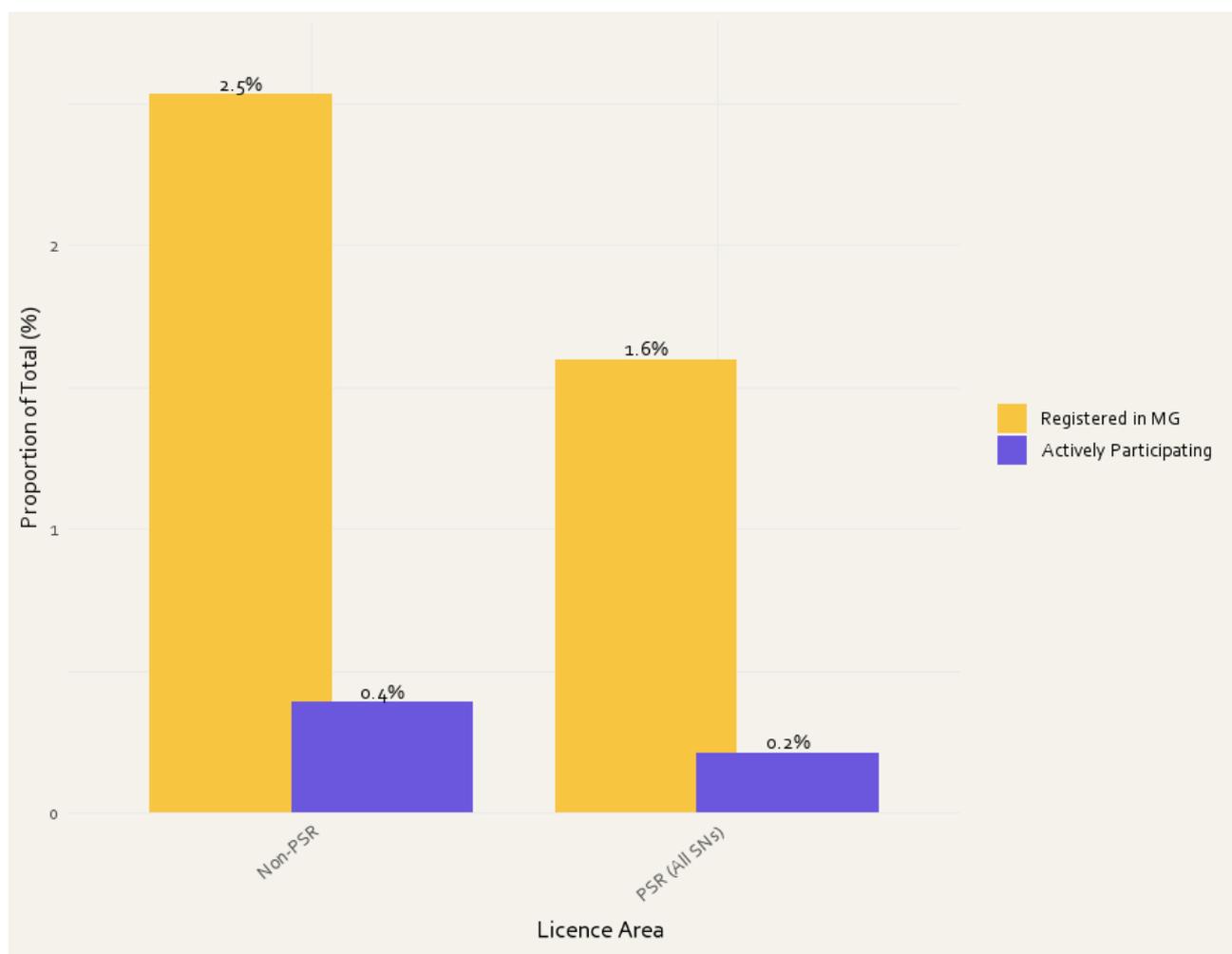
PSR Needs Code	SNo1	SNo2	SNo3	SNo4	Non-PSR
Categorisation	Life threatening (e.g. Kidney dialysis)	Discomfort and inconvenience (e.g. Oxygen concentrator)	Special communication needs (e.g. Blind)	All vulnerable customers outside listed (e.g. Mental health; Poor sense of smell/taste)	N/a
Frequency (All MPANs)	108,056	148,694	455,791	1,812,298	5,664,433
Categories are not mutually exclusive (other than non-PSR) and as such there is likely repeated cases.					

3.3. Analysis

Initially, those registered for the PSR were compared to those not registered for the PSR. This is shown in Figure 2.

The data show that households with PSR flags are already participating in NG DSO flexibility markets, across all needs codes. The data also shows there is a substantial difference between the number of non-PSR and PSR energy consumers, with the latter indicating 0.9% lower registration rates and 0.2% lower participation rates.

Figure 2: Proportions of PSR and non-PSR MPANs registered with Market Gateway and actively participating in flexibility.

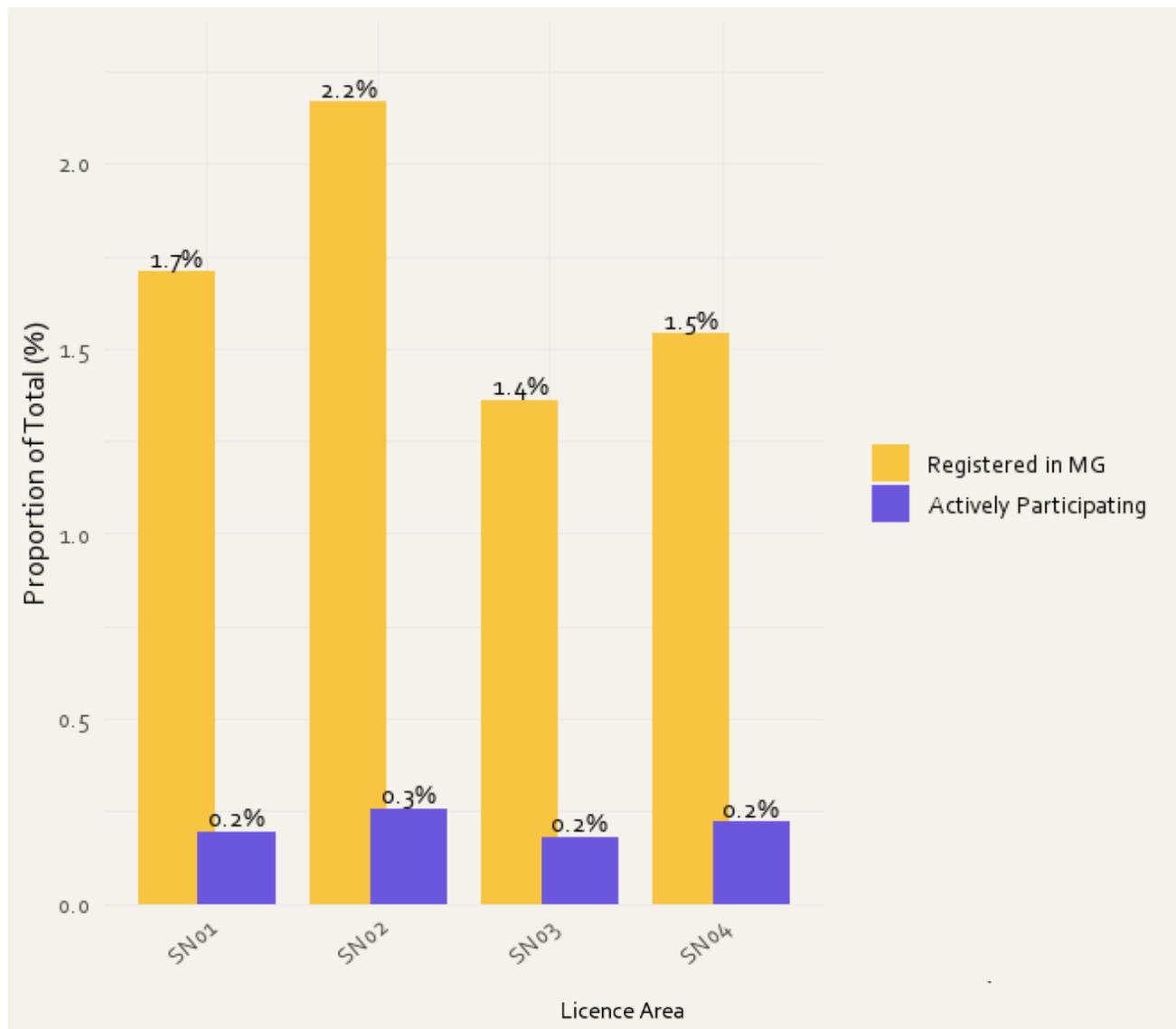


Chi-square analysis (Appendix Table 8) shows that those on the PSR are participating in flexibility less than those not on the PSR. This is true both for registration on Market Gateway, as well as for those actively participating.

The chi-square has percentages for PSR and non-PSR MPANs, indicating that PSRs registered with Market Gateway and those actively participating with flexibility services is significantly lower than non-PSR levels. The proportion of PSRs actively participating are all lower than non-PSR.

Figure 3 below shows the variation in registration and participation rates across different PSR needs codes. SNo2 (Discomfort and inconvenience e.g. oxygen use) MPANs have the highest rates, followed by SNo1 (Life threatening e.g. kidney dialysis), SNo4 (All other vulnerabilities), and SNo3 (Special communication needs e.g. blindness).

Figure 3: Proportion of PSR MPANs who are registered in the Market Gateway, and those participating in flexibility by needs code.



The PSR needs codes identify characteristics that may affect a household’s capacity to manage their energy use flexibly. Particular needs codes identify individuals who need a consistent supply of electricity for the functioning of essential medical equipment. For example, individuals in the

SNo1 code (life threatening) may have kidney failure, and as such need a dialysis machine running continuously throughout the day. This raises the questions about whether a flexibility service is appropriate. However, SNo3 (special communication needs) individuals are the least likely to be registered with Market Gateway. This may indicate a barrier that could be overcome to improve access for individuals with special communication needs. Research on different households' experiences of participating in flexibility services has shown that some households with complex needs, but with high smart energy capabilities have better experiences than households with low smart energy capabilities. High smart energy capabilities typically involve strong levels of digital confidence, high energy literacy, and large flexibility assets, and households with complex needs can have high smart energy capabilities. While other households with similar needs but low smart energy capabilities may experience more challenges, receive fewer benefits, and take greater risks when participating in flexibility services¹².

The analysis of the PSR data does enable us to explore the different reasons behind lower participation rates, or the opportunities to increase participation for households that could benefit. This demonstrates the limitations of PSR as an indicator of ability to engage with flexibility. Therefore, it is recommended NG DSO to re-running the PSR analysis to track change in participation rates over time, but that they also develop better metrics for use in ongoing analysis. The development of new metrics would ensure confidence that households who stand to gain from engagement with flexibility services are doing so, and that those who stand to be negatively impacted are not. This would help to ensure equitable access to flexibility while avoiding the specific, negative impacts faced by vulnerability individuals.

3.4. Conclusion

The implications of this analysis indicate that as energy flexibility becomes an increasingly central mechanism for managing network capacity, household energy bills, and the UK's energy transition more broadly, there is a clear risk that customers on the Priority Service Register will be disproportionately disadvantaged due to additional health needs, and this will likely be exacerbated without active monitoring and intervention. These households often depend on essential medical or health-related equipment, as well as other critical services, which cannot be curtailed or shifted without compromising safety or wellbeing. However, the overall lower levels of registration and participation across all PSR groups shows that there are also situational barriers which do not preclude capacity to flex entirely and may instead be based around awareness, access or confidence. DSOs therefore have a clear role in tracking participation over time, using PSR data initially, but also developing improved metrics on household capabilities specific to flexibility. This will create an evidence base to support targeted interventions and more accessible communication approaches. Doing so will help ensure a system-efficient and equitable evolution of flexibility markets.

In the next two chapters we present two case studies of different flexibility services that could, with targeted interventions and support, be adapted to suit the specific needs of different groups.

¹² For example see [Households Experiences of the Demand Flexibility Service](#) and [CrowdFlex Utilisation Winter Trial 2024/25: Customer feedback](#)

4. Case Study 1: Electric Vehicles

Electric vehicles (EVs) are currently the main source of domestic flexibility in NG DSO's markets¹³. EVs are also recognised as the main source of domestic flexibility and a key route for achieving the Clean Power 2030 targets^{14,15}. EV ownership currently weakly correlates with high household income¹⁶, and higher densities of charging points are found in more affluent areas¹⁷. However, disabled people with mobility needs are also a significant and emerging segment within the electric vehicles market¹⁸. Charging flexibly, or smart charging is a key method to manage running costs for EVs and offers significant savings to households. It is therefore important to understand if disabled EV drivers' participation in flexibility services is the same as other drivers.

Existing research has found that disabled EV drivers need accessible, adaptable and affordable vehicles and charging systems^{19,20}. EV designs that accommodate mobility aids and other adaptations as well as charging points, domestic and public, are usable by a wide range of individuals with different impairments.

Referring back to our framework outlined above, disabled EV drivers represent an example of households with significant flexible loads who may need additional support to increase their participation in flexibility services.

The Motability Scheme provides vehicles on 3 or 5-year leases. Drivers using the Motability Scheme can opt to lease either an internal combustion engine (ICE) vehicle, hybrid vehicles or an EV.

The Motability Scheme supports customers to transition to EVs where it is right for them, and works with partners to find solutions for customers who can't make the switch. As the Zero

¹³ Access to Flexibility Report (2025). <https://centreforsustainableenergy.ams3.digitaloceanspaces.com/wp-content/uploads/2025/03/16095000/access-to-flexibility-a-report-for-national-grid-electricity-distribution-2025.pdf.p15>

¹⁴ NESO - Clean Power 2030: www.neso.energy/publications/clean-power-2030

¹⁵ DESNZ - Clean Power 2030 Action Plan: A new era of clean electricity – main report: www.gov.uk/government/publications/clean-power-2030-action-plan/clean-power-2030-action-plan-a-new-era-of-clean-electricity-main-report

¹⁶ RAND Europe. Identifying patterns and factors affecting the adoption of electric vehicles across the UK. www.rand.org/randeurope/research/projects/2021/uk-electric-vehicle-adoption.html

¹⁷ Caulfield, B. et al. (2022). Measuring the equity impacts of government subsidies for electric vehicles. Energy, 248: www.sciencedirect.com/science/article/pii/S0360544222004911

¹⁸ RIDC (2022). Inaccessible Charging is Barrier to Electric for Disabled and Older Drivers: www.ridc.org.uk/transport/inaccessible-charging-barrier-electric-disabled-and-older-drivers

¹⁹ EV design & disability inclusion: www.motabilityfoundation.org.uk/media/dgobgzyd/estoo62-motability-report-v15.pdf

²⁰ Motability Operations has published their [EV Transition Tracker | Motability Operations](#)

Emissions Vehicle (ZEV) mandate accelerates the shift towards EVs and reduces the availability of petrol and diesel cars in the market, the Motability Scheme is focused on ensuring no one is left behind in the transition. The Motability Scheme provides support with charging for EV customers. Motability Operations also works with installers who provide direct support to the households, who have off-street parking, to ensure they understand how to use their smart charger. The organisation has developed a user journey to ensure there is consistency in the support that the charger installer provides.

This chapter presents a mixed-methods case study developed with Motability Operations²¹ and an FSP working with Motability Operations, ev.energy and active in NG DSO markets. This allowed us to understand trends in flexibility participation among Motability Scheme EV drivers and contextual factors shaping the barriers and opportunities faced by consumers. The data used in this section was provided by ev.energy and Motability Operations. ev.energy provided the numbers of EV users registered, disaggregated to all users enrolled on their platform, and those who received their EV through the Motability Scheme.

4.1. Opportunity gap

Over 100,000 Motability Scheme customers currently have an EV. Table 3 provides a snapshot of the number of Motability Scheme customers with EVs, and the number that had a smart charger at the time of research (October 2025). 73,250 Motability drivers had EVs and a smart charger installed by an installer working with Motability. 36,750 EV drivers did not have a smart charger and used public charging infrastructure. This was roughly one third of all Motability EV drivers.

Table 3: Overview of Motability customers.

	Number of Motability customers	Percentage of Motability customers
Total cars	815,000	100%
Customers with EVs	110,000	13%
Customers with smart chargers	73,250	9%

EV drivers with chargers can participate in a range of flexibility services and markets either by signing up with a Flexibility Service Provider, or by switching to a tariff that enables the supplier to manage their assets. Motability Operations works with a number of Flexibility Service Providers to support their drivers in taking up flexibility services. ev.energy are one of the FSPs that Motability Operations works with. Data provided by ev.energy allow us to explore whether there are different rates of participation between Motability Scheme drivers and other EV drivers.

²¹ Motability: <https://www.motability.co.uk/>

4.1.1. Ability of those on the Motability Scheme to participate in flexibility

Table 4 shows the technical requirements for ev.energy to enter their customers' EVs into different flexibility markets and services.

- DSO market eligibility means that the user has allowed ev.energy to optimise their charging and the household MPAN (meter point administration number) information is available.
- NESO services eligibility refers to the National Energy System Operator which procures services for power system stability. As well as the user smart charging and MPAN information, the user must be able to share information from their home charge point to the FSP as NESO requires this asset metering to participate in its services.
- Wholesale trading (P415) eligibility requires the user to be smart charging, have MPAN and for their household to be half-hourly settled or they have a charger that meets CoP11 metering standards.

While NESO services require metering from an EV charge point, DSO markets also allow metering from vehicle telematics or smart meters. And finally, for ev.energy to use an EV in those markets, the EV owner cannot be on a managed tariff where a supplier controls the EV charging and is already using the EV in those markets.

Table 4: Comparison of ev.energy's general fleet and Motability users meeting technical requirements.

ev.energy definition	ev.energy general fleet	Motability on ev.energy platform
DSO flexibility market eligibility	36%	66%
NESO services eligibility	31%	63%
Wholesale trading (P415) eligibility	15%	12%

Table 4 compares the technical eligibility criteria met by their Motability Scheme drivers (approximately 800 drivers), and their other customers. This data show that those customers on the Motability Scheme are more likely than other EV drivers to meet the technical requirements to participate in flexibility, outside of wholesale trading. This is a positive finding, suggesting less of an opportunity gap than anticipated. This results from the steps taken by Motability Operations to identify within their wider group of EV drivers those that would be able to take up ev.energy smart charging services. Motability's approach to installations results in higher levels of smart charging. There is a consistent user journey, the installer provides advice and Motability is a trusted intermediary, so this advice is followed. ev.energy also identify a trend that Motability Scheme customers appear to be more engaged with the incentives they provide, which could be linked to being more cost conscious.

However, 17% of Motability Scheme customers signed up with ev.energy do not have smart charging enabled. In addition, there is still a sizeable minority (34%) of Motability Scheme customers with ev.energy who lack the technical requirements to participate in DSO flexibility services. There is still a system-level accessibility barrier around how assets are identified, registered, and validated into flexibility markets. As a result, someone can have an EV and a charger and still be blocked by registration and data validation rules.

4.2. DSO Options to increase flexibility participation

4.2.1. Review of interventions

The data showed that ev.energy and Motability Operation's collaboration had already resulted in high levels of technical eligibility for their drivers. To understand if other DSO led interventions could further improve participation, we reviewed three types of interventions that were identified in the first phase of the research. These are local area-based support, incentivising FSPs, and procurement processes²²:

1. Provide more targeted support for consumers in CMZs in low income or deprived areas to improve their smart energy capabilities and boost their provision of flexibility.

We discussed a scenario in which the DSO identified an area which needed more flexibility, and Motability Operations and ev.energy worked to increase the numbers of EVs in that area through the Motability Scheme by working Motability Scheme ICE drivers. This was not seen as viable. Motability Scheme drivers are on multi-year leases and EV switching dates are tied to individual leases and involve long hardware install times. Therefore, a targeted effort in one area would not produce a high volume of new assets, and an extended period of targeted support would be expensive. Instead, Motability Operations see the changing regulations around ICE vehicles as the main mechanism that will increase numbers of EV drivers in their customer base.

Although area-based support will not deliver significant increases in flexibility participation for this group, Motability Operations recognised the value of improving energy advice for their EV drivers. Motability Operations do not currently provide tariff advice, and recognised that this could build confidence in flexibility and result in lower EV running costs and higher levels of satisfaction. ev.energy also confirmed a need to improve understanding of what charging behaviour creates the most amount of flexibility per asset.

2. Incentivise FSPs to capture more flexibility from households in vulnerable circumstances, or remove cost barriers.

This intervention is less applicable for Motability Scheme customers. Motability Scheme customers access EVs through a lease model and the partnership with ev.energy creates a direct route into flexibility services. However, Motability Operations did point out that aggregators tend to prioritise markets with the highest value (currently wholesale trading). If DSOs strengthen

²² Access to Flexibility Report (2025). <https://centreforsustainableenergy.ams3.digitaloceanspaces.com/wp-content/uploads/2025/03/16095000/access-to-flexibility-a-report-for-national-grid-electricity-distribution-2025.pdf>.

incentives and overall value in DSO markets, particularly with an accessibility/representation lens, aggregators may be more motivated to bid EV assets into those markets.

3. Change procurement processes or notice periods.

ev.energy felt the current DSO procurement processes as working well and while there are areas for improvement, they are not prohibitive to FSP participation. However, they did point to a system-level accessibility barrier around how assets are identified, registered, and validated into flexibility markets. Some criteria are customer-facing (smart charging enabled, compatible integration, not on a managed tariff), but others are system/data-facing, for example:

- Whether the MPAN is provided and correct.
- Whether settlement/metering arrangements allow participation in certain markets (e.g., HH settlement or equivalent evidence).
- Whether the asset can be accepted into specific market routes (DSO vs NESO vs wholesale).

These issues can mean that a household with an EV and a charger can still be blocked by registration and data validation rules. While no additional Motability-specific DSO intervention was identified, wider accessibility of flexibility is still constrained by these market-entry frictions (MPAN/registration accuracy, onboarding interoperability), and that addressing them likely requires coordinated action across DSOs and regulators.

4.2.2. Next steps: Develop smart energy advice for Motability Scheme customers

Providing practical and accessible guidance on tariffs, optimal charging patterns, and cost-saving strategies will reduce household running costs for Motability Scheme EV drivers and increase satisfaction. Therefore, the next step is to produce this insight and advice.

Through ED2, DNOs are required to provide low carbon transition support services to customers in their licence areas. There are therefore opportunities to share the new advice and insight developed with Motability Operations and ev.energy with NGED's existing advice services. CSE currently runs the Smart Energy Advice Forum²³, through the Smart and Fair research programme. This will provide a route to share new advice materials more widely with the energy advice sector.

²³ More details on the Smart Energy Advice Forum are available on [CSE's website](#)

5. Case Study 2: Storage Heaters

Electric heating is another major source of domestic flexibility, however this is largely associated with the adoption of heat pumps. In this chapter we focus on storage heaters to understand the opportunities for diversifying who is participating in LV flexibility markets and supporting effective participation.

Currently, storage heaters are not included in NESO modelling as an opportunity for delivering on flexibility targets²⁴. This is because storage heaters are considered already 'flexed' as they typically are connected to Economy 7 meters and tariffs and charge for up to seven hours overnight starting from midnight, releasing their heat during the day. However, storage heaters have some potential to be used more flexibly than the basic Economy 7 model enables. Using storage heaters more flexibly could deliver both network and household benefits. Networks could benefit from an additional asset type that could provide both turn up and turn down services in response to network needs, while households benefit from the additional comfort of having more hours of heating available and the financial benefits from delivering flexibility.

There has been a lack of innovation around storage heaters as flexibility assets which has been identified by CSE as a source of exclusion²⁵. There is evidence that storage heaters are associated with lower income households and in areas that score more highly on the indices of multiple deprivation²⁶. There is also evidence that storage heaters on Economy 7 often do not provide a sufficient amount of heat for those in vulnerable circumstances. Many users require a constant level of heating throughout the day. Many storage heaters, particularly older models, can't store sufficient heat to provide this and/or don't have sophisticated enough controls to allow for flexible programming²⁷. Therefore, there is motivation for more than one charging window per day, to allow a (partial) recharge of the storage heater. Research has also found that poor understanding of storage heater controls, and the interaction with tariffs such as Economy 7 cause issues with storage heaters²⁸. Automating control and interaction can increase satisfaction among those with storage heaters. This has resulted in some new innovation and trials of more flexible use of storage heaters. For example, in the retail market we have seen suppliers offer smart tariffs bundled with specific, new models of storage heater (for example the British Gas Dimplex

²⁴ DESNZ (2025) Clean Power 2030 Action Plan' p.32: assets.publishing.service.gov.uk/media/677bc80399c93b7286a396d6/clean-power-2030-action-plan-main-report.pdf

²⁵ See for example, chapter 2 in CSE (2024): [Smart & Fair: Working with the smart energy capabilities lens](#)

²⁶ See Access to Flexibility report (2025)

²⁷ 21st Century Heating (2021): <https://21stcenturyheating.co.uk/advice/storage-heaters-differences-between-older-and-newer-models/>

²⁸ SSEN (2022). An Electric Heat Pathway: Looking Beyond Heatpumps: https://ssen-innovation.co.uk/wp-content/uploads/2022/08/NIA_SSEN_0039-Electric-Heat-Pathways-Final-Report.pdf. p14.

Quantum tariff²⁹), managed smart tariffs with the supplier automating storage heaters (for example Octopus Energy’s Snug Octopus tariff), and smart tariffs that give additional charging windows during the day. From technology companies we have seen new technologies that can be retrofitted to older storage heaters and hot water tanks to allow them to be automated. These innovations from tech companies and retailers create opportunities to widen participation in flexibility services broadly, and DSO markets specifically.

In our first phase of research, we recommended that NG DSO look at including direct electric heating as an asset type in their Market Gateway, and explore the value of electric heating as an asset³⁰. In this chapter we present an analysis of the opportunity gap represented by the storage heaters in their license areas, and then present some insights on an intervention that would be possible. In contrast to chapter 2, there is not an existing flexibility service provider working with households with storage heaters in NGED’s licence areas, but Connected Response is a technology provider and FSP working with social landlords in other parts of the UK to optimise storage heaters and include them in flexibility services.

5.1. Opportunity gap

Storage heaters already participate in flexibility, notably through Economy 7 tariffs. However, as patterns of electricity consumption and generation change with decarbonisation, different deployment of the flexibility capacity could be more beneficial.

Market Gateway data from NG DSO reflects the fact that there are no flexibility service providers using storage heaters a flexibility asset in the NGED licence areas. NG DSO has recently added a new category of ‘other electric heating’ to their Market Gateway, this will allow monitoring going forward. In this chapter we present the potential capacity available from storage heaters.

5.1.1. Overall flexibility availability

Initially, it is worth indicating the potential scale of flexibility available from storage heaters. We have examined this across the National Grid DSO area, and existing constraint managed zones (CMZs) issues by National Grid DSO.

Table 5: Capacity of storage heaters across the National Grid licence areas and CMZs.

Area	Homes	Capacity (GW)	Storage capacity (GWh)
DSO area	275,000	2.3	18.6
CMZs	137,876	1.1	9.4

²⁹ This tariff was offered in 2024, but is no longer available to new customers. See [BG Dimplex Quantum A5 update 2024 PR.indd](#)

³⁰ Access to Flexibility Report (2025) p.47: <https://centreforsustainableenergy.ams3.digitaloceanspaces.com/wp-content/uploads/2025/03/16095000/access-to-flexibility-a-report-for-national-grid-electricity-distribution-2025.pdf>.

Table 5 contains estimates of storage heater capacity, based on an estimated number of homes with storage heaters and the number of bedrooms in a home. These figures were calculated using address-level EPC data (including interpolated data for properties without EPCs)³¹, with a dataset of storage heaters in the NG licence areas and a separate dataset for LV CMZs. Estimates for numbers of legacy and high heat retention (HHR) storage heaters were derived from specification sheets from manufacturers of the most common heaters³².

Table 6 contains estimates of hot water heater capacity in the same households, assumed to be 100% in the houses with storage heaters installed, with conservative estimate of 1.5kW capacity per heater. Total capacity indicates combined storage heater and hot water tank capacity. The combined figures for storage heaters and hot water heaters give total capacities of 2.7 and 1.3 GWs for the total DSO and CMZs, respectively. The total storage capacity sits at 20.8 and 10.5 GWh in the same areas.

Table 6: Capacity of hot water heaters across the National Grid license areas and CMZs and totals with storage heaters.

Area	Homes	Capacity (GW)	Storage Capacity (GWh)
DSO area	275,000	0.41	2.2
CMZs	137,876	0.21	1.1

This data needs to be considered in relation to the realities of how households use their storage heaters. Connected Response have worked with about 15,000 lower income households who have storage heaters, some of whom pay for their heat via their rent, others pay for their heat directly on their electricity bill. Of the bill payers, Connected Response have found that roughly a third of households cannot afford to use their storage heaters and underheat their homes. Currently off-peak electricity tariffs are 2-3 times gas prices, and peak tariffs 3-4 times gas prices. For this reason, properties with storage heating are often under-heated.

Another third of households that Connected Response work with use supplementary heating with or in addition to their storage heaters, to achieve an adequate level of heat. Supplementary heating may be chosen by a household because it is perceived to be lower cost for short periods, provide more control or targeted heating, or because they are unable to access a suitable tariff for storage heating. The most common tariff for storage heaters allows 7h of overnight charging (8.5 in Scotland). Less energy efficient properties (e.g. EPC C and below) are often unable to retain sufficient heat in the property for adequate comfort by the afternoon or evening (depending on the number and sizing of heaters), meaning that supplementary heating at peak times is required.

³¹ CSE has a model which imputes EPCs for addresses which do not have one, based on the certificates for nearby similar buildings

³² BEIS (2019) Evidence gathering for electric heating options in off gas grid homes: https://assets.publishing.service.gov.uk/media/5d78ed6be5274a27c2c6d50c/Electric_heating_options_in_off_gas_grid_homes.pdf

This can be addressed by:

1. Fitting High Heat Retention (HHR) storage heaters. These are able to store a similar amount of energy as traditional storage heaters (c20kWh from a full charge), but can retain it for longer due to the higher levels of insulation and active control of heat release. However, if there is a continuous high heating demand during the day, direct electric heating may still be required as a top up (this functionality is usually built into HHRs).
2. Selecting a tariff with multiple off-peak periods, such as Economy 10. In this case, a three-hour charge between 1pm and 4pm eliminates the need to use supplementary heating in the afternoon and evening.

Interventions that improve the performance and flexible use of storage heaters can therefore deliver real benefits to households as well as creating more flexibility in the low voltage network.

5.1.2. Turn down potential

Currently, National Grid CMZs procure turn-down services (FSPs are asked to provide reduced electricity consumption in a certain time window, when demand is generally high) and have procured turn-up since April 2025 (FSPs are asked to increase electricity consumption, when demand is generally low or there is excess capacity). Further options for expanded turn up procurement is discussed more in Section 5.1.3.

Storage heaters have been presumed to not be useful to contribute to turn-down services, as Economy 7 is designed to shift electricity use to lower-use times. Normally Economy 7 hours are set between midnight and 7am, though this does vary. However as noted above, a property with storage heaters may not follow a storage heater profile if supplementary heating is in use. Typical Economy 7 charging (which accounts for c97% of all storage heater charging) always starts at midnight and continues until the thermostats in the heaters indicate that no more charge is required. This means that charging is concentrated between 00.00 and 04.00, although sometimes longer on very cold days – charging cannot be undertaken outside the 00.00-07.00 window.

National Grid CMZs are split into 4-hour time periods, including one period which overlaps with Economy 7 cheap rate hours. This is the night delivery period, which is from 00:00 – 04:00. There are also approximately 70 CMZs requiring turn down services in the night delivery period where there are storage heaters (see Appendix I, 9). We have compared the CMZs which are seeking turn-down delivery during the night delivery period with the locations of storage heaters. This allows us to estimate what storage heater capacity, if on Economy 7, is being flexed in a way that is worsening constraint. Figure 4 shows the overlap of storage heater capacity with night delivery period CMZs, broken down by National Grid distribution regions.

Figure 4: Overlap of storage heater capacity with night delivery period CMZs.

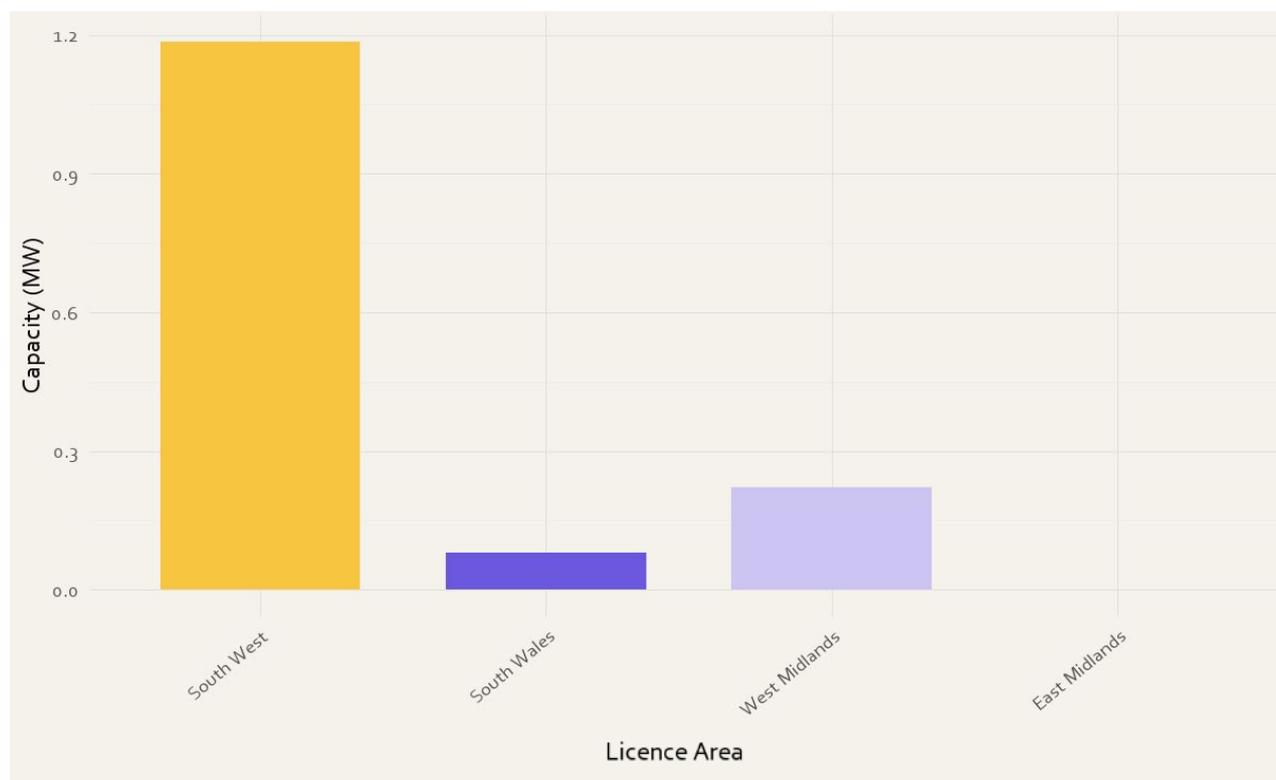


Figure 5 shows that, overall, about 1.5 MW of storage heater capacity is currently being turned up during a turn down period. This is small compared to the overall storage heater capacity in the National Grid DSO area. However, this illustrates an opportunity to use storage heaters more effectively in constraint management. Particularly as electrification of heat and transport will lead to an increase in overnight charging and creating a risk that more areas will become constrained in night-time periods.

5.1.3. Turn up potential

As electricity generation moves towards decentralised and variable renewable power, it is likely that an increasing amount of turn-up services will be required. The intention of these is to make good use of generation at times that an excess is being produced, by increasing demand for electricity. This offsets potentially costly actions such as curtailment of generators which would otherwise be required.

As National Grid DSO are in the process of deciding where to expand procurement of turn-up services, it is difficult to predict how useful storage heater capacity might be in providing turn up. However, due to their characteristics, they are a potential source of demand turn up, with minimal impact on consumers.

Currently, most storage heaters are not suitable for demand turn up outside of off-peak hours, as the off-peak circuit is physically de-energised by the controls on the smart meter or the (now

legacy) RTS switch. Furthermore, suppliers have not yet implemented systems to enable demand turn up during off-peak periods. To avoid overheating, it is important that there is a room thermostat that can provide feedback to control the level of charging during demand turn up events.

There are solutions to this issue. For example, Connected Response offer systems that can optimise storage heaters to function with different smart tariffs while optimising comfort levels, offering greater flexibility. Their technology is currently being used in c15,000 social housing properties in GB, and has been used to provide flexibility services to SPEN and NESO (Local Constraint Market).

5.2. DSO options to increase flexibility participation

Enabling greater flexibility from storage heaters involves overcoming their typical control and tariff arrangements. This is both a technical and non-technical issue. The technical side comes from storage heaters being designed and installed to work with Economy 7 tariffs, through a 'restricted' supply which is only energised during off-peak times. This reflects earlier versions of storage heaters which had no built-in time control, but still provides a safety net to prevent heaters being accidentally charged using peak rates, for example if the heater time is set incorrectly. The non-technical challenge is opening up the heating to be used flexibly through a wider range of tariffs, and giving households confidence that they will still receive enough heat, even if the charging takes place at different times to what they are used to. There are similar challenges to maximising the flexibility potential of hot water tanks with electric immersion heaters.

Connected Response use three steps that create additional flexibility for storage heaters:

1. Improve the control of the heating and hot water by retrofitting technology that allows them to be controlled directly, using wireless technologies such as cellular GSM and Zigbee Low Power Radio. Connected Response then optimise the charging based on external weather conditions and internal temperature data, with charging increased in colder periods and reduced in warmer weather. On average, this reduces annual heating demand by 30% by reducing overheating on warmer days.
2. Customise the charging schedules to meet the specific needs of the household, in terms of target temperature and heating times. Customers can set their preferences via an app or via a telephone service with a UK call centre.
3. Increase the number of hours that storage heaters can be turned on by switching to a tariff that has a larger number of off-peak hours across multiple periods through the day.

Connected Response have explored both demand turn down and demand turn up with positive results. In a NIA pilot project³³ with SSEN and Energy Systems Catapult, their demand turn down service provided a 50% reduction in peak demand as recorded by meter data, while maintaining

³³ [NIA SSEN 0072 Demand Diversification Service for LMAs | SSEN Innovation](#)

internal comfort levels. Demand turn up has been used to provide services to NESO using 200 properties in Scotland with smart controls and flexible tariffs. They see other opportunities to create greater value through:

- Co-ordinating with EV charging. There is potential for heating and hot water demand to be optimised in conjunction with over-night EV charging.
- Removing use of secondary heating. Roughly a third of the households that Connected Response work with rely on direct electric heating, like electric fires, in the early evening to compensate for the lack of heat from their storage heaters. There is therefore a proportion of early evening peak demand that could be reduced by enabling storage heaters to charge in the daytime.
- Reducing under-heating. Another third of the households that Connected Response work with do not use their storage heaters at all. Improving the cost effectiveness of using storage heaters would create the confidence and the means for these households to turn on their heaters, improving their quality of life.

5.2.1. Review of interventions

Connected Response have few assets in NGED's license areas and recognise an opportunity to work with the DSO to widen their customer base and increase flexibility from storage heaters. They reviewed the three potential DSO-supported interventions.

1. Provide more targeted support for consumers in CMZs in low income or deprived areas to improve their smart energy capabilities and boost their provision of flexibility.

Targeted support means building confidence of households as well as landlords to engage with flexibility. This typically means providing a clear assessment of the costs and technical requirements of managing electricity flexibly, as well as simple descriptions of the actions required by the different parties, (setting a household heating schedule for example) and realistic estimates of the cost and comfort benefits. Targetted support was seen as an enabler by Connected Response if it could deliver two outcomes. Firstly, connections to landlords with a property portfolio that includes storage heaters, to increase uptake of Connected Response's technology. This would deliver assets in NGED license areas that could potentially be used in NG DSO's markets. Secondly targeted support for tenants to improve their use of storage heaters and lead to reduced reliance on secondary heating or reaching adequate levels of heating.

2. Incentivise FSPs to capture more flexibility from households in vulnerable circumstances or reduce upfront and running costs of new LCTs and retrofits.

Connected Response's customer base includes a higher proportion of households on lower incomes than other FSPs because they target storage heaters, and therefore an incentive mechanism to diversify their customer base is less relevant. Instead, the main issue is to overcome the upfront and running costs associated with the retrofitted technology. Innovation trials have looked at the mechanisms that DSOs can use to reduce these types of cost barriers, where DSO markets will benefit, but also that there are wider societal and system benefits that can be unlocked. The trials reviewed found that DSO intervention can be justified where flexibility

creates clear network benefits. In this case, flexibility revenues could potentially support the annual heating optimisation service costs. A Cost Benefit Analysis is needed to look at the specific revenue streams and if there is any top up funding³⁴ or other mechanism that NG DSO can provide to overcome any implementation or sign up issues.

3. Change procurement processes or notice periods.

Connected Response felt there was less opportunity for changes in DSO products to make a substantial difference to the increase in storage heater flexibility. Firstly, because low levels of procurement by a DSO make it hard to predict revenue levels, as it is a lottery where a service may be required. This could change if flex becomes more BaU. Secondly, because flexibility contracts at DSO level tend to be one-off or short duration, which make it hard to develop a longer-term business case. However, Connected Response highlighted some other avenues that can be explored. Smart storage heaters could be used to provide other operational services, such as storm recovery or frequency response. As local electricity markets evolve, there are also opportunities for commercially led network balancing.

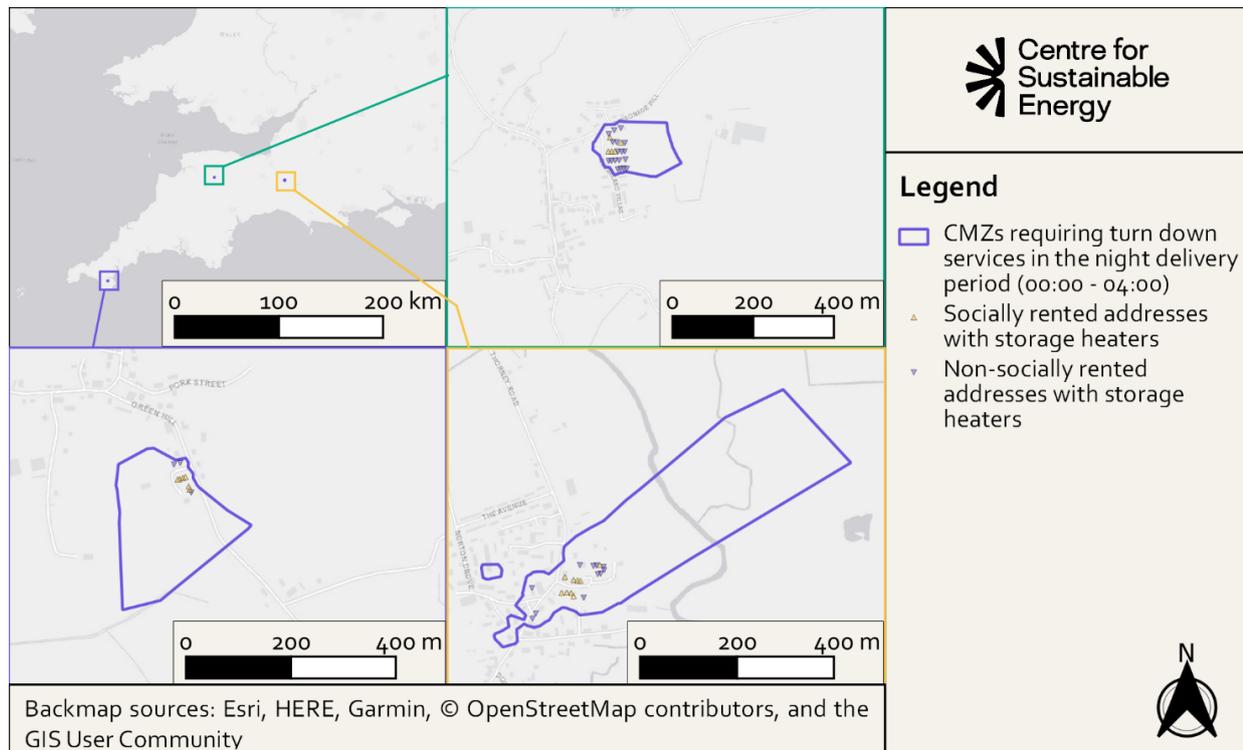
5.2.2. Next steps

There is a clear opportunity within NGED's licence areas to develop an intervention that supports storage heater flexibility. The first step is to identify potential locations to trial an intervention. To do this, we have examined EPC data to understand where storage heaters are clustered, particularly where these are in social housing or in existing CMZs.

Map 2 shows the location of three CMZs which require turn-down services during the night delivery period, with a full list of these CMZs in Appendix I (Table 9). In these CMZs, there are 20 socially rented properties with storage heaters. These represent an ideal location to run an intervention. Because turn-down services are already required here, a trial would not rely on initiatives making turn-up services available. As the storage heaters here are in clusters of social housing, there is an ideal opportunity to work with an RSP as a trusted intermediary. The extent of impact may be limited however, as there are only between five and ten addresses that are socially rented with storage heaters. However, these areas have additional non-socially rented properties with storage heaters who may also be able to be recruited to the trial.

³⁴ See the Socially Green for the use of specific 'top up' mechanism used by UK Power Networks to incentivise working with 'hard to reach' households. [NIA UKPN0069 Close Down Report 2024-07-25 10_18.pdf](#)

Map 2: Socially rented addresses with storage heaters in night delivery CMZs.



The trial may target testing turn-up with storage heaters. In these cases, it is best to target where there is significant storage heater capacity, particularly where this is in socially rented housing. This would enable a trial with the RSP as a trusted intermediary, while providing significant flexibility capacity. There are around 40 Low Layer Super Output Areas (LSOAs) with more than 1MW of storage heater capacity in the NGED DSO area. These are given in Appendix I, 10.

Table 7: Summary of interested parties' roles and next steps (storage heaters).

Party	General Role	Next Steps
DSO	Identify CMZs where turn-down services are required e.g. those in Map 2 above.	Use CMZ/storage-heater mapping (e.g. Map 2) to find trial clusters and link Connected Response with RSPs. Review procurement rules and incentive mechanisms for additional support.
FSP (Connected Response)	Provide services that deliver storage heater flexibility.	Liaise with RSPs to assess technical solutions needed, develop engagement strategy and scope costs and benefits for landlord and households.
Registered Social Housing Provider	Support residents and act as a key intermediary between households and FSPs.	Deploy retrofits (if necessary). Coordinate resident engagement. Report experiences and barriers.

6. Conclusions

This report has built on two recommendations made in the initial 'Access to Flexibility' report.

1. Assess uptake of flexibility services amongst households in vulnerable circumstances.
2. Identify DSO led interventions that can improve access to flexibility, particularly for those in vulnerable circumstances.

To progress the assessment of uptake we looked first at PSR data to compare households with PSR needs codes and households not on the PSR. We then looked at data for two specific demographic groups: disabled EV drivers and households with storage heaters to understand if there was an opportunity gap.

To progress DSO led interventions that can improve access to flexibility, particularly for those in vulnerable circumstances, we worked with flexibility services providers and trusted intermediaries that are already widening access to flexibility to see where NG DSO could make a difference.

6.1. PSR Analysis

The analysis of PSR data in the National Grid DSO area shows that households on the PSR area already signed up and participating in flexibility services. However, it also found that those who are in vulnerable circumstances are consistently less likely to participate in flexibility than those who are not on the PSR. Interestingly, the extent of under-representation varies between PSR needs codes, suggesting that different vulnerabilities produce asymmetric barriers to engagement with energy flexibility. We recommend that NG DSO repeat the analysis at least annually to track changes over time.

The findings also highlight the limitations of PSR data to accurately represent barriers and opportunities to flexibility for households with different needs. Some households may be able to take up and benefit from flexibility services if they are given additional support, if communication challenges can be addressed for example. Other households with different needs or conditions may be better off not participating in flexibility. Therefore, we recommend that NG DSO develop more appropriate metrics to be able to determine which of the customers are participating in flexibility services and the benefits they are receiving. Better metrics will help to build an evidence base enabling DSOs, FSPs and intermediaries to design targeted, effective solutions that improve accessibility and outcomes for all households.

6.2. Disabled EV drivers

Data provided by Motability Operations and ev.energy show that collaboration between an FSP and trusted intermediary can ensure that higher proportions of disabled EV drivers meet the technical requirements to participate in flexibility schemes. The research did not identify

significant opportunity gaps or a need for DSO led interventions, but reinforced the need for co-ordinated action across DSOs and regulators to remove market-entry frictions such as registration accuracy and interoperability. There is, however, an opportunity to improve advice about tariffs and flexibility services for Motability Scheme customers which will improve household experiences, reduce running costs and increase the use of smart charging. CSE, Motability Operations and ev.energy are taking this opportunity forward.

6.3. Storage heaters

Storage heaters represent an opportunity to engage many who may be in vulnerable circumstances, using existing assets that are widely deployed and often clustered together. There is significant potential in the capacity of storage heaters in DSO areas, and in more local areas. Some LSOAs exceed 1MW of storage heater potential within social housing alone. This clustering is valuable as it enables the procurement of meaningful flexibility with relatively low material cost and effort.

There is also evidence that current storage heater flexibility practices (through Economy 7) are contributing to grid constraint in some areas. Adjusting the charging profile and utilising an appropriate tariff could help to reduce the strain on the grid, while also enabling heaters to provide turn-down and, potentially, turn-up flexibility.

Connected Response is already working to improve storage heater flexibility, through retrofit control technologies and tariff structures, but does not currently have large numbers of assets in NG DSO's markets. The analysis found three specific CMZs that look viable for NG DSO to begin procuring turn down services from storage heaters. The analysis also found around 40 Low Layer Super Output Areas (LSOAs) with more than 1MW of storage heater capacity that could present opportunities for both turn up and turn down services. We recommend that NG DSO take forward a collaboration with Connected Response to explore this opportunity.

Appendix I

Table 8: Chi-square contingency table results for differences in PSR and non-PSR registration and participation rates amongst different needs codes.

SN	PSR Registration %	Non-PSR Registration %	Registration p-value
SN01	1.71%	2.5%	1.26e-65 ***
SN02	2.17%	2.5%	3.84e-14 ***
SN03	1.36%	2.5%	0 ***
SN04	1.54%	2.5%	0 ***
	PSR Participation %	Non-PSR Participation %	Participation p-value
SN01	0.20%	0.4%	2.64e-30 ***
SN02	0.26%	0.4%	1.28e-19 ***
SN03	0.18%	0.4%	3.51e-107 ***
SN04	0.22%	0.4%	3.63e-248 ***

Table 9: List of all CMZs with storage heater requesting turn down in the night delivery period - shaded cells relate to the CMZs in Map 2

CMZ code	CMZ name	Number of addresses with storage heaters	Number of socially rented addresses with storage heaters	Flex capacity of storage heaters in CMZ (kW)
CMZ_LV_T10A_SWE_264565	Glebelands Villas N	23	5	129
CMZ_LV_T10A_SWE_216158	Kingsbury Church	20	9	174
CMZ_LV_T10A_SWE_415357	Vill Hall St Martins	9	6	90
CMZ_LV_T10A_WM_862688	Bagot View Leigh	9	0	120
CMZ_LV_T10A_SWE_260704	Loxhore Cotts	7	0	78
CMZ_LV_T10A_SWE_411010	Gear St Martins	5	0	62
CMZ_LV_T10A_SWA_582078	Meini Llwydion (Llangain	4	0	36

CMZ_LV_T10A_SWE_113147	Sheepcombe Farm	4	0	39
CMZ_LV_T10A_SWE_341070	Hayford Hall	4	0	50
CMZ_LV_T10A_SWE_344590	Colehanger	4	0	42
CMZ_LV_T10A_SWE_410887	Durgan	4	0	39
CMZ_LV_T10A_WM_743958	Newcastle North -Tran	4	0	25
CMZ_LV_T10A_WM_791361	Througham Fields	4	0	48
CMZ_LV_T10A_SWE_260284	Dean Head Goodleigh	3	0	42
CMZ_LV_T10A_SWE_342384	Neadon	3	0	39
CMZ_LV_T10A_SWE_350949	Roundhayes	3	0	28
CMZ_LV_T10A_SWE_413352	Tremethick Cross	3	0	31
CMZ_LV_T10A_SWE_414731	West Sinns	3	0	25
CMZ_LV_T10A_SWE_433464	Waterloo School	3	0	42
CMZ_LV_T10A_SWE_451735	Pendrim	3	0	25
CMZ_LV_T10A_WM_841083	More Arms	3	0	28
CMZ_LV_T10A_SWE_260680	Great Huxhill	2	0	25
CMZ_LV_T10A_SWE_261222	Way Barton	2	0	17
CMZ_LV_T10A_SWE_343600	Powderham Park	2	0	22
CMZ_LV_T10A_SWE_411215	Halamanning	2	0	22
CMZ_LV_T10A_SWE_432148	Tregawn Cottages	2	0	22
CMZ_LV_T10A_SWE_432639	Triggabrowne	2	0	25
CMZ_LV_T10A_WM_740328	Cricks Grn N	2	0	20
CMZ_LV_T10A_WM_752391	Byford Common	2	0	22

CMZ_LV_T10A_WM_761603	Stoney La	2	0	25
CMZ_LV_T10A_WM_771909	Broadway Ct	2	0	34
CMZ_LV_T10A_EM_872428	Hillcliff Farm	1	0	11
CMZ_LV_T10A_EM_910699	Keythorpe Hall P112	1	0	14
CMZ_LV_T10A_SWA_593163	Holy Trinity Church (Felingwm)	1	0	11
CMZ_LV_T10A_SWA_602569	Cresselly House	1	0	17
CMZ_LV_T10A_SWA_614878	Pantglas	1	0	17
CMZ_LV_T10A_SWE_181015	Sea Breeze	1	0	11
CMZ_LV_T10A_SWE_211089	Ashbrittle Rectory	1	0	6
CMZ_LV_T10A_SWE_212394	Dancing Hill	1	0	8
CMZ_LV_T10A_SWE_212705	Middle Wick Farm	1	0	8
CMZ_LV_T10A_SWE_213523	Claypits Cotts	1	0	8
CMZ_LV_T10A_SWE_213643	Lakewell Farm	1	0	8
CMZ_LV_T10A_SWE_253421	Lwr Brimley Combe Fm	1	0	11
CMZ_LV_T10A_SWE_260617	Kalamakee Tawstock	1	0	11
CMZ_LV_T10A_SWE_310900	Cadhay House	1	0	8
CMZ_LV_T10A_SWE_312133	Morchard Mill	1	0	14
CMZ_LV_T10A_SWE_312820	Tucking Mill	1	0	11
CMZ_LV_T10A_SWE_314512	Culmbridge Manor	1	0	8
CMZ_LV_T10A_SWE_331005	Great Pethill	1	0	14
CMZ_LV_T10A_SWE_332576	Fitzworthy	1	0	11
CMZ_LV_T10A_SWE_342098	Middlecott	1	0	8

CMZ_LV_T10A_SWE_350696	Newhay	1	0	11
CMZ_LV_T10A_SWE_350710	North Hill	1	0	6
CMZ_LV_T10A_SWE_351527	Boldventure.	1	0	8
CMZ_LV_T10A_SWE_352195	Harlake	1	0	14
CMZ_LV_T10A_SWE_354082	Treskinnick Farm	1	0	8
CMZ_LV_T10A_SWE_410326	Brea Cottage	1	0	8
CMZ_LV_T10A_SWE_411613	Lane End	1	0	17
CMZ_LV_T10A_SWE_414606	Hilltop Cottage	1	0	14
CMZ_LV_T10A_SWE_430751	Guineaport	1	0	6
CMZ_LV_T10A_SWE_431496	Pendavey St Breward	1	0	17
CMZ_LV_T10A_SWE_432940	Pound Cottages	1	0	8
CMZ_LV_T10A_SWE_433646	Trevine Farm	1	0	17
CMZ_LV_T10A_WM_740313	The Willows	1	0	11
CMZ_LV_T10A_WM_741368	The Field Eardisley	1	0	14
CMZ_LV_T10A_WM_741486	Leys Cott Bircher	1	0	8
CMZ_LV_T10A_WM_744455	Tack Barn	1	0	8
CMZ_LV_T10A_WM_744909	Munsley Green -Tran	1	0	17
CMZ_LV_T10A_WM_750869	Pithouse	1	0	6
CMZ_LV_T10A_WM_752914	Sunnyside	1	0	11
CMZ_LV_T10A_WM_760022	Caddcroft	1	0	17
CMZ_LV_T10A_WM_761204	Hill End Salwarpe	1	0	17
CMZ_LV_T10A_WM_762092	Sinton Grn W	1	0	14

CMZ_LV_T10A_WM_77351 1	Bunkers Hill	1	0	17
CMZ_LV_T10A_WM_78104 6	Huntley Hill - Tran	1	0	11
CMZ_LV_T10A_WM_78275 2	Portway Cotts	1	0	17
CMZ_LV_T10A_WM_84108 7	Bog Cott	1	0	11

Table 10: LSOAs containing more than 1MW of storage heater capacity in socially rented properties.

LSOA Code	LSOA Name	Estimated storage heater capacity (MW)
E01008913	Birmingham 050B	1.2
E01009002	Birmingham 023A	1.1
E01009143	Birmingham 136A	2.0
E01009493	Birmingham 113D	1.1
E01009607	Coventry 004C	1.0
E01009651	Coventry 031D	1.0
E01009741	Dudley 022A	2.0
E01009744	Dudley 022B	1.1
E01010292	Walsall 008A	1.8
E01010368	Walsall 030A	2.2
E01010369	Walsall 024D	1.1
E01010370	Walsall 030B	1.6
E01010372	Walsall 030D	1.4
E01010464	Wolverhampton 020B	1.5
E01010490	Wolverhampton 028B	1.1
E01010508	Wolverhampton 017B	1.3
E01013453	Derby 013A	1.2
E01013968	Nottingham 010B	2.0
E01013983	Nottingham 030C	1.2
E01014330	Stoke-on-Trent 013E	1.1
E01014653	Bristol 055B	1.5
E01022374	Stroud 014C	1.5
E01022377	Stroud 004E	1.3
E01022383	Stroud 010C	1.0
E01026336	South Kesteven 013C	1.2
E01029468	East Staffordshire 010A	1.1
E01029499	Lichfield 004B	1.0
E01029578	Newcastle-under-Lyme 011B	1.5

LSOA Code	LSOA Name	Estimated storage heater capacity (MW)
E01029603	Newcastle-under-Lyme 011D	1.0
E01029745	Stafford 003C	1.1
E01029835	Tamworth 002A	2.0
E01031273	Warwick 006A	1.1
E01032322	Worcester 009E	1.5
E01032873	Leicester 041D	1.2
E01033399	Nottingham 023E	1.0
E01033402	Nottingham 039C	1.5
E01033623	Birmingham 138C	1.3
E01033891	Sandwell 040C	2.1
E01034020	Leicester 040F	1.3
E01034055	Stoke-on-Trent 016I	1.9
W01001955	Swansea 025F	1.2



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